

# AIR SENTRY

## Laboratory Fume Hood

OPERATIONS &  
MAINTENANCE MANUAL

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# I. INTRODUCTION

Laboratory Fume Hoods are important safety devices in today's laboratories. The safety of laboratory technicians and scientists depends upon optimum containment by the fume hoods with which they work. Lab Crafters Fume Hoods are the safest and most technologically advanced fume hoods on the market today.

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

“A Laboratory Fume Hood is a ventilated enclosure that, when connected to a properly designed laboratory ventilation system, will carry the undesirable effluents (generated within the enclosure during a laboratory procedure) away from laboratory personnel. A Laboratory Fume Hood shall be made primarily from the flame resistant materials including the top, three fixed sides, and a 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, bypass systems designed to control airflow patterns within the enclosure 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. Generally, Laboratory Fume Hoods, as long as twenty feet, reflect the basic tenant of a Laboratory Fume Hood.

A Laboratory Fume Hood is given here as the proper terminology. Other widely used terms include --- Fume Hood, Chemical Hood, Chemical Fume Hood, Hood, and Fume Cupboard.”

The velocity 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. 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 roof, near the front. Access to this junction box is achieved by removing the front panel.

## III. OPERATION RECOMMENDATIONS

- Fume Hood exhaust fans should be kept on at all times.
- Fume Hoods are 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 (see Lab Crafters Perchloric Acid Fume Hood Operation and Maintenance Manual).
- 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. Be careful, however, not to block off the baffle slots with any equipment or apparatus.
- 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 be used by the fume hood operator as a safety shield. The sash should only be raised vertically to the lowest point that properly provides access to the process within the hood.
- 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 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.

## IV. 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.

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

The 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.

## **VI. 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.

## VII. TROUBLESHOOTING

The following factors may adversely affect the performance of the Fume Hood:

- **Lack of Sufficient Exhaust** - If the volume of air being exhausted from the Fume Hood does not meet the minimum requirements as indicated by your organization's Facilities or E,H&S staff, then the fume hood may not maintain containment. The exhaust fan must be of adequate size to handle the required volume of air.
- **Lack of Sufficient Supply Air** - If the volume of air being supplied to the laboratory space is not sufficient to meet the 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.



# VII. 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.

## VIII. 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.

## IX. 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

# IX. REFERENCES

CONTINUED

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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