Local Exhaust Ventilation Maintenance & Use Instructions

Purpose

To provide information about local exhaust ventilation equipment available to students, faculty, and support staff.

Scope

The scope of the procedure is the installation, maintenance, performance, testing, training, and use of local exhaust ventilation equipment, an engineering control used to prevent chemical exposures. Equipment relevant to this procedure includes canopy hoods, chemical fume hoods, downdraft tables, gloveboxes, paint booths, slot hoods, and snorkel exhausts, but may also include areas involving hazardous chemical storage. Guidelines will pertain to chemical fume hoods unless otherwise specified. Relevant equipment is primarily installed in laboratories, workshops, and art studios. The procedure pertains to academic areas for teaching and research.

This procedure does not pertain to equipment used in kitchens, laundry facilities, restrooms, or other non-academic work areas. This procedure does not apply to biosafety cabinets.

Responsibilities

A. Environmental Health & Safety (EHS)

1. EHS will provide safety training and information as required.
2. EHS will perform annual inspections for safety equipment and test as required. This responsibility may be delegated to the Building Manager who shall provide data to EHS for recordkeeping.

B. Facilities Management (FM)/Building Manager

1. FM/Building Manager will perform or manage installation, maintenance, and repairs on equipment by request.
2. FM/Building Manager will perform testing after service or alarms as required.

C. Area Managers & Principal Investigators (Supervisors)

1. Supervisors will ensure that access to equipment is maintained.
2. Supervisors will provide training to personnel.
3. Supervisors will ensure that equipment is tested by personnel.

D. Laboratory Personnel

1. Laboratory personnel will perform qualitative checks as required.
2. Laboratory personnel will receive training on the equipment locations and use methods.
3. Laboratory personnel will report equipment issues to FM.

Introduction

Local exhaust ventilation (LEV) is an engineering control that is used to protect personnel from exposure to hazardous airborne contaminants used in the workplace, specifically the laboratory or workshop. It is most healthful indoors to capture contaminants at the source rather than wait for natural ventilation or dilution to dissipate such a hazard. Potential hazard sources should be identified prior to use to determine the potential for exposure and the associated risks. LEV should be as close to the source of contaminated air as possible, enclose the work area, must be suitable for the work being done and the type of contaminants produced. Other requirements are that the LEV has sufficient airflow around the process or material that generates the contaminant source, in order to capture the emissions and the user should prevent obstructions or turbulence that interferes with airflow or capture. Exposure control devices (ECDs) should be specified as appropriate to control emissions at the source as not all devices are adequate for selected equipment, materials, and processes.

The chemical fume hood (or simply fume hood) is the most commonly used ECD in the laboratory, and it is used to prevent escape of air contaminants and exposure to inhalation hazards during work that should not be done on an open laboratory bench. Fume hoods have additional features such as electrical outlets and accessory valves which provide utility access for lab apparatus, and storage cabinets for quick access to chemicals. Our laboratories contain benchtop fume hoods, which sit on a work surface approximately 36" above the floor. Fume hood performance and efficiency depend upon a sufficient, uniform velocity of air moving through the sash opening at the face. Performance is adversely affected by several factors including mechanical malfunction; drafts from open doors and windows or constant movement in front of the hood; and operator error by the user. The latter factor may include use of equipment or materials that causes a physical blockage of the exhaust duct, escape of air contaminants at the sash face, or inappropriate, turbulent airflow through the hood.

Parts of a Fume Hood

A standard ducted fume hood has several important parts for its operation (see Figure 1 below): an airfoil, baffles (adjustable partitions), a bypass grille, an exhaust duct, a sash, slots (adjustable and fixed), and a work surface. At the front or face, the sash is a window or door used primarily to protect users from hazardous air contaminants and control airflow to the fume hood and should be kept as low as necessary to do work. It may also offer some protection against splashes and small-scale explosions. Adjusting the sash height changes the velocity of air entering the hood, and the bypass grille provides additional steady air through an upper vent to maintain velocity and constant air volume, while decreasing turbulence at the face as the sash is lowered. The airfoil is designed to guide air into the fume hood smoothly to also reduce turbulence and prevent air currents called eddies from escaping at the face. An eddy may carry air contaminants which expose the fume hood user to hazards.

Within the hood is the work surface where all apparatus and chemicals may be used. The surface may be recessed to contain spills, but this is not a characteristic to all fume hoods. In the rear, baffles and slots are placed to create laminar flow throughout the hood, by directing hazardous fumes from the work area to the exhaust. Hoods may also have a baffle screen (or screen) to prevent light objects (e.g. paper) from being drawn into a slot and causing

turbulence or blockage, reducing airflow and energy efficiency. The contaminants and fumes from chemicals and any work done in the fume hood are diluted by room air and drawn into the exhaust duct by fan.

In addition to these features, fume hoods may have lights for added visibility during work and may be useful to detect hazardous conditions controlled by an external switch at the face. Most fume hoods are equipped with utilities such as electrical outlets for apparatus, and may also include valves for air, various gases (including natural gas), water (cold and/or hot), and/or vacuum. **Note:** Vacuum nozzles shall always be used with a vapor trap (e.g. cold trap, liquid trap, filter) or equivalent device to prevent harm to workers and to prevent contamination and damage to the vacuum line and related system.

