

# Your Fume Hood Systems

## *20 Answers to Your Most Important Questions*



### **Introduction**

In the laboratory environment, the fume hood is an integral part of most applications. It is vital that lab personnel understand how they work so that they can use them properly and safely. Safety should be the number one concern when choosing a fume hood and when planning for the placement and installation. A fume hood must be properly installed and operated in order to achieve optimum performance. The purpose of this document is to answer the most commonly asked questions about Fume Hood Systems and to provide beneficial information to all lab personnel through the understanding of these important devices.

### **Question One: *What is a Laboratory Fume Hood?***

A laboratory fume hood is a ventilated enclosure where hazardous materials can be handled safely. The purpose of the fume hood is to contain contaminants and prevent their escape into the laboratory. This is accomplished by drawing contaminants within the hood's work area away from the user, so that inhalation and contact are minimized. The fume hood is part of the laboratory fume hood system.

### **Question Two: *What is a Laboratory Fume Hood System?***

A laboratory fume hood system consists of four basic components: 1) base cabinet(s), 2) fume hood, 3) duct, 4) remote blower. Each system is designed and installed for your specific ventilation requirements.

### **Question Three: *How do I know which Fume Hood I need?***

There are two main factors to consider when selecting a fume hood style. First consider the type of work being performed in the hood. Second consider the air consumption of the hood. The types of fume hoods are: 1) Airfoil By-Pass, 2) Airfoil Variable Volume, 3) Airfoil Add Air, 4) Low Flow, and other specialty fume hoods.



**Question Four: *What is an Airfoil By-Pass Fume Hood?***

The By-Pass hood generally operates at a constant volume. As its sash is closed, the air entering the hood is re-distributed, therefore minimizing the high velocity air streams encountered in conventional hoods. The by-pass openings above and below the sash reduce fluctuations in face velocity as the sash is raised and lowered and the lower bypass provides a continuous air sweep of the work surface.

**Question Five: *What is an Airfoil Variable Volume Hood?***

The Variable Air Volume (VAV) hoods are designed to be used with exhaust control systems provided by other manufacturers. In lieu of an upper bypass the VAV hood has a lintel which restricts the air intake of the hood to the sash opening and lower bypass. The commercially available exhaust control system will detect the movement of the sash and adjust the volume of air required to maintain a constant face velocity.

**Question Six: *What is an Airfoil Add Air Hood?***

The Add Air Hood is also known as an auxiliary air, make-up air, induced air, or balanced air. The Add Air hood was initially seen as a simple and dramatic way to conserve energy and reduce energy costs since the hood provides up to 70% of the hood exhaust requirements. With a by-pass similar to the Airfoil Bypass Hood, outside air is introduced through the add air plenum, thus minimizing the amount of conditioned room air required. Caution should be used when considering this type of hood due to the balancing of the air coming in from the outside.

**Question Seven: *What is a Low-Flow Hood?***

The Low-Flow Hood operates with a simple constant volume operation offering “zero risk” energy savings that is not dependent on the operator. Clean room air flows into the operator breathing zone and eliminates potential hazards from fumes, vapors and particles. The configuration increases net usable space versus gross space and decreases duct chase sizes, floor to floor clearances, mechanical space, and roof loads.

**Question Eight: *What if I think I need a specialty hood?***

You may want to consider a specialty hood type if you are using radioactive, explosive, extremely corrosive or toxic materials in your lab processes. ADA hoods address the specific needs of wheelchair operators and Walk-In hoods will accommodate large apparatus or complex set-ups. Working with an expert in the fume hood industry will be beneficial in selecting the right hood for your specialty application.



**Question Nine: *How do I know what type of sash I need?***

Most manufacturers offer the vertical rising sash with safety glass as a standard feature. However, horizontal sliding and combination horizontal/vertical sashes are also available. A combination horizontal/vertical sash can provide both safety and energy efficiency while the horizontal sliding panels act as a safety shield while reducing the sash opening by 50%. As with the selection of the proper hood, it is a good idea to consult with an expert in the fume hood industry to ensure the proper decision is made.

**Question Ten: *Do I need an Explosion Proof Fume Hood?***

Don't believe that any fume hood is truly explosion proof. As a common practice, manufacturers use that term to mean they have modified their standard hood to help eliminate the likelihood of explosions. Such modifications include eliminating electrical switches and moving outlets away from the fume hood cavity. Other changes can include retrofitting the hood with an explosion-proof remote blower. Caution should be exercised when installing and operating an explosion proof system. The National Electric Code (NEC) can provide details about explosion proof components.<sup>[1]</sup>

**Question Eleven: *Where should the hood be placed in the lab?***

Whether adding one or 100 fume hoods to a laboratory, planning is critical. Each hood is affected by the room's ventilation and traffic flow. When selecting a fume hood location operator convenience, work flow and exhaust duct locations should all be considered. It is both inconvenient and dangerous to install a fume hood so that the operator is forced to work in the line of traffic movement. The presence of cross drafts will adversely affect the performance of the fume hood so it is a good idea not to locate the fume hood near open doors and windows. Consulting with a qualified laboratory ventilation expert during planning and installation phases can save time, money and ensure the safety of the lab personnel.

