SCOPE

This document applies to all members of the University community who work with laboratory fume hoods. This standard will not address the use of recirculation fume hoods whose use is considered unacceptable for the control of hazardous materials. This standard does not apply to biological safety cabinets (BSCs) or clean air benches which should not be used for the control of chemical hazards. For information on BSCs refer to the Biosafety and Procedures Manual.

PURPOSE

A laboratory fume hood is a ventilated enclosure, that provides local exhaust control, and in which harmful chemicals can be handled safely. The fume hood is attached to an exhaust system that draws air and contaminants away from the operator, over the fume hood work area and out to the external environment, minimizing the risk of worker exposure to contaminants. Access to the interior of the hood is through an opening which is closed with one or more sashes that may slide vertically, horizontally, or in both directions to vary the opening into the hood.

RESPONSIBILITIES

Environment, Health & Safety

- Provide information to users on appropriate legislation, codes, standards and best practices for the selection, installation and use of fume hoods.
- Perform clearance of fume hoods for safe maintenance or removal of fume hoods.

Facilities Management and Development

- Apply the University guidelines for the application, purchase, installation and commissioning of fume hoods.
- Perform preventative maintenance and repairs to fume hoods and associated exhaust systems.
- In conjunction with EH&S, investigate and make recommendations regarding fume hood system operational deficiencies.

Supervisors

- Conduct hazard assessments to determine what materials and/or work is required to be performed in a fume hood.
- Ensure that laboratory workers are trained in the proper use of the fume hood(s) in their lab. Training, as a minimum, will include method used to determine flow, safe working sash height and, alarm systems as applicable.
- Ensure that all fume hood users follow prudent safe work practices when operating fume hoods.
- Perform periodic inspections of their lab to ensure proper fume hood usage and operation.

Workers

- Must read this standard and receive instruction prior to conducting work inside a fume hood.
- Follow the requirements set out in this standard and any additional requirements determined by the area supervisor in regards to performing work in a fume hood.
- Report hazardous conditions immediately to their supervisor.
- Must not perform work inside a malfunctioning fume hood.
FUME HOOD STYLES AND INSTRUCTIONS

Vertical Rising Sash

*Sash* is the term used to describe the movable glass panel that covers the face area of a fume hood. Sashes can be vertical, horizontal, or a combination of the two.

Vertical rising sashes adjust up and down and are the most common type of fume hood at the University. The sash controls the size of the opening. Some fume hoods are equipped with a sash stop used to prevent the sash from being opened above the maximum safe working height. Sash stops should never be removed or modified. A maximum safe working height is set to indicate the highest point the sash should be set at when working with hazardous materials and should be indicated by a sticker next to sash (See Appendix 2 Fig 1)

- Work inside a fume hood should be performed with the sash positioned as low as possible to comfortably work but never above the sash stop or the posted maximum safe working height. Above this point the capture velocity and shielding of the sash may be ineffective at providing adequate protection to the worker.
- The sash may be raised above the maximum safe working height and the sash stop overridden to facilitate the movement of materials or equipment into or out of the fume hood but returned to the safe working height before work with hazardous materials commences.
- For fume hoods equipped with sash detectors and audible alarms raising the sash above the safe working height will activate the alarm as a reminder to return the sash to a safe working height.
- The sash should be in the fully closed or lowered position whenever the operator is not actively performing work inside the fume hood.
- The sash should be easy to raise or lower. If not, an Work Request should be submitted to Facilities Management for repair. The nature of the problem should be described in the request.

Horizontal Sliding Sash

Horizontal sashes move from side to side. This design allows the sashes to act as a series of movable safety shields that always limit the size of the fume hood opening to some degree. Therefore, the fume hood is never in a fully open position unless the operator improperly removes a sash.

- Slide the sashes to minimize the openings, keeping a panel between you and the inside of the fume hood.
- Minimize the openings between panels to as small as possible to improve capture velocity.
- The sashes should be in the fully closed position whenever the operator is not actively performing work inside the fume hood.
- Do not work in a hood with a missing sash panel.

Airflow

Constant Air Volume (CAV)

The overall volume of air exhausted within this type of hood remains constant. As the sash is lowered or raised the velocity of the airflow increases and decreases respectively. It is very important to properly position the sash no higher than the marked safe working height, when working with hazardous materials in the hood, in order to maintain an optimum face velocity of 80 -120 fpm or 0.40 – 0.60 m/s.
Variable Air Volume (VAV)
These hoods have the ability to maintain a constant face velocity as the height of the sash is lowered and raised. The exhaust volume is adjusted when the sash is moved so that the average face velocity is maintained within set parameters.