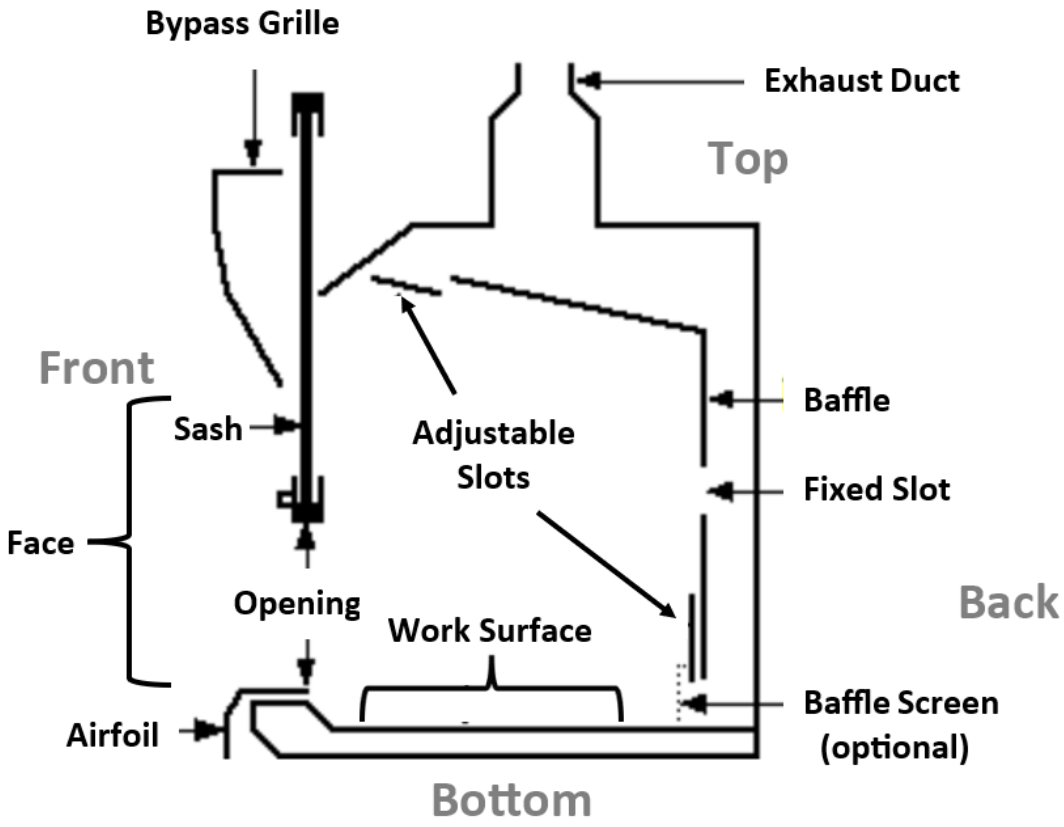

Figure 1. Fume Hood Parts Diagram. The figure displays a simplified diagram of a fume hood. Parts include the working area at the face and the surface within the hood and all other specified parts affecting airflow.

Constant Air Volume vs. Variable Air Volume

Constant Air Volume (CAV) fume hoods are hoods where the rate of the exhaust airflow, air pulled through the hood, is constant. This is the standard fume hood that has been used in laboratories for several decades. When the sash is lowered and the cross-sectional area of the hood opening decreases, the velocity of airflow (face velocity) through the hood increases proportionally. Since a constant volume of air is exhausted, this may be less energy efficient over the long-term for a given laboratory. Such fume hoods are less expensive to purchase with lower installation costs.

Variable Air Volume (VAV) fume hoods are hoods where the rate of the exhaust airflow or air pulled through the hood varies as the sash is raised or lowered in order to maintain a constant face velocity. This is a newer technology utilized for sustainability and reduction in energy use. When the sash is lowered and the cross-sectional area of the hood opening decreases, the velocity of air flow (face velocity) through the hood remains constant, reducing the total air volume exhausted by comparison to CAV hoods. For example, if the sash is lowered or closed, the velocity is maintained (e.g. 80 fpm) with a lower volume of air passing through the hood.

Exposure Control Devices

In addition to standard chemical fume hoods, there are other local exhaust ventilation devices that are used for exposure control. While a fume hood may better contain hazards (e.g. from inhalation, splashes, etc.), not all work can be done within one due to size constraints, configuration, or other suitability requirements. Below are examples of devices that may be more feasible to use than a fume hood to remove inhalation hazards or to control associated hazards at the emission source.

