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LABS AND RESEARCH FACILITIES

by Kelly Williams

Ensure Your Campus Labs are Safe

Headlines involving laboratory safety issues are not making the national news agencies, so the general population as well as laboratory personnel are not aware of the number of incidents that are actually occurring in laboratories. While lack of proper training certainly plays a role in lab incidents, it is a lack of daily compliance to safe laboratory practices that more often results in injuries.

Non-compliance is easy when you are not aware of the consequences. Because we are not hearing of these "lab incidents" it is easy to take shortcuts and not consistently follow standard lab protocols that ensure our safety. Constantly hearing about horrific traffic accidents keeps us clicking our seatbelts, so maybe if we were more aware of actual cases where negative consequences occurred because of lack of safety compliance, we would make it a higher priority.

A striking number of people put themselves in harm's way in their labs because they don't know if their ventilation product is working correctly. Others are familiar with proper ventilation operation, but don't check their equipment's performance regularly.

Fume Hoods and Biological Safety Cabinets

The primary goal of fume hoods and biological safety cabinets is to protect their end user. The containment level of laboratory ventilation depends on mechanical parts to produce specified airflows. Any

mechanical operation needs to be checked often to ensure changes haven't occurred as parts undergo everyday wear and tear.

At a minimum, certification needs to be done by a qualified certifier on an annual basis. Even on certified equipment, airflow levels need to be checked each time the equipment is used. Fortunately, airflow monitors and alarms are becoming standard on most ventilation equipment. If you do not already have an airflow alarm, one can be easily installed.

A great source for laboratory safety information is the UC Center for Laboratory Safety website. This center has been created to improve the practice of laboratory safety through the performance of scientific research and implementation of best safety practices in the laboratory. Another source for pertinent, easily accessible lab safety information is the Dow Safety Academy. Dow has produced over 30 videos addressing lab safety to enhance awareness of safety practices in academic research laboratories and to promote a safety mindset in the future workforce of the chemical community.

One of the biggest expenses in laboratories is the heating and cooling of the air that is exhausted. New fume hood designs maximize containment while minimizing air flow requirements. Many times the money spent on new hoods is recovered by the reduction of utility costs within a year or two of purchase.

Saving Money by Replacing Older Equipment

In many instances laboratories can save money by replacing older fume hoods with newly designed fume hoods. One of the biggest expenses in laboratories is the heating and cooling of the air that is exhausted. New fume hood designs maximize containment while minimizing air flow requirements. Many times the money spent on new hoods is recovered by the reduction of utility costs within a year or two of purchase. With the operating life of a fume hood at 10-15 years, replacing inefficient older fume hoods can generate a large savings in operation costs and increase safety parameters.

Shopping for a New Fume Hood

The process of finding the right fume hood can be confusing. You can save yourself a lot of trouble if you know the answers to the following questions before you start shopping.

• Consider the size fume hood needed and if any particulates will be used.
Fume hoods and enclosures vary in width from 2' to over 12'. They can vary in height from 18" to over 12' tall. Knowing the size you require will help you narrow down what type of hoods to consider.

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Hoods vary in type such as general purpose, ductless, powder, acid, explosion proof and many specialty hoods. Identifying the chemicals that will be used in the hood, as well as particulate volumes and methods that will be performed, will help to determine which type of hood best fits the application. Also keep in mind if hot plates or other heat-producing items will be used in the hood.

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• Determine the overall importance of cost of operation.
The cost of operation will be determined by the amount of tempered air that is exhausted from the room. This cost can vary greatly depending on the hood type. Some hoods are high performance and can be operated at lower face velocities than traditional hoods thereby saving in both energy and costs. Some hoods are ductless, therefore do not exhaust any air out of the room, while others require large volumes of air to be exhausted out of the room in order to maintain proper containment. Consult your safety officer.

Accessories such as automated sash sensors can be added to a hood to reduce operating costs. You should study your budget and determine if you are interested in spending a little more at the initial purchase in order to save thousands of dollars over the life of the hood. Balancing purchase price and operation costs should be given much consideration throughout your hood selection process.

• Consider what service fixtures and other accessories are needed in the hood.
There are many types of services and accessories that are typically found in a hood. Vacuum, water, and gas lines are the most common, as well as airflow monitors, sash stops and auto sash returns. Ask yourself how many service fixtures you will need and where to locate them. How many electrical outlets will be needed? Is a sink required and where is the desired placement?

Airflow monitors are recommended. What type is best for your lab—simple red light/green light indicators or a digital airflow readout? Simple sash stops keep the sash in the safest operating position and can reduce operation costs. This inexpensive accessory installs quickly and adds value to your hood.

• **Consider where the fume hood will be placed in the laboratory.**
Placement is key. Is there an available duct run in the building? Is the hood away from foot traffic? Are there any cross drafts or competing air patterns that may affect containment? Where are the emergency services such as a fire extinguisher or washdown shower? What is the common workflow pattern in the lab?

Is there an existing bench space? If not existing, when selecting a base cabinet, consider whether you will be storing acids or solvents in it. Most hoods require a specifically designed work surface. Do you want your work surface to be dished for containing spills or include a sink?

• **Determine if you need a blower to exhaust the fume hood and—if so—size needed.**
A hood is simply an enclosure designed to contain the fumes and provide a safe working environment. It is the blower that moves the air to ensure proper fume containment. There are external roof-mounted blowers and there are internal blowers. Knowing the


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type of blowers your application, as well as your building codes, require will help you decide the type of exhaust blower. Proper blower sizing is critical to the effectiveness of the hood.

Always seek an expert's advice when figuring the blower size. Information that is needed to size the blower includes the type of fume hood model, duct diameter, length of the duct run, number of 45° and 90° turns in the duct run, and type of weather cap that may be used.

• Decide who will install the fume hood. Proper hood installation is critical. Blower adjustments may need to be made, electrical and service connections are very important, and a final certification of airflow and containment should always be done.

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