- VAV hoods at the University are connected to a sophisticated control system that monitors the sash height and through a system of interlocks adjusts the room exhaust and fume hood exhaust to maintain the overall pressurization in the laboratory.
- Overriding the sash height sensor or disconnecting the operator display panel will result in incorrect face velocities and may result in worker exposure, wasted energy, and may ultimately affect the room ventilation.

Perchloric Acid Hood
Perchloric acid is a strong acid requiring the use of a special fume hood to safely work with it. Please read the Perchloric Acid Fume Hood Procedure before planning work with perchloric acid.

FUMEHOOD OPERATION

Daily Checks
Prior to working in a fume hood the following checks should be performed;

- Check that work surfaces, baffles and sash(es) are clean. In order to prevent degradation chemicals spills and leaks should not be left in contact with work surfaces.
- Check that controls for services (water, gas, vacuum etc.) are labelled and functional.
- Check that interior lights are functioning.
- Verify that the fume hood is drawing air, check the operator display panel or airflow indicator.
- If equipped, check that the alarm is functional.

Work Practices

- Do not evaporate or permanently store hazardous waste inside the hood.
- Do not block the back baffles with excessive materials as this will reduce the flow rate and effectiveness of the hood.
- When ever possible substitute hazardous chemicals with those that are less hazardous.
- When using the fume hood, keep your face outside the plane of the hood sash and remain alert to changes in air flow.
- Work at least 6 inches inside the cabinet from the face of the sash. Placing a strip of tape on the hood work surface indicating the six inch line is a good reminder.
- Discontinue work if the hood alarm sounds or airflow indicators show a low flow situation during work, close open containers and close the sash. Follow instructions below for repair service.
- Wear splash goggles and a full face shield or work behind a safety shield if there is possibility of an explosion or eruption.
- Do not make quick motions into or out of the hood, walk quickly past the hood opening or operate portable fans in or around the fume hood. All of these activities can cause airflow disturbances which reduce the effectiveness of the hood to capture or contain contaminants.
- Look for process changes that improve safety and reduce losses to the environment (e.g. more accurate chemical delivery systems vs. pouring volatile chemicals from bottles).
- Develop a process to evaluate research proposals for potential emissions ahead of time and look for opportunities to reduce them e.g. closed systems or neutralizing emissions before exhausting.
- Close sash when not in use. This provides a safer environment for both CAV and VAV hoods and saves energy when using a VAV hood.
Equipment Use

- Place apparatus and equipment as far back as possible in hood for safety and optimal performance. Equipment should be placed a minimum of 6 inches inside the hood. Keep electrical connections outside of the hood. Do not use equipment that prevents the sash from closing.
- Ensure that equipment or materials do not block the baffle vents in the back of the hood.
- If using large apparatus inside the hood place the equipment on blocks to elevate it 1-3 inches so the airflow can sweep the base work surface.
- Do not place electrical apparatus or other ignition sources inside the hood when flammable liquids or gases are present. Keep in mind that liquids with low flash points may ignite if they are near heat sources such as hot plates or steam lines.

Alarms and Indicators

Variable Air Volume hoods at the University are equipped with an operator display panel with visual and audible alarms to indicate the operation status. For a complete explanation of how the VAV system operator display and alarms work see Appendix 1. Some Constant Air Volume hoods are also equipped with alarms from the manufacturer which will sound if there is a loss of face velocity or if the sash is raised above the safe working height. Fume hoods without alarms should be equipped with a manehelic gauge or if not a small piece of tinsel or other light weight chemically resistant material affixed to the bottom of the sash to indicate an inward flow of air. Air flow indicators do not give a quantitative measurement of face velocity. They only indicate that air is being exhausted through the fume hood.

Repairs

All repairs to fume hoods must be arranged through Facilities Management (FM).