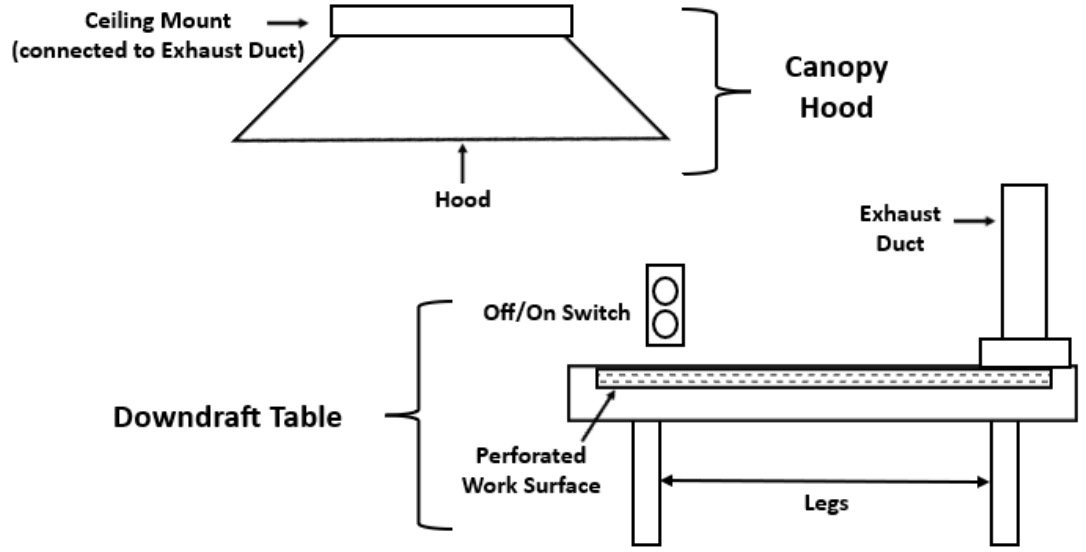

Figure 2. Canopy Hood & Downdraft Table Diagrams. The figure displays simplified diagrams of a canopy hood and a downdraft table. Parts for each include stabilizing parts for mounting and exhausting elements affecting airflow, with the canopy hood being tapered and intended to be directly above equipment and the downdraft table used for materials situated atop the equipment. These exposure control devices are used separately, but they are illustrated together here for convenience.

Canopy Fume Hood

A canopy fume hood (or canopy hood) is designed to capture and vent non-toxic vapors like heat (as hot air), steam, and odors from nonhazardous sources, which exhaust from large equipment such as autoclaves, baths, laboratory- or industrial-use furnaces, and ovens. A canopy hood removes this air in a wider area than is allowed by a chemical fume hood and

allows capture without requiring a physical barrier around the work surface. The hood is typically positioned directly above the source or equipment to be its most effective, and it also relies on the natural rise of heat and odors for capture. Such equipment is often left to operate without the presence of workers to avoid heat/hazard exposure.

Downdraft Table
A downdraft table is a ventilated workbench that allows hazardous air contaminants such as dust, fumes, odors, or other airborne particles to be drawn downwardly through its surface and exhausted. Such tables are perforated throughout their surface with holes/slots or are equipped with grates, so that users may work with powered equipment, bulk materials, or specimens (e.g. cadavers) in an open setting for a larger work surface and are equipped with an electrical switch to turn off the table when not in use. The drawback is that there is a higher likelihood of exposure to air contaminants than in a fume hood.

Ductless Fume Hood
A ductless fume hood (or enclosure) is a fume hood that is not connected to an external vent or other ductwork. This type of device is powered to remove contaminants by filter (e.g. HEPA or activated carbon) with low to moderate chemical loads and recirculate air back to the laboratory. The advantages to such equipment are that it is portable, which allows users to adapt to space requirements, no permanent ductwork being required to operate, easy installation with just plugging into an electrical outlet, reduces emissions, and potentially saves energy by not exhausting conditioned air. Limitations include incompatibility or unsuitability with all chemicals or prolonged, heavy use; filters require replacement; additional parts such as a fan that may require replacement and contribute additional noise. This device must be approved for use by EHS and certified prior to use. The standard ducted fume hoods on campus shall be used to conduct laboratory work with hazardous chemicals.

Gloveboxes
A closed glovebox is an exposure control device that is completely enclosed and airtight so that users may not be exposed to hazardous chemicals or fumes during work. The chemicals and equipment on the work surface of the glovebox may be manipulated through the use of attached gloves as a feature of the equipment. The glove material must be resistant to the materials used and are typically thick, butyl rubber in construction. Gloveboxes are most useful for chemicals that are highly reactive or explosive when exposed to air or water (including humidity from air), hence the internal atmosphere for such a device is kept inert, in this case oxygen-free and moisture-free, utilizing gases such as nitrogen or argon depending upon compatibility. Other gases may safely be employed in this protected environment for specialized use in experiments.

