



# Air-Prentice®

## Academic Science Lab Fume Hood Operation & Maintenance Manual

Revision 1



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# I. INTRODUCTION

Laboratory Fume Hoods are important safety devices in today's laboratories. The safety of laboratory researchers and students depends upon optimum containment by the fume hoods with which they work. Lab Crafters **Air-PRENTICE**<sup>®</sup> Laboratory fume hoods provide the fume hood users with this required level of protection, when used properly.

What is a Fume Hood? The Scientific Equipment and Furniture Association (SEFA) defines a fume hood as follows:

“A Laboratory Fume Hood is a safety device specifically designed to carry the undesirable effluents (generated within the Hood during a laboratory procedure) away from laboratory personnel and out of the building, when connected to a properly designed laboratory ventilation system. A Laboratory Fume Hood shall be made primarily from flame resistant materials including the top, three fixed sides, and a single face opening. The face opening is equipped with a sash and sometimes an additional protective shield. The face opening will have a profiled entry and usually an airfoil designed to sweep and reduce reverse airflows on the lower surface. A Laboratory Fume Hood will be equipped with a baffle and, in most cases, a bypass system designed to control airflow patterns within the hood and manage the even distribution of air at the opening. The bypass system may be partially blocked to accommodate Variable Air Volume (VAV) Systems. A Laboratory Fume Hood will be set on a bench, a pedestal or on the laboratory floor.”

The speed of the air as it moves through the face opening is known as “face velocity”.

Above all else, a laboratory fume hood is a **SAFETY DEVICE**. Proper selection of the appropriate fume hood design and correct use practices are key to maximizing user safety.



## II. UNCRATING AND INSTALLATION

1. To uncrate the Air-Prentice fume hood, remove the wood frame sash support. Remove the two (2) screws, securing the hood to the pallet, from the rear rail.
2. Attach two (2) filler clips to the back of the base cabinet(s) on the sides where the filler panels will be attached.
3. Set the base cabinet(s) off the back wall, according to the pipe space shown on the shop drawings. Make the necessary leveling adjustments of the base cabinet(s) by adjusting the leveling feet on the bottom of the cabinet(s). Refer to the shop drawings to obtain the required height from the finished floor to the top of the base cabinet(s).
4. Apply dabs of silicone to the top of the cabinet(s) approximately twelve inches (12") apart.
5. Center and set the counter top on the cabinet(s). To center the counter top on the cabinet(s), the sides of the counter top should be three and one half inches (3½") from the outer sides of the cabinet(s).
6. Attach any piping vents to base cabinet(s), if required.
7. Raise the Air Sentry fume hood, center and set on the counter top.
8. Complete all the wiring and service connections.
9. Attach filler panels into previously installed filler clips on the back of the base cabinet(s).



### III. FUME HOOD SERVICES

Maintenance personnel have access to the fume hood services in case the need for repair arises. Plumbing services are accessible by removing the fume hood's exterior side panels, or in cases where hoods are side-by-side or against a wall, through the interior access panel.

The fume hood lamp is replaced by removing the fume hood front panel and accessing the ballast through the top of the light box. The fume hood is wired to a single junction box located on the hood left side, near the top, front. Access to this junction box is achieved by removing the front panel or going above it.

### IV. OPERATION RECOMMENDATIONS

#### **Air-Prentice™** Fume Hood (Bench-Mounted)

##### **Air Flow Data**

##### **Constant Volume Exhaust**

HOOD MODEL	HOOD SIZE	EXHAUST VOLUME	SASH OPENING	FACE VELOCITY	STATIC PRESSURE	COLLAR SIZE
HBAPV3	3'	365 CFM	18" x 27"	100 FPM	0.20" wg	10"
HBAPV4	4'	515 CFM	18" x 39"	100 FPM	0.30" wg	10"
HBAPV5	5'	670 CFM	18" x 51"	100 FPM	0.30" wg	12"
HBAPV6	6'	830 CFM	18" x 63"	100 FPM	0.30" wg	12"

NOTES: The static pressure values shown represent the pressure loss for the fume hood only. Please inquire as to the required air volume for other face velocities or through different size fume hoods and/or fume hood sash openings.

- See the above chart for the **Air-Prentice®** Fume Hood's exhaust requirements and operating sash openings.
- Fume Hood exhaust fans should be kept on at all times.