- The customer submits a Work Request to FM at http://www.ucalgary.ca/fmd/. If it is an emergency (e.g. fan has quit working) the customer can call FM Customer Care at 220-7555 to request repairs.
- The customer needs to clearly indicate the work required. If the repair requires work inside the hood, Customer Care will contact Environment Health & Safety (EH&S) and request a clearance.
- EH&S will contact the customer and instruct them as to the clearance requirements to eliminate the hazards from the fume hood. Once the fume hood has been cleaned and cleared, it will be out of general service for approximately one day as long as parts are available. It is important that the customer agrees upon a scheduled day for the work to be completed.
- The customer will complete the fume hood cleaning prior to the scheduled day and will confirm the completion of the cleaning with EH&S.
- EH&S will inspect the fume hood and upon approval, will secure the fume hood sash with a clearance seal (see Appendix 2 Fig. 2). The seal will include the date, time, name of the person clearing the fume hood as well as their contact number. If the fume hood seal is removed or torn prior to response by FM the clearance will have to be repeated before repairs can be made.
- FM will remove the clearance sticker upon arrival. If the hood cannot be repaired at that time and it is unsafe to operate the fume hood an OUT OF SERVICE seal will be applied by FM (see Appendix 2 Fig. 3).

REFERENCES

CSA Z316.5-04 Fume Hoods and Associated Exhaust Systems
Alberta Fire Code 2006
Alberta Occupational Health and Safety Code July 1, 2009
Laboratory Fume Hoods – Recommended Practices SEFA 1 - 2002

Laboratory Fume Hood Standard 2010.06.22
Laboratory Fume Hood User's Guide  Appendix 1  Siemens System
Variable Air Volume Controls and Alarm Explanation

What’s Normal?

The fume hood controller controls the face air velocity and comes equipped with a digital display panel. The air velocity is controlled at 0.457 m/s, or 0.508 m/s. The University maximum safe work height for a fume hood sash is 12 - 16 inches (30 – 40) cm as marked. The fume hood controller automatically adjusts the airflow to the set point as the sash is raised and lowered.

Air velocity

Green Light, Yellow Light, Red Light

A green light indicates that the fume hood is working normally within the operating parameters established by Safety Services. A yellow light will illuminate if the airflow drops 15% below set point, or high by 140% of set point. A red light will illuminate and regular beeps will sound if the airflow drops 20% below set point or high by 200% of set point.

What’s That Sound Coming From my Fumehood?

The annoying beeping sound coming from your new fume hood controller is letting you know your fume hood has entered an UNSAFE CONDITION. What is an unsafe condition? Fumes are allowed to leave the fume hood when air is being drawn in too slowly. Air swirls in front of the user and draws fumes out of the fume hood when air is being drawn in too quickly. A continuous tone is an unsafe condition—air flow is too fast or too slow. To correct the problem the sash must be closed. A six-beep alert will sound every minute if the fume hood sash is opened too high. Refer to sticker on the fume hood.

Do you rob Peter to have extra air for Paul?

Some fume hoods share common exhaust ducts. If you walk away and leave your fume hood open you are robbing “Peter” who may need the extra flow for an EMERGENCY. CLOSE THE SASH WHEN NOT IN USE!

Oops! Spill! Hit that Emergency purge button. Close that fume hood!

Each fume hood controller has an ‘emergency purge mode’ for your added protection which will cause the fume hood to go to full exhaust for 10 seconds then 255% of set point. NOTE: This feature works best if unattended fume hoods, on the same exhaust duct, are closed to give the exhaust system extra capacity.

Laboratory Fume Hood Standard 2010.06.22
**Fig. 1**

Maximum Safe Working Height

Date Certified: ________________

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**Fig. 2**

CAUTION

This piece of equipment or area has been checked by Environmental Health & Safety (EH&S) and cleared for maintenance, servicing and repairs. This seal may be removed in the event that this equipment or area is required for any emergency. No non-emergency work with or storage of hazardous materials in this sealed area is permitted until this seal is removed.

Date & Time: __________________

Clearance Person: ______________

Contact Telephone Number: ________

In Case of Emergency Contact Security @ 220-5333

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**Fig. 3**

OUT OF SERVICE DO NOT OPEN

This fume hood has been sealed by Campus Infrastructure for maintenance, servicing, or repairs. This seal may not be removed except by maintenance personnel and only after it has been determined safe for use. Use of fume hood during maintenance could result in an exposure to harmful substances to you, others working in the area and/or maintenance personnel.

Date & Time: __________________

Sealed By: _____________________

Contact Telephone Number: ________

In Case of Emergency Contact Security @ 220-5333