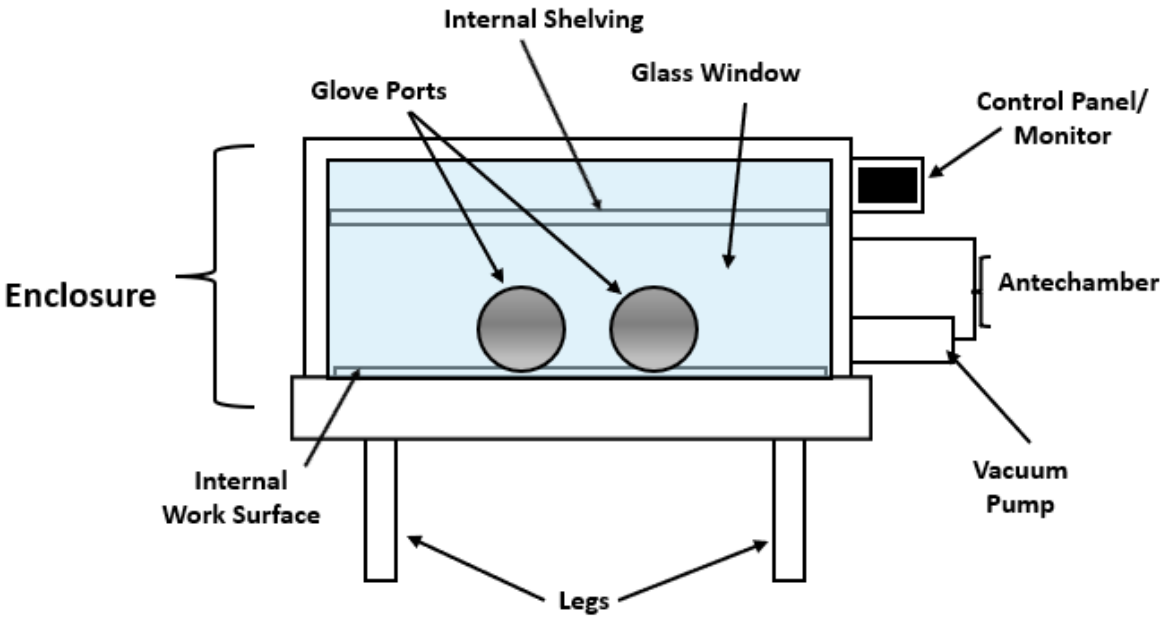

Figure 3. Glovebox Diagram. The figure displays a simplified diagram of an enclosed glovebox, which excludes ports for vacuum or gases, and any placement for gas cylinders. Parts include ports for gloves mounted, antechamber used for internal access for items, and other parts providing stability and safety.

Paint booth

A paint booth (or spray booth) is an enclosure designed to isolate and remove fumes or overspray from spray paint or other coatings. It may resemble a chemical fume hood in its box structure, but with a completely open face for easier access to application of the coatings to an object. It should be metal or fire-resistant with explosion-proof electrical fittings, if equipped, as the materials used in painting and coating, specifically spray paint, are often flammable from its volatile organic compound components. There are two types of paint booths: dry, which uses filter for air contaminant removal, and water wash, which uses water spray or a curtain of water to remove such contaminants.

Perchloric Acid Fume Hood

A perchloric acid fume hood is a benchtop fume hood designed to be used with perchloric acid and its salts. It functions in much the same way other benchtop hoods operate, but because the acid and its salts may build up and create an explosion, particularly while heating, this necessitates some precautions. The design typically includes a stainless-steel interior or other chemical resistant lining for its surfaces and a shatterproof sash. It also will contain a washdown system and a built-in drain trough for hood interior cleaning, making sure to cycle after every use to avoid accumulation. Connected ductwork should take the shortest path to the building exterior and should not mix with the other exhaust systems, so typically this fume hood would have a dedicated ventilation system.

Slotted Hood (Thin Fume Box Hood)
A slotted hood is a special type of hood used to ventilate tanks or other open containers, to quickly remove air contaminants from a wider, open work area, and to do work for specific applications such as welding. It ensures that air velocity is sufficient over the entire surface of the tank. These devices have a similar function to benchtop fume hoods with fixed slots, but they are thin and smaller with no work surface space in its interior. Instead, the work area will be immediately at its face, drawing in air contaminants at a high airflow velocity and exhausted through a dedicated ventilation system.

Snorkel Exhaust
A snorkel exhaust is a device used to remove hazardous fumes or emissions during work (e.g. welding, burning) or from active equipment at a point source. The equipment is typically mounted to the ceiling and connected to a ventilation exhaust system for the building, and in some cases, this may be a dedicated exhaust system for a specific hazard or material (e.g. wood dust, metal fume, volatile organic compounds). The snorkel consists of an articulating arm that is movable, flexible, and extendable to its dedicated length, a flanged hood where the air contaminants enter, a damper to close the hood when not in use, and a handle to adjust the placement of the hood/arm. The user will typically use a snorkel exhaust by extending the arm and using the handle to move the hood to within six inches of the emission source for maximum capture with the damper opened. This equipment may be used in mechanical workshops, and it is often used within laboratories in connection with larger analytical laboratory equipment that produces emissions from running samples or for operations that produce fumes as with high-powered lasers.

