

**Chemical Fume Hood Maintenance,
Repair and Certification**

Procedure: 6.03 Created: 6/20/2013

Version: 2.0 Revised: 3.8.2016

A. **PURPOSE:** To establish a protocol for maintenance, repair and certification of chemical fume hoods (CFH) at Columbia University. This includes performance testing, reporting and responding to equipment failure, scheduled maintenance, steps necessary to safeguard workers who perform repairs, and the responsibility for implementation of this policy.

B. **APPLICABILITY/SCOPE:** There are two basic categories of laboratory hoods: chemical fume hoods and biological safety cabinets. This policy outlines the design, face velocity requirements, and test procedures for chemical fume hoods. [Biological safety cabinets](#) are tested and certified by an independent contractor and their safe use is outlined in a separate policy. This policy covers all Columbia University campuses, including Morningside, Medical Center, Lamont-Doherty Earth Observatory (LDEO) and Nevis. Environmental Health and Safety also provides annual certification to hoods on both the New York State Psychiatric Institute and Barnard campuses. The specific campus procedures are addressed in the attached appendices.

C. RESPONSIBILITIES

1. Facilities Management

- a. Establish annual preventive maintenance program for all CFH systems.
- b. Upon notification, investigate hood failure through a review of the entire system (e.g., motor, belts, fan unit and electrical connections).
- c. Notify research personnel of the affected lab and EH&S of the hood problem through and provides an estimated time necessary for repair..
- d. Ensure personnel safety when repairing CFH Contact EH&S if clearance is needed.
- e. Repair and adjust flow rate between 80 – 120 feet per minute (fpm) at 12” sash height.
- f. Inform lab PI and research personnel in the lab. Removes lockout of hoods, if used.
- g. Notify EH&S to perform re-certification after repair or adjustment of CFH is complete.

2. Environmental Health & Safety (EH&S)

- a. Perform annual certification of all CFH. Post a certification sticker on each hood.
- b. Inform laboratory and Facilities if a CFH fails certification and post a “Do Not Use” sticker.
- c. Provide necessary clearance to Facilities, when requested.
- d. Re-certify fume hood when notified by Facilities that adjustment or repair is complete.
- e. Remove “Do Not Use” sticker and inform laboratory after recertification.
- f. Assist in the communication between Facilities and users on status of hood repair.

3. CFH Users/Lab Staff

- a. Adhere to the *Chemical Fume Hoods Use in Research Laboratories Policy*

D. DEFINITIONS:

1. Engineering Controls (Chemical Fume Hoods)

Engineering controls are a critical component of protection against workplace hazards, removing the hazard from the worker’s environment. Engineering controls include local exhaust ventilation (e.g., chemical fume hoods) to prevent exposure to gases, chemical vapors and aerosols.

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NOTE: *The use of Perchloric acid is prohibited in standard fume hoods. Perchloric acid should be used only in a chemical fume hood that has been designed for its specific use and is equipped with wash down capabilities. Consult EH&S for additional details.*

Face Velocity: Measurement of the speed at which laboratory air enters a fume hood's face plane opening. The measurement of hood face velocity (V) is important for quantitatively determining the effectiveness of a chemical fume hood in capturing and exhausting materials emitted within it.

Average Face Velocity: Measurement of the speed at which laboratory air enters a fume hood's face plane opening averaged over several measurement points. The average face velocity (V, in ft/min or fpm) is the volumetric flow rate of the hood (Q, in ft³/minute or cfm) divided by the area of the hood face (A, in ft²), or $V = Q/A$. Adequate face velocity ranges from 80-120 linear fpm. Minimum face velocity is the minimum acceptable velocity at any point on the operating opening. This should not be less than 95 percent of the as-designed average face velocity. Maximum face velocity is the maximum acceptable velocity at any point of the operating opening. Maximum face velocity should not be greater than 150 fpm to prevent creation of turbulent air currents within the fume hood.

E. PROCEDURES:

1. Chemical Fume Hood Performance Testing Method

To document performance of a fume hood, EH&S shall measure linear air velocity in the plane of the fume hood face (face velocity) by using an Anemometer.

2. Chemical Fume Hood Performance Testing Procedure

EH&S shall perform chemical fume hood testing and certification annually. Average face velocity is determined by measuring velocity at evenly distributed points in the plane of the hood face in the following manner:

- a. The sash is placed at the lowest working height, not lower than twelve (12) inches, and in no case greater than eighteen (18) inches. The plane of the hood face is divided into (at least) three equal-in-area sections. Face velocity is measured at the center of each section. The hood face velocity is the average velocity of these measurements.
- b. The tester will place a certification sticker on the hood ~~frame at that location~~, between twelve (12) and eighteen (18) inches, where the average face velocity is between 80 – 120 linear fpm. The sticker shall include the test date, flow rate, and initials of the tester.
- c. If the face velocity is less than 80 or exceeds 120 linear fpm, the hood shall be clearly marked “**DO NOT USE**” (see Appendix 1, Attached Sticker).
- d. Fume hood testing information is maintained by the EH&S Office. It shall include department, building, room number, hood ID #, date, velocity (fpm) and tester's initials.

3. Fume Hood Certification Ratings

The fume hood certification is characterized as follows:

- a. **Certified:** A hood is considered certified when the average face velocity is between 80 – 120 fpm at a working sash height of 12-18”.
- b. **Conditionally Certified:** When the face velocity at a working sash height between 12-18” is between 121 and 150 fpm, the hood is considered conditionally certified. *This only applies to specific fume hoods at the Medical Center.*

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- c. **Not Certified:** If the face velocity cannot be maintained between 80-120 fpm at a working sash height between 12 -18”, the hood is considered to have failed and is not certified. A **DO NOT USE** sticker is placed on the sash by EH&S and the laboratory is not permitted to use the hood with chemicals or as an engineering control.