- The **Air-PRENTICE**<sup>®</sup> Fume Hood is not a total containment vessel. Glove boxes, safety cabinets and/or other such devices should be used when required.
- Work with Perchloric Acid must only be performed in fume hoods that are specifically designed and designated for Perchloric Acid work. Perchloric Acid Fume Hoods require special practices and procedures for operation and maintenance.
- Fume Hoods should not be used as chemical storage cupboards. Chemicals should be stored in cabinets that are designed for chemical storage.
- Before you begin to use the fume hood, ensure that the exhaust system is functioning properly, air is entering the fume hood and being exhausted out of the hood. Check that the air flow alarm indicates that the fume hood is safe and not in a state of alarm.
- All equipment and chemicals within the fume hood should be placed and used at least six inches (15.2 cm) back from the plane of the fume hood sash. The further away the equipment and chemicals are located from the plane of the sash, the safer the fume hood user is.
- Large objects within the fume hood should be elevated at least one inch (2.54 cm) off the work surface in such a manner that air can easily flow underneath the equipment.  
The sash should only be raised vertically to the lowest point that properly provides access to the process within the hood. The horizontal sash panels should never be removed from the sash frame.
- Avoid moving the sash rapidly. Rapid movement of the sash may cause turbulence within the fume hood and cause the escape of fumes into the laboratory. Excessive walk-by traffic in front of the hood should also be avoided for the same reason.
- The worker should never place his head inside the fume hood.



- The **Air-PRENTICE**<sup>®</sup> Fume Hood should never be modified or tampered with by anyone other than authorized Lab Crafters representatives. Such modifications may adversely affect the fume hood's performance and endanger the fume hood operator.

## **V. GENERAL FUME HOOD MAINTENANCE**

The practice of good fume hood housekeeping ensures the longevity and optimum return on your fume hood investment. The exterior of the fume hood should be periodically cleaned to avoid blemishes on the finish. The fume hood sash should be kept clean so that the fume hood operator's view of the interior of the hood is not compromised. The fume hood's interior liner and the work surface should be cleaned as required and in such a way that the processes performed in the hood allow. The sash guides, pulley wheels and cables should be lubricated as needed. Cracked or broken sash panels should be replaced immediately. Any and all worn or broken components should be replaced as required. Contact Lab Crafters for replacement parts and order information.



## **VI. FUME HOOD CERTIFICATION AND TESTING**

The **Air-PRENTICE**<sup>®</sup> Fume Hood has been tested per the ANSI/ASRAE-110 1995 Method of Testing Performance of Laboratory Fume Hoods. Copies of the As Manufactured test reports are available upon request. Lab Crafters recommends that all fume hoods of atypical location and design be initially tested per the latest ASHRAE Standard. All fume hoods should be periodically (no less often than annually) tested to ensure that the fume hood is exhausting the specified volume of air and that no escape of fumes or stalling of the air exists. This can be accomplished by testing the face velocity of the fume hood using a thermal anemometer and testing the hood using titanium tetrachloride smoke producing bottles or sticks (note titanium tetrachloride is toxic and corrosive and may adversely affect some experiments; contact Lab Crafters for alternative smoke sources). The procedures for these tests should be as noted in the ASHRAE Standard. Any change in the ventilation system warrants re-testing all the fume hoods to determine the effect the change has had on each fume hood. Lab Crafters offers fume hood testing and evaluation services in most locations. Contact Lab Crafters for details.

## **VII. RECORD KEEPING**

Detailed logs of all maintenance service actions and all performance tests performed on each fume hood should be kept by the facilities department.





## VIII. TROUBLESHOOTING

The following factors may adversely affect the performance of the **Air-PRENTICE**<sup>®</sup> Fume Hood:

- **Lack of Sufficient Exhaust** - If the volume of air being exhausted from the **Air-PRENTICE**<sup>®</sup> Fume Hood does not meet the minimum requirements as indicated by the chart in Section IV, then the fume hood may not maintain containment. The exhaust fan must be of adequate size to handle the required volume of air. Note that the air flow chart in Section VIII specifies the air requirements and the static pressure losses for the fume hood only. The calculations for the fan size must include other factors in order to yield the correct fan size. These factors include, but are not limited to, the size and configuration of the ductwork and the number of fume hoods on the same fan.
- **Lack of Sufficient Supply Air** - If the volume of air being supplied to the laboratory space is not sufficient to meet the **Air-PRENTICE**<sup>®</sup> Fume Hood's exhaust requirements, then the fume hood may not maintain containment.
- **Flexible Ducts** - The use of flexible ductwork to connect the fume hood to the ventilation system will adversely affect the fume hood's performance. Hard ductwork should be used at all times to optimize the fume hood's performance.
- **Traffic in Front of the Fume Hood** - When people walk in front of the hood, a vortex is formed behind that person, similar to the wake that forms on the water behind a boat. These vortices cause turbulence at the face of the fume hood and may cause containment to break down. Excessive traffic should be avoided in the aisles adjacent to fume hoods.



# TROUBLESHOOTING

CONTINUED

- Location of Supply Air Diffusers - Air supply diffusers that are located adjacent to the fume hood can cause disturbances in the airflow at the face of the hood, thereby adversely affecting containment. Supply air diffusers should be located in such a way that they do not interfere with the airflow in front of the fume hood. Existing supply diffusers should be either relocated, replaced with another type that directs the air away from the fume hood or the supply air volumes should be re-balanced for the diffusers.
- Fume Hood Proximity to Doors and Windows - Fume hoods that are located next to windows and/or doors may lose containment efficiency due to the turbulence caused by the opening and closing of these windows and doors. The opening and closing of windows and doors causes waves of air that can adversely affect the airflow into the fume hood. In addition, the pressure changes in the laboratory space caused by the opening and closing of doors can negatively affect the fume hood's performance.