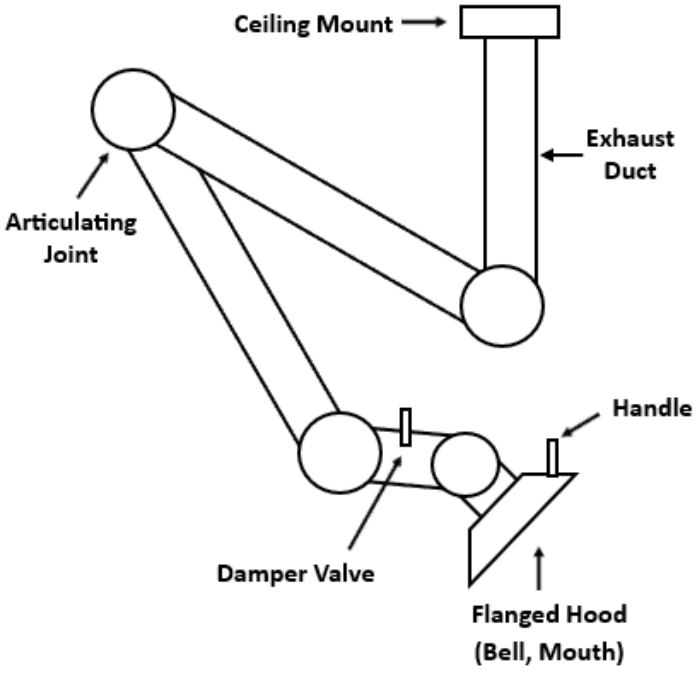

Figure 4. Snorkel Exhaust Parts Diagram. The figure displays a simplified diagram of a snorkel exhaust arm. Parts include the flanged hood, where contaminants are captured, articulating joints that allow for flexibility and movement of the unit, ceiling mount, and other specified parts affecting airflow.

Vented Gas Cabinet

A vented gas cabinet is a device connected to a ventilation exhaust system as with most of the other aforementioned equipment listed, and it is used to store gas cylinders that are in use within a laboratory or for flammable or toxic gas cylinder storage, at the gas storage dock, whether empty or full. The cabinet is an upright, slender enclosure, equipped with a locking door, that adequately contains the typical industrial gas cylinder that is several feet in height with limited diameter. While gases may be safely stored outside of cabinets with proper restraints and employed through the use of tubing and other connections, the cabinets provide an extra level of security from errant objects or collisions, accidental activation, and safety by drawing room air into the device, exhausting leaks through ductwork, and through the use of sensors (for laboratory units only), notifying users of leaks for quicker investigation and use of the Emergency Stop control to quickly shut off access to the cylinder.

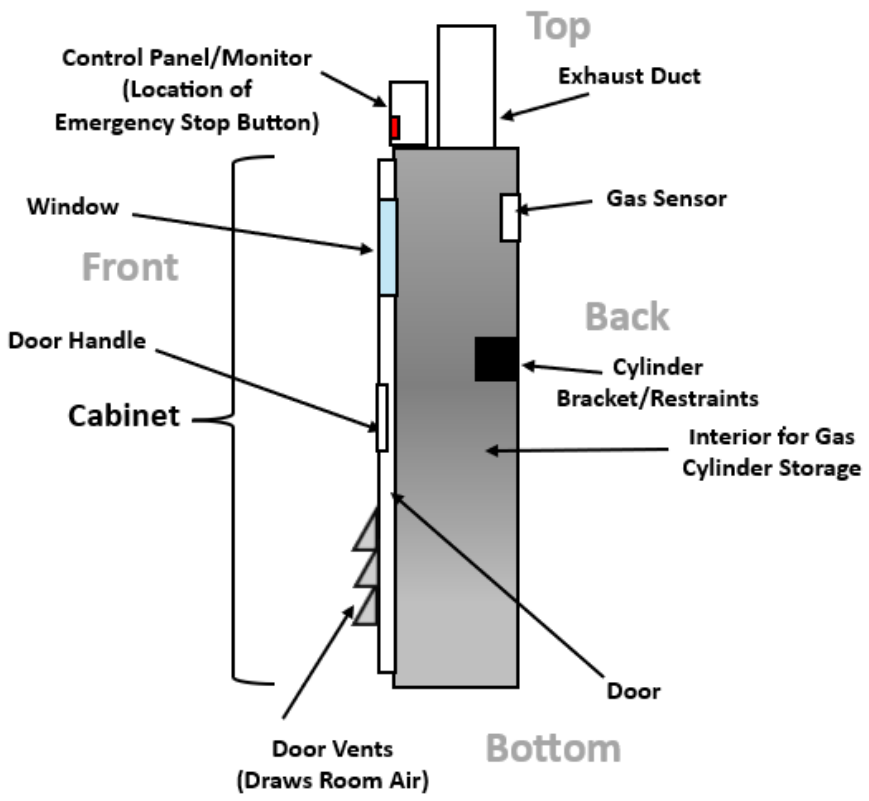

Figure 5. Vented Gas Cabinet Diagram. The figure displays a simplified diagram of a vented gas cabinet. Parts include the door, control panel for starting/stopping gas service, gas sensor to monitor for leaks, restraints, and other parts directing airflow.

Procedure

A. Installation & Performance

1. Facilities Management and EHS must be involved in the installation of fume hoods and LEV, or any modification of a fume hood, LEV, or related utilities and infrastructure.

a) Laboratory personnel may request modification to infrastructure through the Building Manager and Facilities Management.

