



# University of New Haven

## POLICIES AND PROCEDURES

**Policy Title:**

### Chemical Fume Hood Policy

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**Responsible Office:** Department of Public Safety

**Responsible Official:** Associate VP of Public Safety & Administrative Services

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## **1.0 General Policy**

The University of New Haven is committed to providing a safe and healthy work environment for employees and students. Chemical fume hoods are one of the primary safety devices in a laboratory. When properly installed, maintained, and tested, a chemical fume hood can offer a substantial degree of protection to the user, provided that it is used appropriately, and its limitations are understood.

This policy outlines the maintenance and performance of chemical fume hoods at the University of New Haven. For further information on the proper use of a chemical fume hood, including basic guidelines for operation, please reference the University Chemical Hygiene Plan.

### **1.1 Purpose**

To establish a protocol for the safe use of chemical fume hoods. This includes performance testing, reporting and responding to equipment failures, scheduled maintenance, appropriate steps necessary to safeguard workers who perform repairs and the responsibility for implementation of this policy.

### **1.2 Scope**

This policy covers all chemical fume hoods at the University of New Haven found in Echlin Hall, Dodds Hall, Buckman Hall and Charger Plaza.

### **1.3 Review**

The Associate Vice President of Public Safety & Administrative Services will review and update this policy whenever necessary or at least annually.

All the elements of this policy are considered University of New Haven policy and may be enforced as such. The failure on the part of the employees to follow the policies and elements of this Plan may result in disciplinary action.

## **2.0 Responsibilities**

### **2.1 Associate Vice President of Facilities**

- Assure Director of Facilities and facility staff responds to all correspondence of non-working chemical fume hoods in a timely manner.
- Maintain an accurate inventory of all chemical fume hoods

### **2.2 Associate Vice President of Public Safety & Administrative Services**

- Update chemical fume hood policy at least annually.
- Assure that chemical fume hoods are being certified annually.
- Maintain an accurate inventory of chemical fume hoods at the University.

## 2.3 Laboratory Managers

- Inform all laboratory personnel if a hood is not working.
- Place a “Do Not Use” sticker on the hood if it is not working properly.
- Contact Facilities for repair or air flow adjustment.

## 2.4 Director of Facilities or Designee

- Repair and adjust adequate flow rate of the chemical fume hoods.
- Provide adequate preventive maintenance to all of the chemical fume hoods and maintain records of maintenance performed.
- Ensure personnel safety when repairing chemical fume hoods.
- Schedule certification of all the chemical fume hoods annually.

## 3.0 Definitions

- Capture velocity: Air velocity at any point in front of the hood is necessary to overcome opposing air currents and to capture the contaminated air into the exhaust hood.
- Face velocity: Average linear air velocity into the exhaust system (i.e. fume hood) measured at the opening of the hood.
- Maximum face velocity: The maximum acceptable velocity at any point on the operating opening.
- Minimum face Velocity: The minimum acceptable velocity at any point on the operating opening

## 4.0 Procedures

### 4.1 Laboratory Chemical Fume Hoods

Engineering controls are the first line of defense against workplace hazards, removing the hazard from the worker’s environment can increase laboratory safety. This includes local exhaust ventilation (i.e., chemical fume hoods) to prevent exposure to gases, chemical vapors and aerosols. 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 only.

**NOTE: The use of perchloric acid in chemical fume hoods is prohibited at the University of New Haven. Please contact the Associate Director of Public Safety & Administrative Services at 203.932.7147 with any questions.**

**4.1.1 Location** - Fume hoods shall be located within a lab in such a way that their performance is not adversely affected by cross drafts. Cross currents, drafts and air currents from open windows, doorways and personnel traffic flow directly influence hood containment ability.

**4.1.2 Ductless Fume Hoods** – Due to the potential for misuse creating an unsafe condition, ductless fume hoods are prohibited from installation or use at the University.

## **4.2 Face Velocity**

The measurement of hood face velocity is important for quantitatively determining the effectiveness of a chemical fume hood in capturing and removing materials emitted within. The average face velocity ( $V$ , in ft/min or fpm) is the volumetric flow rate of the hood ( $Q$ , in ft<sup>3</sup>/minute or cfm) divided by the area of the hood face ( $A$ , in ft<sup>2</sup>). Adequate face velocity ranges from 80-120 linear fpm. Fume hood minimum face velocity should not be less than 95 percent of the as-designed average face velocity. Maximum face velocity should not be greater than 120 fpm to prevent creation of turbulent air currents within the fume hood.

