Cleveland State University
Office of Environmental Health & Safety

# Standard Operating Procedures
# For
# Chemical Fume Hoods

Cleveland State University, in its efforts to provide for the health and safety of its employees, shall make every effort to ensure that chemical fume hoods are operating within acceptable industry standards. It will be the responsibility of the Office of Environmental Health & Safety (OEHS) to establish guidelines and to ensure the performance of all chemical fume hoods on campus is monitored. Any questions or concerns pertaining to the safe usage of chemical fume hoods should be directed to the Director of Environmental Health and Safety.

## Acquisition and Installation of New Chemical Fume Hoods

Prior to the ordering of any new fume hoods on campus, departments will provide the manufacturer's specifications to OEHS and to Facilities Management. Upon approval from these departments, the unit(s) may be ordered. The installation shall be coordinated with both OEHS and Facilities Management. Prior to use the unit will be tested by the installation contractor to ensure the unit is performing to industry standards and provide copies of certification to OEHS. No unit will be permitted to be used if it is not documented as functioning properly. Units which are not functional will be "tagged" as Out of Service, clearly indicating that it is not to be used as a chemical fume hood.

## Definition of a Chemical Fume Hood

According to the American National Standards Institute and the American Industrial Hygiene Association (ANSI/AIHA), a chemical fume hood is defined as follows: "A chemical fume hood is a boxlike structure with one open side intended for placement on a table or bench……The open side is provided with a sash or sashes that move vertically or horizontally to close the opening. Provisions are made for exhausting air from the top or back of the hood, and adjustable internal baffles are provided to obtain proper airflow distribution across the open face…"[1]. Any unit that does not meet this definition is not considered a chemical fume hood and is not to be used with hazardous materials that specify the use of a chemical fume hood.

[1]American National Standard for Laboratory Ventilation, published by the American Industrial Hygiene Association, ANSI/AIHA Z9.5-2003.

## Indications for Using A Chemical Fume Hood

Use of a chemical fume hood is indicated when work performed creates the potential for an exposure to the chemicals/materials being utilized that is above Occupational Safety & Health Administration's (OSHA) permissible exposure limit (PEL) or the American Conference of Governmental Industrial Hygienist's (ACGIH) threshold limit value-time weighted average (TLV-TWA), whichever is the lowest. An adequately operating chemical fume hood, together with good laboratory work practices will keep exposure of employees/students to hazardous chemicals below the Permissible exposure limits of OSHA, and the threshold limit values of the ACGIH. If there is ever any doubt as to whether either of these exposure levels will be exceeded, the work should be performed in a properly functioning chemical fume hood.

## General Work Practices for Chemical Fume Hoods

The following are work practices that must be adhered to by all employees/students if proper hood performance is to be achieved. They should be posted in each room containing a chemical fume hood:

1. Know the hazard characteristics of the chemical with which you are working. If you are not sure check the chemical's Material Safety Data Sheet (MSDS) or contact OEHS. Be sure to wear all personal protective equipment (e.g. safety goggles, lab coat, etc…). Chemical fume hoods are not intended to replace personal protective equipment.

2. Never lean into the hood as to allow your head to enter the plane of the hood face.

3. Do not allow equipment inside the hood to block airflow through the baffles.

4. Keep all materials inside the hood at least six (6) inches from the hood face.

5. Do not permanently store any chemicals, including flammable or combustible materials inside the hood; use only quantities which are necessary for performance of the days work, and return all flammable and combustible materials to approved storage cabinets.

6. Do not remove hood sash panels unless work to be performed does not involve any hazardous materials.

7. As much as is possible, keep the sash at a height so that the arrow on the sash meets the arrow on the frame. This is the height which provides optimum performance as reflected in testing by a certified testing contractor.

8. Never use a chemical fume hood that has been "tagged" indicating that it is not functioning properly and is Out Of Service.

9. Any employee or student who feels that a hood is not functioning properly should not use the hood and report the problem to OEHS.

10. All hoods should be spot-checked by the user prior to performing any work by placing a sheet of paper at the face of the hood. Movement of the paper inward towards the hood interior is an indication that the ventilation system to which the hood is attached is operational at the time.

## Chemical Fume Hood Testing

All chemical fume hoods on campus will be tested on a routine basis. These tests will be conducted by an outside contractor who has documented experience in ventilation, air quality, and hood testing and balancing. The specifications used in this testing will be developed by OEHS. The contractor upon completion will provide OEHS with a written report on each hood. Any hoods not meeting specifications will be "tagged" by the contractor as Out of Service.

## Test Conditions

Hood should be tested under the same conditions which they are actually used. Units should be emptied of all hazardous materials prior to testing and house only the supplies necessary for performance of the days' experiments. If a large number of hoods are located in one laboratory with a common exhaust, all hoods should be activated at least thirty (30) minutes prior to obtain accurate results.

## Acceptable Performance Standards

Under ideal conditions, chemical fume hoods should operate with an average face velocity of one-hundred (100) linear feet per minute (LFPM) at a sash opening of eight (8) inches. However, if the sash opening is at eight (8) inches or greater, and the average face velocity is between eighty (80) to one-hundred sixty (160) LFPM, the hood performance shall be considered acceptable. Each hood shall be subjected to a "smoke-test"*

The average face velocity shall be determined by dividing the area face into between nine (9) and twelve (12) equal sections at a minimum sash height of eight (8) inches. Air velocity readings will be taken from each section and then the total number of readings obtained shall be averaged. The result shall be considered the average face velocity. The readings from each section of the hood face shall be within a twenty percent (20%) variability of one another.

All Vertical hood sashes shall be marked with arrows to indicate the sash height necessary to obtain the best face velocity. Labels shall be affixed to all fume hoods indicating the most recent date of performance testing.

> *Procedure for Smoke Test : Smoke test will consist of igniting a smoke generating device designed and approved for hood testing inside each hood as close to the face as possible. Visual observations will be made to ensure that any eddy currents present do not cause the smoke to escape beyond the face and into the breathing zone. Any unit that permits smoke to leave the hood interior shall be considered to have failed the smoke test and will be "tagged" Out of Service.

## Hoods Found Not Functioning Properly

Any chemical fume hood found not to function in accordance with the above mentioned procedure will be brought to the attention of Environmental Operations (Facilities Management) via a work order. Each hood must demonstrate both an acceptable average face velocity and pass the smoke test in order to be considered functioning properly. If necessary, the hood or hoods in question will remain "tagged" Out of Service until the repairs or adjustments can be made. Upon completion, the hood shall be re-tested to verify proper performance.

## Results of Testing

Results of testing are kept on file in the OEHS and Facilities Management. A summary of fume hood performance will be prepared by OEHS upon receipt of a written report. This summary will be forwarded to each respective department utilizing chemical fume hoods.

## Hood Maintenance

The Facilities Management is responsible for supervising and/or performing all maintenance and any modification connected with chemical fume hoods. They will notify each department of impending maintenance on their chemical fume hoods. All hazardous materials are to be removed and the hood decontaminated, if necessary, by each departmental user prior to any maintenance work being done. If the procedures require contact with parts that are unable to be decontaminated, then each worker shall utilize appropriate personal protective equipment (e.g. gloves, safety goggles, face shields, etc…). If an employee is unsure as to the type of personal protective equipment needed for a particular task, he/she should contact the Director of Environmental Health & Safety. Facilities Management also performs preventive maintenance programs on a periodic basis to the hood ventilation system.

## References


1. American National Standard for Laboratory Ventilation, ANSI/AIHA Z9.5 – 2003.

2. Laboratory Fume Hoods: A User's Manual, G. Thomas Saunders, 1993.