Case Department of Occupational and Environmental Safety

Flammable Liquid Cabinets: A Few Important Reminders

As you may know, flammable liquids storage cabinets are designed to minimize the effects of fire in the laboratory in the event of a fire. These cabinets act to contain the fire by decreasing the amount of available oxygen and by confining the fire to the cabinet. This combined effect tends to reduce the amount of combustion possible.

There are, however, several misconceptions about flammable liquids storage cabinets. For instance, were you aware that the venting of flammable liquid cabinets is not required by the National Fire Protection Association (NFPA) 30 fire codes and is not recommended by DOES? The NFPA addresses this issue in specific terms on their website:

> *Question: Are flammable liquids storage cabinets required to have exhaust ventilation?*
>
> *Answer: NFPA 30 does not require an exhaust ventilation system for storage cabinets, although most cabinets have plugged fittings that can be used for such purpose. Exhaust ventilation should only be provided when warranted by the materials in the cabinet, for example, for particularly toxic or noxious materials. If provided, the manufacturer's instructions should be followed. Typically, this will involve small diameter steel duct or pipe leading directly and by the shortest route to the exterior of the building. Exhaust must be taken from the bottom of the cabinet.* (www.nfpa.org)

As it turns out, the venting of cabinets is both costly and difficult in most cases.

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Moreover, the number of cabinets currently in use is very high; therefore, even the small amount of exhaust required for each individual cabinet can have a profound effect on the amount of available exhaust and air supply in a building. This reduces the amount of air available for required ventilation devices such as fume hoods and increases the amount of energy used in the building.

There are, however, ways to achieve the same desired result as venting. If you take the time to do three simple things, you should greatly reduce your need for venting:

1) Properly seal containers before storage
2) Clean the containers' exterior when contaminated
3) Use secondary containers for stubborn odors (NOTE: Always open all secondary containers in a fume hood)

Keep in mind that if a secondary container is used, it should be opened in a fume hood to prevent emission build up from being released into the laboratory air. While there are a few legitimate uses for ventilation in flammable cabinets, you should always check with DOES (ext. 2907) first before venting flammable liquid cabinets. DOES will investigate any request for flammable liquid ventilation and determine if the request warrants ventilation.

Holiday Decorations: Play It Safe

The holidays are getting closer every day. As we begin to prepare for the holidays, safety may not be the foremost thought on our mind. However, the decorations we use can potentially lead to serious safety hazards if we are not careful. We need to be especially aware of increased fire hazards during the holiday season. Here are a few safety measures to keep in mind as you decorate:

1. Decorations must be flame-proof or made of non-flammable material.
2. If decorating a live tree, be sure to...

• use a fresh evergreen that has been treated with a flame retardant.
• equip it with a tree stand that can hold water at the base of the tree; keep it full.
• remove the tree prior to closing for break.

No electrical equipment or devices are permitted on or under trees; only indirect lighting may be used. Nor are candles or open flames allowed on, under, or within 10 feet of the tree. SEVERAL fires at Case have started this way in the past.

3. If using a metallic tree or decoration, do not place electrical lights or objects on it.
4. Decoration materials must not be exposed to lightbulbs, heaters, or other heat or flames.
5. Gift wrappings should be removed right away.
6. Door decorations must not overlap the top, bottom, or sides of doors.
7. Do not leave lights unattended.
8. Do not place any decorations where they would hinder access to safety equipment (fire alarms,

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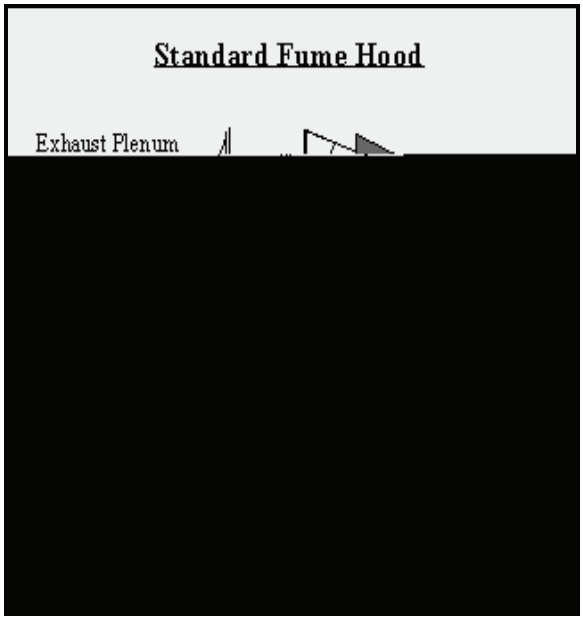
Shut the Sash! A Program of Safety Awareness and Energy Savings

by Mary Ellen Scott and Linda Robson (This is the first article in a two-part series. The next article will appear in the January/February 2008 Newsletter)

In 2005, Harvard University initiated a ***Shut the Sash*** program that resulted in $188,000[1] savings in their energy costs in the first year. An additional benefit of this program was an increase in safety in their laboratories. Harvard accomplished this combined mission by initiating a behavioral campaign that actively encouraged lab staff to close their fume hood sashes. After hearing about the energy savings and increase in lab safety, UC Berkeley and MIT began ***Shut the Sash*** programs of their own. The estimated annual savings is calculated to be in the area of $190,000 (105 fume hoods)[2] for MIT and $1,000,000 (600 fume hoods)[3,4] for UC Berkeley.