2. Performance Requirements
   a) Placement of ventilation equipment should not be close to doors, windows, or HVAC ceiling vents such as supply air diffusers, exhaust, or return air grilles. Drafts and wayward air movement can affect the efficiency of the ventilation for the unit.
   b) Ductwork with the wrong size, sharp bends, or to many branches may create lower air flow, turbulence, or blockage. Airflow shall be sufficient to remove contaminants.
   c) The standard fume hood will be installed such that the base height for the unit is 36 inches from the floor.
   d) Outside air is to be used for removal of airborne hazards. Air should not be recirculated from LEV use, but exhausted.
   e) Fume hood velocity must operate at 80-120 fpm.
   f) Sash adjustment should be easy as the sash should move freely, whether vertically (up and down) or horizontally (left/right), if applicable.

3. Parts & Assembly
   a) Fume hoods, associated valves, and other LEVs are to be installed by Facilities Management.
   b) Fume hood stops for sash should be used to properly set sash in place.
   c) Airfoil (sill at face), plenum (exhaust), and baffles are employed to manage airflow.
   d) The interior of the fume hood, including the work surface, should be made of durable, corrosion-resistant, nonporous material such as stainless steel, various resins, polypropylene, or fiberglass designed to contain liquid spills and withstand harsh conditions.
   e) The fume hood sash is the primary defense against airborne contaminants, splashes, or other exposure to contaminants and must be able to rest on any installed stops easily. The hood sash should be clear and undamaged, and equipped with undamaged handles. Sash is typically made of tempered glass, plexiglass, polycarbonate, or some other clear, chemically compatible material.
   f) Fume hood sensors shall be maintained along with any associated fixture panel attached to the fume hood to prevent premature failure.
   g) Lighting within the fume hood when turned on shall be bright enough to conduct work safely.

4. Access
   a) Authorized use of fume hoods and other LEV is restricted to those users who have access to laboratories and workshops with permission of supervisors in these spaces (Academics: Principal Investigators, Laboratory Instructors, and Laboratory Managers; All Others, Area Supervisors).

b) Devices may be adjusted as necessary for proper use, if equipped. Examples include moving the sash for fume hoods or moving the snorkel by hand.

5. Decommissioning/Removal
   a) A device may be decommissioned and/or removed (or hibernated), if all hazards are removed, it is no longer in use, and the configuration and purpose of the space has changed requiring removal or hibernation. This would be done by request with FM and EHS.
   b) If fume hoods or other LEV are determined to be unused or orphaned, they may be hibernated until needed. This may also be done if the room where they are located is considered vacant or unoccupied regularly. This reduces energy consumption and reduces equipment maintenance.
   c) If the fume hood or other ventilation fixture is not removed, but hibernated
      i. The utilities or valve(s) must be closed or in the "off" position to stop service to the fixtures.
      ii. Fixture heads must be removed or sealed.
      iii. A decommissioning notice must be posted on the unit.

B. Use

1. Preparation
   a) Equipment Setup
      i. For Fume Hood
         1) During setup of equipment prior to an experiment, the sash may be lifted up as high as it will set.
         2) Personnel may enter into and as far back as required to secure equipment in place prior to the introduction of hazardous materials.
         3) There must not be any chemicals, hazardous materials, hazards of any kind (including hazardous energy), or other laboratory work taking place within the hood during the set-up process.
      ii. For other LEV
         1) Set equipment or materials to be used in a way where the exhaust will be as close as possible to the work or emission source to be effective.
         2) For canopy hood, the equipment simply needs to be directly under the hood.
         3) For snorkel exhaust, the hood should be placed within six inches of the source.
         4) For slotted hood, the source or work should be done within six inches of the slot.
   b) Before use of the fume hood or other LEV begins, the user should make sure that the exhaust is working properly, with a visual test as in Step D4a below and check for any obstructions that might impede proper airflow or exhaust within the fume hood.

c) Review the equipment operator manuals, chemical Safety Data Sheets (SDS), and any other relevant reference material for hazardous materials prior to fume hood/LEV use.

2. Operation

Airflow is key to having a properly functioning ventilation device, particularly fume hoods. Airflow to the fume hood may be affected by obstructions, external drafts to the room, infrastructure (e.g. exhaust fan, ductwork), sash positioning, and user actions and movements, so take care to follow the instructions below.

a) General Guidelines

i. Alarms

1) Check alarms/monitors to indicate proper operation of the LEV unit.
2) Ensure that airflow monitor remains on and not in an alarm state.
3) Do not ignore alarms for airflow. If an alarm is present, check the monitor for the unit. If the flow is too low, close the sash or stop service to the unit until it can be repaired.

ii. Chemical Use

1) Fume hoods and all LEV units where chemicals and other hazardous materials are present shall be continuously ventilated while under normal operation conditions.
2) Do not dispose of waste chemicals by leaving containers open and evaporating them within the fume hood or any other LEV.
3) Keep chemical containers closed when not in use.

iii. Personal Protective Equipment Use

1) Always use the appropriate personal protective equipment while using the fume hood/LEV, such as protective eyewear (e.g. safety glasses, splash goggles), body protection such as a laboratory coat, and gloves compatible to the hazard.
2) Laboratory coats should be buttoned and fit properly on the body.
3) Wear the appropriate size of glove to avoid tears and discomfort.
4) Use gloves that are appropriate for the hazard and task.
5) Gloves must be worn over the wrist of lab coat, not inside the sleeve.
6) If explosions may occur, wear a face shield in addition to other eye protection.
7) Long pants and closed-toe shoes are also appropriate when handling hazardous materials.