## **4.3 Fume Hood Testing Responsibilities and Procedures**

The University of New Haven uses a third-party contractor to 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:

- The sash is placed at the lowest working height, usually twelve inches. The plane of the hood face is divided into (at least) three equals in area sections. Face velocity is measured at the center of each section. The hood face velocity is the average velocity of these measurements.
- The tester will place a certification sticker on the front of the hood, recording the test date, face velocity at a 12" sash height, and initials on the sticker. The sash height at which the average face velocity is 100 fpm is also indicated.

## **4.4 Fume Hood Certification Ratings Interpretation**

Fume hood certification is characterized as follows:

- **Certified:** A hood is considered certified when the average face velocity at 12" working sash height is between 80 – 120 fpm.
- **Not Certified:** If the face velocity at 12" working sash height is below 80 fpm or above 120 fpm the hood is considered not certified. A "Do Not Use" sign is placed on the sash and the laboratory manager is advised not to use the hood until required repairs and certification is made.

## 5.0 Fume Hood Failure Procedures

### 5.1 User Responsibility

If it is suspected that a fume hood is not working properly, work inside the hood shall stop immediately and the problem reported to:

- University of New Haven Facilities Department at 203.932.7087 or through the University work order system.
- Notify others in the area that the fume hood is not operating and cannot be used and post a "Do Not Use" sign on the hood. The lab manager must strictly enforce that fume hood is not used until it has been properly certified.
- Close/cover any opened/exposed chemical containers. It may be necessary to remove all chemicals and equipment from the hood to allow access for repair.
- Although rare, hood repair may require extended downtime if major parts (e.g. fan motor) need replacement. Procedures that must be conducted within a hood must be relocated to another working hood during this time.

### 5.2 Facilities Department Staff

- Lockout and tagout individual hoods prior to conducting investigations. Ensure that all non-University contractors follow fume hood lockout/tagout procedures.
- Investigates hood failure through a review of the entire system (e.g., motor, belts, fan unit and electrical connections).
- Notifies laboratory staff of the affected lab and Director of Facilities of the hood problem and gives an estimated time necessary for repair. Posts affected hood with "Do Not Use" sign (if not already posted by lab manager).
- When repair is completed, the hood will be recertified for use by a third-party contractor. The facilities department will schedule this recertification with the third-party contractor.
- Removes lockout of hoods when the hood is returned to service and informs relevant individuals.

## 6.0 Fume Hood Scheduled Maintenance:

Facilities shall provide advance notification to relevant laboratory staff/laboratory managers of any planned interruption of fume hood service and tag the affected fume hoods with "Do Not Use" signs.

During this time, no procedures shall be conducted inside the affected fume hoods. If procedures cannot be interrupted or relocated to another fume hood during this time, the laboratory staff shall inform the Facilities department of this conflict and schedule a mutually convenient time for preventive maintenance to be conducted.

Fume hood service interruption notices shall include:

- Date/time of shutdown
- Fan Motor # to be shut down
- Reactivation date/time
- Number to call for further information.

Once scheduled, the laboratory staff shall make necessary arrangements to conduct procedures requiring local exhaust ventilation elsewhere or suspend these activities until service is restored.

- Facilities shall lockout and tagout affected hoods so that they cannot be used during this time. All hazardous materials inside the hoods must be in closed containers or removed.
- Once Facilities have completed the maintenance on the fume hood, the lockout device(s) shall be removed, and the appropriate laboratory manager notified.

## **7.0 Roof Work**

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 diluted concentrations. If maintenance/repair work must be done on the roof of any building containing hood exhaust(s), Facilities must first notify the appropriate laboratory manager of the work to be performed. If needed, the laboratory manager shall provide to facility and/or contractor staff information regarding chemicals used in their fume hoods. It may be necessary to cease work in fume hoods until roof work is complete.

## **8.0 Fume Hood Flow Monitoring Devices**

New and reconditioned hoods should be equipped with an airflow-monitoring device that provides an indication of the face velocity. The device should be checked and recalibrated by a third-party contractor annually at the time of recertification. For any damaged devices Facilities should be contacted for repair or replacement.