The impressive savings and added lab safety of the ***Shut the Sash*** programs naturally caught the attention of CWRU's DOES and SUSTAINABILITY departments. As with many best practices for energy conservation and safety, one size does not fit all. Energy savings from shutting the sash depends on what type of fume hood and related HVAC system is in place. The chemical fume hood is a box-like structure often mounted at tabletop level with a movable window-like front called a sash (see figure 1). The fume hood captures, contains and exhausts the airborne hazardous materials which are drawn out of the hood by a fan through a port (plenum) at the top. There are many types of fume hoods available, each with its own design and function based on either the Constant Air Volume (CAV) or the Variable Air Volume (VAV) principle.

Constant Air volume hoods exhaust a constant cubic feet per minute (CFM) of air regardless of the vertical sash (up-down) position. Because the amount of exhausted air is constant, the face velocity of a CAV hood is inversely proportional to the sash height. That is, the lower the sash, the higher the face velocity. As the sash is lowered manufacturers now introduce additional bypass air in order to maintain face velocities that do not become too great. This is necessary because very high velocities cause back-eddies resulting in hood containment spills and exposure of contaminants to laboratory workers. However, variable air volume fume hoods employ a constant face velocity. They use little or no bypass air and the exhaust CFM is reduced as the sash is lowered while maintaining a fairly constant face velocity. Typically a control valve is used to throttle or reduce the exhaust CFM as the sash is lowered. As the sash is raised the valve opens allowing for increased fume hood exhaust in conjunction with an increase in air supply. The variable air volume hoods differ from constant air volume hoods because of their ability to vary air volume exhausted through the hood depending on the hood sash position. It is this mechanism of exhausting air from the fume hood that requires most of the energy use and energy use depends on the position of the sash.

As you can see, the VAV hoods provide savings when the sash is shut. For both types of hoods, safety is always a factor and the sash should be down as low as possible when you are using the hood and closed when not attended. Shutting the sash provides additional protection of better capture ability of the chemicals being stored inside the hood as part of the experiment and containment of all materials in case of an accident or explosion.

At CWRU we use both types of hoods, their variations and we are continually updating and improving our laboratories with new fume hoods and more efficient HVAC controls and systems We have about 800 fume hoods on the Quad and in our Medical Schools with about 400 more in the surrounding hospitals and health care centers. Not all our hoods are VAV and not all exhaust systems are tied into the sash position. However based on the above studies, we can make some valid estimate for savings. In conjunction with the Sustainability Department, and Facilities, DOES will initiate a ***SHUT the SASH*** campaign across the campus. We can determine the energy expenditure for each of our buildings and can see the daily kilowatt output per building online at the Facilities/Sustainability website. Every laboratory will be receiving guidelines (reminders) on the proper use of the fume hood and Shut the Sash magnets for each hood, to help researchers (even at the end of a busy day) remember to close their sash. If we can help one another remember to shut the sashes our labs will be safer and save energy.

Figure 2: MIT Graphic for Shut the Sash Program

Guidelines for Safe and Energy Efficient Fume Hood Use (A Few Important Reminders)

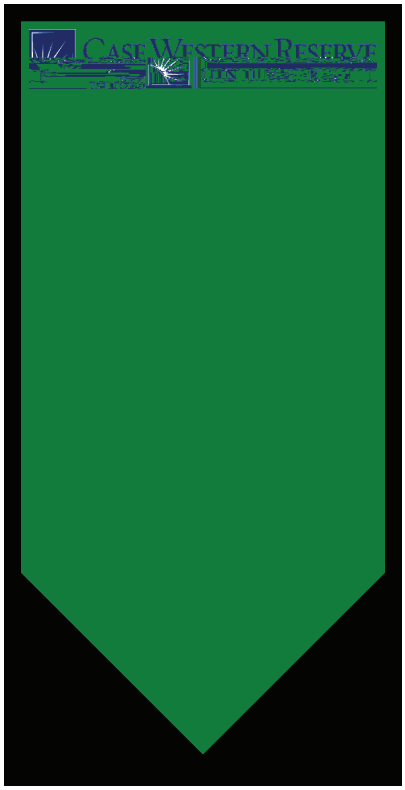
Always check airflow before and after use. Check the flow monitor (if present) or use a "Kimwipe" to demonstrate flow into the hood.

Always work at least 6 to 8 inches from the sash plane.

Always lower the sash to the lowest sash opening practical for work.

Always close the sash when access to an experiment is not needed or hood is not in use. The blue sticker indicates the maximum height the sash can be raised while working inside the hood.