4. Fume Hood Scheduled Maintenance:

- a. Facilities shall perform preventive maintenance on a regularly scheduled basis.
- b. Facilities shall provide advance notification through the communication procedure to relevant PIs, lab personnel and EH&S of the planned interruption of fume hood service –
- c. Facilities will schedule a mutually convenient time for any maintenance with the laboratory, when procedures cannot be interrupted or relocated to another fume hood during this time by the laboratory. The laboratory must be made clear that during this time, no procedures shall be conducted inside the affected fume hoods.
- d. Fume hood service interruption notices shall include:
 - i. Date/time of shutdown
 - ii. Fan Motor #. to be shutdown
 - iii. Re-activation date/time
 - iv. Number to call for further information
- e. Once scheduled, the laboratory shall make necessary arrangements to conduct procedures requiring local exhaust ventilation elsewhere, or suspend these activities until service is restored.
- f. Facilities shall ensure that the affected hoods cannot be used during this time. All hazardous materials inside the hoods must be in closed containers or removed.
- g. Once Facilities has completed maintenance, the PI and EH&S notified.
- h. EH&S must recertify such hoods when maintenance is complete and give clearance for use if it passes re-certification.

5. Roof Work Near Fume Hood Exhaust

Chemical fume hood exhaust stacks are located on building roofs, where the potential exists for the release of chemical contaminants to the outdoor environment. Fume hood exhaust ducts terminate just above the roofline in many cases. Working near these outlets could potentially expose workers to hazardous chemicals, *albeit in extremely dilute concentrations*. If maintenance/repair work must be done on the roof near hood exhaust(s), Facilities must first notify the PI to provide them with information regarding chemicals used in their fume hoods on a regular basis and as requested. Contact EH&S if necessary.

F. EMERGENCY CONTACTS/INQUIRIES

1. Morningside (MS) Campus: EH&S at (212)-854-8749. CUF at (212) 305-4357.
2. Columbia University Medical Center (CUMC) Campus: EH&S at (212)-305-6780. CUF at 854-2222.
3. Lamont (LDEO) Campus: Security & Safety (845)-365-8860.
4. Nevis Campus: (914)-591-9244.

G. MEDICAL SURVEILLANCE N/A

H. RECORDKEEPING

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- a. Maintain all maintenance and repair records
- b. Maintain blue prints for fume hood ducts and any changes

2. EH&S

- a. Maintain records of certification

I. FORMS

1. "Do Not Use" Sticker to be Placed on a Non-Functional Fume Hood

J. REFERENCES:

1. ANSI/AIHA Z9.5-2003, American National Standard for Laboratory Ventilation.
2. ACGIH's Industrial Ventilation: A Manual for Recommended Practice.
3. RCNY Chapter 10, Chemical Laboratories, 1992
4. ANSI/ASHRAE 110-1995 Method of Testing Performance of Laboratory Fume Hoods.

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CAUTION

Do Not Use This Fume Hood

This Hood Is Not Functioning Properly and is Unsuitable For Chemical Use

All Chemicals Must Be Removed from Hood to Repair

Face Velocity (FPM): _____ Name _____

Date Facilities was Notified to Repair: ____/____/____

If any Question, Please Contact:

Department	Phone	For
Facilities Management	See Contacts Below*	Repair, Noise, etc.
Environmental Health and Safety	CUMC 212-305-6780 MS 212- 854 - 8749	Safety, Air Flow, etc.

EH&S Has Notified Facilities for Repair

*CUMC Campus - (212) -305 - 7367

*LDEO Campus - (845)-365-8860

*Morningside Campus -(212)-854 -2222

*Nevis Campus - (914) 591 - 9244

Following Repair Contact EH&S for Recertification

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Appendix A. Morningside Campus Fume Hood Procedures

All items above apply to this campus.

If a fume hood has failed certification as noted by the EH&S posting, the laboratory must place a work order for the repair of the hood by calling (212) 854-2222. Once this has been placed they should forward the work order confirmation email to the building manager for that department. The building manager must then email this confirmation to fumehoods@columbia.edu.

All fume hoods on this campus are certified at a sash height or sash opening of 12-inches.

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Appendix B. Medical Center Campus

All items above apply to this campus.

If a fume hood has failed certification as noted by the EH&S posting, the laboratory must place a work order for the repair of the hood by calling (212) 854-2222. Once this has been placed they should forward the work order confirmation email to occsafety@columbia.edu.

All fume hoods are certified at either 12, 15, or 18 inches, as indicated by the yellow certification sticker placed on the hood by Environmental Health and Safety.

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Appendix C. Barnard College

Columbia University Environmental Health and Safety performs annual certification tests for all chemical fume hoods in Barnard College. If a hood fails the certification test it is reported to Barnard Facilities and the effected department.

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Appendix D. New York State Psychiatric Institute

Columbia University Environmental Health and Safety performs annual certification tests of all chemical fume hoods in the New York State Psychiatric Institute.

If a hood passes certification, a yellow certification sticker is placed on the hood, indicating the appropriate sash height it should be used at. If the hood fails certification, a Do Not Use sign is posted and the fume hood is reported to NYSPI Engineering. Once the fume hood is fixed, Columbia EH&S re-certifies the fume hood.