iv. Observe any unusual noise or air movement to indicate proper operation of the LEV unit.

v. *Take care to secure loose materials such as paper, so that it does not get pulled into exhaust. Such materials may cause blockage and inadequate airflow.*
vi. *Personnel is must not bring food or drink into the laboratory, and do not place such items in the fume hood.*

b) For Fume Hoods
   i. *The fume hood exhaust shall be on at all times while the hood is in use.*
   ii. *Chemical Use*
      1) *Do not permanently store chemicals in the fume hood.*
      2) *Label all hazardous materials that will be used within the fume hood, including chemical containers.*
      3) *Use condensers, traps, or scrubbers to contain and collect waste solvents, vapors, or dust.*
      4) *Use of perchloric acid, especially heated, requires a special type of chemical fume hood, specifically, a perchloric fume hood.*

   iii. *Obstructions*
      1) *Avoid opening and closing the sash rapidly. Do not use quick arm and body movements in front of or inside the hood to avoid turbulence on the fume hood.*
      2) *The fume hood airfoil and baffles (at front and towards the rear bottom, respectively) shall not be obstructed by equipment or other materials.*
      3) *Any equipment stored in the fume hood shall be lifted 2-3 inches from the work surface by sturdy materials such as shelving, racks, or blocks.*
      4) *The interior of the unit should be uncluttered by containers, equipment, or other materials to maintain airflow.*
      5) *Keep paper, tissue, absorbent pads, vials, and other small or lightweight objects from being drawn into the baffles or other parts of the exhaust duct.*
      6) *Limit traffic (pedestrian and otherwise) passing directly in front of the fume hood during use.*
      7) *The fume hood should not be obstructed by bulky objects at its face while in operation.*

   iv. *Positioning*
      1) *Operational height for the fume hood sash is ≤ 18 inches, with 12-18 inches high being optimal. The sash should never be lifted above this height during normal operation to maintain containment and avoid alarm.*
      2) *Laboratory personnel must never enter the fume hood beyond arms during normal operation (while hazardous materials and equipment are*

present and active). That is, the head or upper body must never cross the plane of the sash for any reason.

3) *Position work and all apparatus/equipment at least 6 inches inside the fume hood from its face.*

v. *Visibility*

1) *Use the sash as a barrier and look through it during operations, not under it, to avoid exposure.*
2) *Lighting should be turned on within the fume hood for safe, active operations unless materials or equipment require that lighting is turned off for safety or functional reasons. Lighting may be turned off to save energy otherwise.*

3) *Monitor the fume hood when performing ongoing or reactive experiments.*

c) For Snorkel Exhaust

i. *For equipment that is movable or posable, adjust the unit appropriately to avoid fugitive emissions and inadequate capture.*
ii. *Personnel should keep the hazardous operation at a constant distance from its hood.*
iii. *Use dampers to close unit when not in use.*
iv. *Damper effectiveness should be tested to check seal (velocity = 0 cfm).*
v. *Do not alter equipment without certification by manufacturer and testing by EHS.*

d) Vented Gas Cabinet

i. *Vented gas cabinets are used for gas cylinders larger than a lecture bottle (~13 inches long, and ~2 inches in diameter). Lecture bottles containing toxic gases may be stored and used in a fume hood.*

3. Normal Shutdown

a) When work has been completed, properly put away equipment and hazardous materials in the appropriate storage areas outside the fume hood/LEV.
b) Clean the work surface.
c) Close the fume hood sash/exhaust when the unit is not actively being used. Exhaust will remain on.
d) For other LEV use, shut dampers or use shut off button. Close any related valves for the unit to stop utility service if required.

C. Maintenance

1. Cleaning

a) Use an appropriate solvent or cleaning solution to clean the work surface and sash of fume hoods or other LEVs as required. Soap solution and RO water may be sufficient for cleaning. Wear the appropriate PPE while doing so.

b) Wipe down the exterior surface of the fume hood or other LEV with a wet cloth to remove any accumulated dust. Nonporous external surfaces may be wiped down with mild soap solution and a clean towel. The sash for a fume hood may also be cleaned with any regular glass cleaner.
c) Wipe all areas with water to remove any residue of soap, solvent, or glass cleaner.

2. Repair/Out-of-Specification
   a) Notify the Supervisor if a ventilation unit or its utilities (e.g. lights, outlets, valves, pipes) are damaged, malfunctioning, or requires repair in any way. They will contact Facilities Management and/or the Building Manager who may best address the issue. EHS will verify and certify that the unit is functional or use an external vendor to do so.
   b) For fume hoods that contain chemicals or other hazardous materials, these items must be removed, and the fume hood must be decontaminated prior to any work repairing the unit. Decontamination will depend upon the types of materials used.
   c) For other LEV, equipment may need to be moved or relocated in order to access the unit.

3. System Maintenance
   a) Facilities Management is tasked with providing routine maintenance for ducted fume hoods and LEV, specifically ventilation (HVAC) systems (e.g. air handling units, vents, ducts, intake/exhaust fans), and related electronic monitoring.