**Question Twelve: *How do I know which fume hood liner my laboratory needs?***

The most common liner available is made of epoxy resin. Other common liners include fiberglass, epoxy-coated steel, stainless steel, PVC, polypropylene and glass reinforced cement. Each liner material is suited for specific applications, and offers varying degrees of chemical resistance. Your specific application should be considered when making your selection.

[1] The National Electrical Code (NEC), or NFPA 70, is a U.S. standard for the safe installation of electrical wiring and equipment. It is part of the National Fire Codes series published by the National Fire Protection Association (NFPA). "National Electrical Code" and "NEC" are registered trademarks of the NFPA. While the NEC is not itself a U.S. law, NEC use is commonly mandated by state or local law, as well as in many jurisdictions outside of the United States. [1] The NEC codifies the requirements for safe electrical installations into a single, standardized source.



**Question Thirteen: *What about fixtures?***

Many people overlook or underestimate their fixture needs when ordering a fume hood. This is understandable given all the available options such as air, gas vacuum, water, electrical and special needs fixtures. Look at the possibilities of need changes in the future also and consider the location of the fixtures to accommodate the requirement of a cup sink if one is necessary.

**Question Fourteen: *What about a fume hood alarm?***

Hood alarms should be considered with any fume hood system. An alarm will notify the user immediately of a malfunction in the exhaust system. Alarms are required when medium to heavy use of solvents and acids are present and any use of chemicals that could produce a volatile condition. There are several alarms from which to choose ranging from a simple audible unit to a sophisticated digital variety that works in conjunction with your air handling system.

**Question Fifteen: *Is a fire extinguisher really necessary?***

You may want to consider a fire extinguisher if you are operating your system with potentially dangerous applications that could produce a fire in your hood cavity. Some manufacturers offer automatic fire extinguishers that mount inside or adjacent to the hood and discharge at predetermined temperature set points. These fire extinguishers are activated by a fusible link that melts at 165 degrees Fahrenheit, opening the valve which releases a multipurpose ABC Dry Chemical. Fume hoods that are 72” and wider require the use of two fire extinguishers for adequate protection.

**Question Sixteen: *Do I need a filter or scrubber?***

Depending on the hazard level associated with your laboratory operation, as well as the degree of pollution abatement required, treatment for your systems effluents may be necessary. Types of treatment include charcoal, HEPA filters and wet scrubbers.

**Question Seventeen: *What type of Duct do I need?***

Duct for the most part may be the most confusing issue of your fume hood system. A number of types are available and choosing can be difficult from a list that includes poly-vinyl chloride, stainless steel, fiberglass, glass and galvanized. The PVC remains the most popular given its high resistance to both acid and solvent vapors. Although PVDC duct is not inexpensive, its cost is considerably less than stainless steel, fiberglass and glass. Extreme caution should be used if galvanized duct is considered.

**Question Eighteen: *Can't my maintenance department install my fume hood?***

There are many facility maintenance departments who are qualified to install a fume hood, but unfortunately, many fume hood systems are installed by unqualified installers. A fume hood must be properly installed and operated in order to achieve optimum performance. Qualified



installation firms have been professionally trained in the many facets of a properly installed fume hood system. They understand why the duct run, blower location, stack height, damper system (if necessary), electrical and plumbing connections are all vital links in your system's performance. They know laboratory installations. Therefore, before you make the final decision on installing your new or retrofit system, contact your hood manufacturer to ensure the installation firm is authorized or certified with their products. Key questions should include: How many systems has the installation firm installed? Can they calibrate and certify the system's performance? Are they insured? A final note: Do not assume that a firm familiar in HVAC systems is qualified in, or fully understands fume hood system installations.

**Question Nineteen: *After my system is installed, what's next?***

Before using your system, remember to create a Chemical Hygiene Program (CHP) as outlined by OSHA.<sup>[2]</sup> Instruct your personnel on the proper operation of your fume hood and its upkeep. Your manufacturer and qualified installation firm can provide you with details. Training sessions are typically available and run for approximately one hour or less.

**Question Twenty: *Why is preventative maintenance important?***

Your fume hood systems should be evaluated periodically to ensure that they are functioning properly to ensure the safety of your personnel and your facility. Preventative maintenance on the fume hood motors and exhaust fans is not just something that you should do.... it is something that you must do! The average remote blower has over 20 moving parts that typically rotate over 136 million times a year and any number of these parts can weaken and eventually cause a premature system failure. Most failures occur without your knowledge, resulting in performance degradation and potentially place you and your operators at risk. Other items to be inspected and maintained are utilities, sashes and safety glass.

**CONCLUSION**

Of course there are many more than 20 questions surrounding fume hood systems, but hopefully this paper gives you guidelines that will be helpful with all aspects of choosing, installing and maintaining your systems. Fume hoods are designed to last you for many years, however if improperly used, even the best fume hood can be compromised beyond its capabilities. Key points to remember are, choose the proper hood for your application, rely on qualified firms for placement, installation and maintenance of your fume hood systems and comply with safety regulations.

[2] Chemical Hygiene Plan (CHP) under the Occupational Safety and Health Administration's (OSHA) Laboratory Standard, 29 CFR 1910.1450.



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