# IX. WARRANTY STATEMENT

Lab Crafters, Inc. ("the Company") warrants all equipment manufactured by it or bearing its nameplate to be free from defects in workmanship and materials under normal use and service for which product is intended. The warranty period for equipment not installed by the Company is for a period of one year from date of delivery. A written notice of considered defect under this warranty must be sent to the Company and no product shall be returned without the Company's permission. Equipment not installed by the Company, which is paid for in full, when disconnected by purchaser and when received with transportation prepaid at Company's factory and found by our inspection to be defective in factory workmanship or material within warranty period, will be repaired or replaced at Company's option, free of charge, and returned transportation prepaid. A removable part, assembly or portion thereof, which our inspection indicates to be defective and prepaid freight to our factory, will be similarly replaced or repaired at Company's option and will be under same one year warranty, effective repair. This warranty does not cover the cost of labor, material or services contracted by the purchaser. A repair or replacement of part(s) under warranty may be done either at Company's factory or purchaser's location at Company's option.

When equipment is installed by the Company or under its direct supervision and Company's defect is ascertained and confirmed by Company inspection, it will be repaired or replaced at Company's option free of charge, warranty commencing upon the installation date.

If Company's inspection determines any defect for installed or supplied product(s)/equipment not covered by this warranty, the product(s)/equipment will be repaired or replaced and the Company's regular service and material charges will apply.

WITH THE EXCEPTION OF THE WARRANTY PERIOD SET FORTH HEREIN, THE COMPANY MAKES NO WARRANTIES, EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS OR OTHERWISE, WHICH EXTENDED BEYOND BUYER/SELLER AGREEMENT. Liability is limited only to the purchase price of the product.

No warranties or representations, express or implied, are made by the company with respect to products sold by our company, but manufactured by a third party. Therefore, Company will not be responsible for any labor or material charges or consequential damages to defects. Our sole responsibility will be to act as liaison between original manufacturer and purchase to honor third party's warranty.

In no event will the Company be held responsible for freight charges, consequential or incidental damages of any nature whatsoever, installation cost or contingent liability of any kind resulting from the manufacture, sales or use of its products.

Expendable items such as fluorescent tubes, filters, bulbs and disposables are excluded from this warranty. Abuse, misuse, neglect, alterations and failure to install, operate and maintain equipment in accordance with Company's installation, Operation and Maintenance Manual or good manufacturing and operations practices and procedures and failure to follow standard construction trades practices will void warranty. No salesperson, employee or agent of the Company is authorized to vary terms of the Warranty Statement.



## X. REFERENCES

### Occupational Safety & Health Administration (OSHA)

U.S. Department of Labor  
200 Constitution Avenue, NW  
Washington, DC 20210

[www.osha.gov](http://www.osha.gov)

Reference Document: Federal Register 29 CFR Part 1910 Occupational Exposures to Hazardous Chemicals in Laboratories, Vol. 55, No. 21

### American Industrial Hygiene Association (AIHA)

2700 Prosperity Ave.  
Suite 250  
Fairfax, VA 22031

[www.aiha.org](http://www.aiha.org)

Reference Document: ANSI/AIHA Z9.5-2003 American National Standard: Laboratory Ventilation

### American Society of Heating Refrigeration and Air-conditioning Engineers (ASHRAE)

1791 Tullie Circle, N.E.  
Atlanta, GA 30329

[www.ashrae.org](http://www.ashrae.org)

Reference Document: ANSI/ASHRAE 110-1995 Method of Testing Performance of Laboratory Fume Hoods

### National Fire Protection Association (NFPA)

1 Batterymarch Park  
Quincy, MA 02169-7471

[www.nfpa.org](http://www.nfpa.org)

Reference Document: NFPA 45 Standard on Fire Protection for Laboratories Using Chemicals 2000 Edition



## Scientific Equipment and Furniture Association (SEFA)

1205 Franklin Avenue, Ste. 320

Garden City, NY 11530

[www.sefalabs.com](http://www.sefalabs.com)

Reference Document: SEFA 1.2, 2002 Laboratory Fume Hoods

## National Research Council (NRC)

The National Academies

500 Fifth St. N.W.

Washington, D.C. 20001

[www.nas.edu/nrc](http://www.nas.edu/nrc)

Reference Document: Prudent Practices in the Laboratory: handling and Disposal of Chemicals

## Laboratories for the 21<sup>st</sup> Century (Labs21)

U.S. Environmental Protection Agency

U.S. Department of Energy

<http://www.epa.gov/labs21century/index.htm>

## American Conference of Governmental Industrial Hygienists (ACGIH)

1330 Kemper Meadow Dr.

Cincinnati, OH 45240

[www.acgih.org](http://www.acgih.org)

Reference Document: Industrial Ventilation: A Manual of Recommended Practice



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