4. Testing
   a) Daily Test
      i. Prior to use, verify the EHS inspection label for the most recent date that the fume hood was inspected; the date must be within the last 12 months.
      ii. Visually test at the edge of the hood before each use by paper or anemometer (in the case of the fume hood, at the sash). If using paper, hold at the edge of the sash; do not release the paper into the hood.
      iii. Verify that any attached airflow meter also reads 80 fpm or above prior to use.
      iv. If the behavior of the airflow monitor does not match the visual test or if it is below 80 fpm when the sash is open, take the unit out of service.
   b) Annual Inspection
      i. EHS performs annual inspections of fume hoods.
      ii. EHS will test units for compliance with ANSI/ASHRAE 110 including:
         1) Velocity in fpm (by anemometer or velocity meter)
         2) Visual check (smoke test)
         3) Inspection labels are present, dated, completed, and initialed.

4) *Observations and notes for additional concerns such as soil/waste, damage, corrosion, fugitive emissions, parts not operating properly or are missing, or other violations.*

iii. *Measurements will determine whether the unit passes inspection.*

iv. *Data will be recorded and initialed by the EHS inspector and kept on file.*

D. Emergency Procedures

1. Personnel Injury/Illness/Exposure
   a) In case of emergency, call 911 or TUPD for 410-704-4444; if applicable, contact the National Poison Control Center at 1-800-222-1222.
   b) First aid kits for minor injuries are provided by your department and will be found within the facility.
   c) Eyewashes and safety showers are available for use by personnel in laboratory spaces as required.

2. Contamination/Spill
   a) In general, clean spills immediately. Do not allow spilled liquid chemicals to evaporate.
   b) In case of a major contamination or spill (e.g. immediately dangerous to life or health, cannot be contained to the room), immediately exit the facility and do not re-enter the contaminated environment until the condition can be corrected. If spilled within the fume hood, close the sash prior to leaving and set the airflow monitor to emergency mode. This will increase the airflow to the fume hood to remove contaminants.
   c) Warn others in the laboratory of the emergency on your way out of the facility.
   d) Contact EHS at 410-704-2949.
   e) Report the nature/hazard of the spill (i.e. what chemical or hazardous material used, volume or mode of contamination [airborne, toxic, etc.]), and any other pertinent information.

3. Facility/Equipment
   a) Fire/Emergency Evacuation
      i. *In case of fire or required evacuation (e.g. natural gas leak)*
         1) *Stop work immediately and evacuate the facility, shutting down operations on the way out of the laboratory.*
         2) *Warn others in the laboratory of the emergency on your way out of the facility and activate the fire alarm.*
      ii. *If a fire occurs inside the fume hood*
         1) *Stop work immediately.*
         2) *Immediately close the sash and evacuate the laboratory.*
         3) *Warn others in the laboratory of the emergency on your way out of the facility and activate the fire alarm.*
         4) *From a safe area, contact 911/TUPD to report the type of fire (e.g. chemical fire).*

b) Facility Failure
   i. *In the event of a facility failure or malfunction (e.g. power outage, HVAC failure, water outage) the Continuity of Operations Procedures for the facility should be followed.*
   ii. *Contact Facilities Management at 410-704-2481 for the following:*
      1) *Natural gas leak, water leaks/flooding, HVAC, telecommunications, electrical, or any other mechanical/infrastructural issues.*

c) Equipment Failure
   i. *If you observe defective or overheating equipment, shut off the equipment, disconnect it, close the sash, and report the problem to your Supervisor.*
   ii. *If the alarm sounds or the monitor lights indicate low flow while working with highly toxic, volatiles, or other high hazard chemicals, work should be stopped, equipment turned off, and the sash lowered. Lab personnel should leave the area if highly toxic, volatile chemicals, or other high hazard chemicals are being used and notify other individuals in the area to exit.*

E. Training

1. Personnel who may use a fume hood/LEV must be trained in its proper operation prior to use. Users will follow laboratory training and procedures for how to use specific equipment within fume hoods at all times.
2. Fume hood users and LEV will follow this standard operating procedure.

Resources

A. ANSI

1. ANSI/AIHA/ASSP Z9.5-2002 Laboratory Ventilation
2. ANSI/ASHRAE 110-2016 Methods of Testing Performance of Laboratory Fume Hoods

B. NFPA

1. NFPA 45 Standard on Fire Protection for Laboratories using Chemicals

C. OSHA

1. Occupational Exposure to Hazardous Chemicals in Laboratories & Appendix A – National Research Council Recommendations Concerning Chemical Hygiene in Laboratories
2. Welding, Cutting, Brazing - General Requirements

D. Environmental Health & Safety

For issues with equipment or general inquiries, contact EHS by emailing safety@towson.edu or by calling the Environmental Health & Safety (EHS) office at 410-704-2949.

Appendix A: EHS Fume Hood Inspections Label

Towson University

EHS Fume Hood Inspections

Test Date	Avg Velocity (lfpm)	Inspector Initials	Test Date	Avg Velocity (lfpm)	Inspector Initials