

# Chemical Fume Hoods

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## University of Tennessee Safety Procedure IH-002

**Document Contact:** EHS-Lab Safety

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### Purpose

The purpose of this document is to provide guidance for the use and testing of chemical fume hoods on campus.

### Scope and Applicability

This procedure shall apply to chemical fume hoods that are owned by the University of Tennessee, Knoxville. It shall address chemical fume hoods used to control hazardous substances in the laboratory. This plan does *not* address biosafety cabinets, glove boxes, histology grossing tables, clean benches, bench-top exhausts and similar local exhaust ventilation.

### Abbreviations and Definitions

#### Abbreviations

**ANSI:** American National Standards Institute

**CFR:** Code of Federal Regulations

**EHS:** campus Environmental Health and Safety

**GFCI:** ground fault circuit interrupter

**NFPA:** National Fire Protection Association

**OSHA:** Occupational Safety and Health Administration

### Roles and Responsibilities

#### Environmental Health and Safety will:

- Maintain this written plan and place in the online safety manual
- Assist with interpretation of the plan
- Conduct annual chemical fume hood testing
- Assist departments or individuals to the extent feasible with compliance
- Maintain records as required
- Provide training upon request related to chemical fume hood use
- Place a sticker on chemical fume hoods indicating the date of test.
- Send testing reports to Facilities Services



**Departments that have chemical fume hoods shall:**

- Ensure the individuals are trained as appropriate
- Consult with Environmental Health and Safety when specific questions arise related to this plan

**Staff and students who use chemical fume hoods shall:**

- Attend training as needed
- Use the hoods in accordance with their design and limitations
- Report any problems associated with the hoods
- Have a plan to address chemical fume hood shut down; both planned and unscheduled

**Procedures****Deficient Hoods**

Chemical fume hoods that do not meet minimum performance standards shall be tagged out of service by Environmental Health and Safety (EHS). Lab workers present at the time of inspection/testing shall be notified of hoods that fail. The failure shall be noted on the field worksheet. Facilities Services and the department shall be notified immediately of the failure.

**Equipment for Testing**

Individuals performing chemical fume hood testing shall have access to the following equipment.

- Air velocity meter
- Tape measure
- Air current tubes
- Field Worksheets
- Danger tags that read "Do Not Use"
- Disposable gloves
- Eye protection
- Hood labels

**Testing and Observation**

The following procedure will be followed to test and observe the performance of chemical fume hoods in the laboratory.

***For New Installations***

- Record basic information about the hood.
- Measure the width of the hood of the opening of the hood.
- Collect several measurements (screening) at various sash height where the average approximates 100 linear feet per minute.
- Go to II (b) below

**For Existing Chemical Fume Hoods:**

- Set the sash at the most recent testing height
- Note and record on the field worksheet the setting of any baffles that may be present
- At least six measurements must be taken along the face of the hood. Note that less than six measurements may be taken with small hoods having a sash height set below 18 inches or for hoods that are <28" wide.
- Complete the field worksheet (note that calculations may be completed later in the office).
- Place a new sticker on the side of the hood opening or update the existing one if space remains.

**Performance Measures**

The minimum performance measure for a chemical fume hood that contains hazardous materials is 100 linear feet per minute averaged across the face with the sash set at 15 inches. Lower sash heights may be permitted depending on the work to be completed. Ideally no measurements should be plus or minus 20% of the average. Hoods shall be tested upon installation, annually and upon request.

**Chemical Fume Hood Outage**

Unexpected loss of exhaust ventilation for chemical fume hoods could create significant safety or health hazards in a laboratory.

Planned outages are interruptions in exhaust ventilation hoods that are scheduled in advance and generally done for maintenance purposes. Unscheduled fume hood outages are likely the result of an unexpected event such as loss of power or failure of the exhaust fan or controls. The overarching process to address for these events comes from the lockout/tagout standard (Policy GS5) found in the Safety Manual. Chemical fume hood users shall report any failure to Facilities Services.

Facilities Services shall identify the hood(s) that will be shut down or that are out of service and notify users of:

- Date and time of shut down
- Anticipated length of outage
- Reason for shut down
- Warning not to use the hood
- Contact person

Notification may be made in person or e-mail. A sign shall be posted on the sash of the fume hood with information "a" through "e" above.

In addition to the sign, attempts shall be made to physically restrain the sash to prevent use of the hood. This may be done with placing a cable or chain through the sash handle and then around the lower air foil.

Lockout/tagout procedures shall then be followed with respect to the fan motor. Personal protective equipment associated with the work shall be addressed in a separate procedure.