## **9.0 Fume Hood Safe Work Practices**

Lab personnel shall employ proper work practices that minimize/eliminate their exposures when working with hazardous materials in fume hoods:

- Lab personnel should not place their upper body in the fume hood except during initial setup of equipment inside the hood, before any hazardous materials have been placed inside the hood.
- Hazardous materials should be placed > 6" inside the hood for proper containment of chemical vapors.
- Hoods should not be used for permanent storage of hazardous materials.
- Equipment inside the hood should be placed so as to not block airflow through slots in the baffle.
- Equipment that could be sources of emission (including in case of breakage) should be placed > 6" inside the hood.
- The hood sash or panels should be lowered to the lowest (comfortable) working height, usually 12". Fully opening the sash lowers the face velocity to the point of ineffectiveness.
- The hood sash or panels shall not be removed except for initial experimental setup and before hazardous chemicals are placed in the hood.
- Each hood shall be posted with a sticker showing the date of last certification. If the hood failed the performance test, it shall be taken out of service until repaired, or posted with a restricted use notice.

## **10.0 Removing Hoods from Service**

When a chemical fume hood is to be removed from service, the laboratory manager must ensure that all hazardous materials have been removed and the hood has been properly decontaminated. After decontamination and final survey, clearance for removal will be given.

## **11.0 References:**

- ANSI/AIHA Z9.5-2003, American National Standard for Laboratory Ventilation.
- ACGIH's Industrial Ventilation: A Manual for Recommended Practice.
- RCNY Chapter 10, Chemical Laboratories, 1992
- ANSI/ASHRAE 110-2016 Method of Testing Performance of Laboratory Fume Hoods.



## **APPENDIX A - Face Velocity Measurement Procedure**

Average face velocity will be determined by measuring air 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, usually twelve inches. The plane of the hood face is divided into (at least) three sections equal in area. 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 certification sticker on the front of the hood, recording the test date, face velocity at a 12" sash height and initials the sticker. The sash height at which the average face velocity is 100 fpm is also indicated.
- c. If fume hood is not working according to the specifications, the laboratory managers have been instructed to clear the fume hood so that Facilities or a contactor may repair or make proper adjustments to the fume hood.
- d. Upon adjustment or repair, and notification by Facilities, the laboratory manager will contact a 3rd party contractor to verify the fume hood velocity is appropriate (minimum average 100 fpm @12 inches) and provide certification.

## **APPENDIX B - Hood Out of Service Signage**

This signage is required to be placed on chemical fume hood when not working as designed:

**DANGER**

**HOOD IS NOT WORKING**

**DO NOT USE**

**FOR QUESTIONS CALL FACILITIES AT 203.932.7087**



## APPENDIX C - Chemical Fume Hood Inventory

### Chemistry

| Room Number      | Number of Chemical Fume Hoods |
|------------------|-------------------------------|
| Buckman 301      | 10                            |
| Buckman 304      | 5                             |
| Buckman 306      | 1                             |
| Buckman 307      | 10                            |
| Buckman 310A     | 2                             |
| Buckman 310B     | 2                             |
| Buckman 310C     | 3                             |
| Buckman 311      | 3                             |
| Buckman 313      | 3                             |
| Buckman 314      | 4                             |
| Buckman 332      | 5                             |
| Buckman 331A     | 3                             |
| Buckman 311B     | 2                             |
| Total # of Hoods | <b>54</b>                     |

### Biology

| Room Number      | Number of Chemical Fume Hoods |
|------------------|-------------------------------|
| Charger Plaza 5  | 1                             |
| Charger Plaza 6  | 2                             |
| Charger Plaza 14 | 2                             |
| Dodds 103        | 3                             |
| Dodds 302        | 1                             |
| Dodds 305        | 4                             |
| Dodds 306        | 1                             |
| Dodds 308        | 1                             |
| Dodds 309        | 0                             |
| Dodds 311        | 1                             |
| Total # of Hoods | <b>16</b>                     |

## Forensics

| <b>Room Number</b>      | <b>Number of<br/>Chemical Fume<br/>Hoods</b> |
|-------------------------|--|
| Dodds 408               | 2  |
| Dodds 411               | 3  |
| Dodds 412               | 2  |
| Dodds 413B              | 2  |
| Dodds 414A              | 1  |
| Dodds 415               | 4  |
| Charger Plaza 108/110   | 2  |
| <b>Total # of Hoods</b> | <b>16</b>                                    |

## Fire Science

| <b>Room Number</b>      | <b>Number of Chemical<br/>Fume Hoods</b> |
|-------------------------|--|
| Echlin Hall 11          | 3  |
| <b>Total # of Hoods</b> | <b>3</b>                                 |