Shut the Sash! A Program of Safety Awareness and Energy Savings (continued from page 4)



Clean your hood regularly; it is not a storage device. ft your hood is clearly labeled for STORAGE USE ONLY, the sash is closed and experimentation is not performed in this hood at any time. Do not evaporate or store hazardous waste for long periods of time inside the hood. Submit a request with DOES to pick up waste.

Never use a fume hood marked INOPERATIVE or REMOVED FROM SERVICE.

Never use perchloric acid in a hood that is not designed for its use. Only use perchloric acid in a properly designed system.

Never connect unapproved devices to the air ductwork on a fume hood.

Never disengage a control or a warning device. If the alarm engages, lower the sash until the alarm stops; if alarm continues notify SAFETY immediately.

Never block the airflow by overloading you fume hood. Place equipment on blocks, jack stands or legs, so that air can flow underneath the equipment to the bottom slot of the baffle. All containers and equipment should be at least 2" from the back and sides of hood.

Route service connections under the airfoil. These include electrical cords and tubing from compressed gas cylinders. This allows unimpeded airflow into the hood.

Figure 3: Case Shut the Sash Magnet

Locate sources of ignition or spark outside of the hood. These include transformers (Variacs), electrical outlets (such as power strips), rheostats and heat guns.

For additional information contact Mary Ellen Scott, Ph.D. at DOES (6077) and Linda Robson at SUSTAINABILITY (5328).

References

1. Shut the Sash Behavior Change Programs in Labs at Harvard: Labs 21 Conference 10/26/06
2. Green Campus Chronicles (3/2007) V3: #6 p3,
3. MIT Tech Talk (6/2007) V51:# 29 p3
4. The Bale 2-3/2006 V4: #1 p4

If the hood is not operating, stop work and immediately contact safety services at 368-2907

From the CWRU Physical Safety Manual (CFR 1910.331-335)#

1. Be on the lookout for exposed wires, terminals and any energized electrical equipment; do NOT come into contact with it.

2. Do not use portable metal ladders around exposed, energized electrical equipment.

3. Do not wear any metal objects, watches, rings, bracelets, etc., when working around electricity.

4. Only "qualified persons" can install or repair electrical systems and equipment.

5. Do follow Lockout/Tagout procedures if you are an authorized employee (doing this work) or an affected employee (the work is being done in your area and/or on your equipment).

6. Regularly inspect your work area(s) to identify electrical hazards and/or unsafe conditions that may be present.

* Missing/broken electrical box covers including outlets and switches.
* Light fixtures and/or other appliances hanging by their wires and not securely fastened.
* Wires protruding from holes in the wall, ceiling, floor, etc.
* Any situation you suspect might be a hazard or unsafe condition.

Promptly report any of the above to Plant Services and your supervisor. Avoid the situation and post warnings if necessary until it is checked and repaired as necessary by a qualified person.

7. Regularly inspect any appliances, portable electric tools and devices, etc. that you use to identify defects.

* Cables and cords not frayed, kinked, cut or torn.
* Plug ends in good condition and ground connection intact where applicable.
* Switches and other control & safety devices in good condition and working properly.
* No signs of arcing or excessive heating.
* Housings not cracked or broken; no missing pieces.

Do not use any defective equipment until it is checked and repaired as necessary by a qualified person.

8. If you use portable electric tools in wet/damp areas, the tools must be made and approved for wet e 0 Tw -30.6 -

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DOES Welcomes Many New Faces in 2007

Just for Your Information: Fatal Work Injuries Down Slightly in 2006

There were 5,703 fatal work injuries in the United States in 2006, down slightly from the revised total of 5,734 fatalities in 2005, according to data released recently by the Bureau of Labor Statistics (BLS). The rate of fatal work injuries in 2006 was 3.9 per 100,000 workers, down from a rate of 4.0 per 100,000 in 2005.

Key findings of the 2006 Census of Fatal Occupational Injuries include the following:

The overall fatal work injury rate for the U.S. in 2006 was lower than the rate for any year since the fatality census was first conducted in 1992.
Coal mining industry fatalities more than doubled in 2006.
The number of workplace homicides in 2006 was a series low.
Fatalities among workers under 25 years of age fell 9 percent.
The 937 fatal work injuries involving Hispanic or Latino workers in 2006 was a series high.
Fatalities among self-employed workers declined 11 percent and reached a series low in 2006.
Aircraft-related fatalities were up 44 percent.

For more information, visit <www.bls.gov/news.release/pdf/cfoi.pdf>

Source: U.S. Bureau of Labor Statistics

*Upcoming Training Sessions**

IMPORTANT NOTE: While all laboratories must attend training at DOES, labs must hold specific training in the CHP and ECP as it pertains to the actual work they do. Labs will also need an outline of the CHP and ECP training and a sign in sheet to accompany. Store the sign-in sheet and outline with the CHP and ECP. IT will be asked for during lab inspections.

New Hazard Communication (Right-to-Know) Training

Retraining is required annually.
DOES Small Meeting Room - Service Building 1st Floor
PREREGISTRATION IS REQUIRED! - Please call 368-2907

***As always, consult our website (http://does.case.edu) for a full schedule of training sessions**

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New Radiation Safety Training

Retraining is required annually.