Contact Environmental Health and Safety (EHS) if perchloric acid may have been used in the hood. In addition, EHS is available to develop site specific procedures and

Facilities Services employees who service chemical fume hoods shall be provided with information about this process.

### Multiple Hoods, Sash and Doors

Labs may contain several hoods and may have doors that are open while others are closed. Some hoods have an upper and lower sliding sash and/or sliding panels within a sash. To standardize air flow and observation the following must be completed before testing:

- All lab doors must be in their “normal” or routine position. Doors to the hallway should be closed while doors to adjoin spaces may be open.
- All hoods in the lab must have their sash height set to the measurement height before any measurements are taken.

### Snorkels, Gross Anatomy Tables, Teaching Hoods and Canopy Hoods:

Snorkels, gross anatomy tables, small hoods located in teaching labs and canopy hoods will be checked with smoke tubes and results will be recorded as working or not working properly.

### Labeling

Chemical fume hoods shall be tested and tagged annually. The tagging shall consist of an adhesive label that includes:

- Check appropriate department box
- Name or initials of the individual checking the hood, in the appropriate department box.
- Date the hood was tested
- Sash height where measurements were taken
- Contact number of the department performing the test

### Hoods Tested by Outside Contractors

Hoods that have been tested and labeled by an outside contractor shall also be tested by Environmental Health and Safety to ensure the system is still performing as specified. These hoods shall not be labeled by EHS; however, results of the testing shall be entered on the field worksheet and the summary.

### High Air Velocity Readings

Some hoods are installed to exhaust an average of 100 linear feet per minute with the sash fully open. High velocity is generally not considered ideal for energy conservation or for health protection. However, it is important to realize that the building’s ventilation system may have been designed to keep the lab under negative pressure by exhausting room air via the chemical fume hood. An air current tube should be used to evaluate hood capture efficiency when the average air velocity exceeds 200 linear feet per minute.

### Air Velocity Meters

Air velocity meters must be used in accordance with the manufacturer’s instruction. Individual taking velocity measurements must be familiar with and follow these requirements. Analog devices must bear a recent (less than 12 months) calibration date. Meters that may have been compromised (example: dropped on the floor) or appear to be malfunctioning shall not be used.

### Worker Safety

Chemical fume hoods by their very nature contain hazardous materials and processes. Individuals tasked with checking these hoods should be aware of their potential risk of exposure. Equipment, including velocity meter,

notebooks, etc. must be placed in the lab where they will not become contaminated. Glove must be used if contaminated work surfaces are present. If dermal exposure to an unknown substance or to known hazardous substances occurs, wash that area immediately with soap and water. Eye protection should be worn upon entering labs. Seek the nearest eyewash if the eyes are exposed (e.g. splash).

### **Summary Reports**

EHS shall develop a summary report and submit it to Facilities Services and the department that is using the hood. Results shall be in a table form and include a narrative. Failures and trends shall be noted in the report.

### **Training and Information**

EHS has online training available for chemical fume hoods. Departments/Responsible Units may conduct training on their own. EHS is available for consult as necessary.

### **Recordkeeping**

EHS shall maintain field worksheets for at least two years. Summary data, in paper or electronic form, shall be kept for a minimum of 10 years.

### **References**

ASHRAE 110 Standard

### **Appendices**

Appendix A: Chemical Fume Hood Survey (Field Worksheet)

### **Disclaimer**

The information provided in these guidelines is designed for educational use only and is not a substitute for specific training or experience.

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## Appendix A:

### Chemical Fume Hood Survey Field Worksheet

I. Location of hood: Building \_\_\_\_\_ Room # \_\_\_\_\_

II. Face Capture Velocity Results

(Measure at least 6 point. Also indicate if measurement was variable by placing a “v” next to the reading.)

Height  
(inches)

\_\_\_\_\_

Opening Width (inches): \_\_\_\_\_

III. Average face velocity was \_\_\_\_\_ feet per minute

IV. Calculated total volume of air exhausted \_\_\_\_\_ cubic feet per minute

V. Does any measurement deviate by more than 20% from the average?

VI. Calculated sash height at 100 feet per minutes \_\_\_\_\_ inches

VII. Was there excessive storage in the hood?

VIII. Does the hood have an air flow alarm?      Yes                  No

IX. Are radionuclides used in the hood?    Yes                  No

X. Does the hood have air foils?            Yes                  No

XI. Baffle setting

XII. Results by others      fpm \_\_\_\_\_ date \_\_\_\_\_ group \_\_\_\_\_

XIII. List any sources of turbulence that could affect the hood’s performance

XIV. Does the sash operate smoothly?

XV. Other comments (Use back of this sheet for additional space)

Surveyor:

Date of inspection:

Meter used:

Date meter was last factory calibrated: