# Madison Area Technical College
# EHS103 – Laboratory Fume Hood

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## CONTENT



## FORMS

Chemical Fume Hood Inspection Form
Chemical Fume Hood Inspection Checklist

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## *PURPOSE*

To establish a protocol for the safe uses of chemical fume hoods (CFH). This includes safe work practices, performance testing, reporting and responding to equipment failure, scheduled maintenance, alarms, fires and evacuations, and removing from service.

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## *SCOPE & APPLICABILITY*

The requirements of this policy apply to the Madison Area Technical College (the college, college) District.

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## *DEFINTIONS*

**Capture Velocity:** Air velocity at any point in front of the CFH 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. chemical fume hood) measured at the opening into the CFH.

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## *RESPONSIBILTY*

**Risk Management/Environmental Health and Safety Manager (Risk/EHS)**

- Ensure all CFH are certified annually.
- Maintain records of CFH inspection and testing.
- Re-certify CFH when repair is complete.
- Gives clearance for use after retesting/recertification.

**Instructor**

- Ensure CFH(s) are operational when working with chemical or other hazardous products.
- Ensure CFH(s) are working as intend while in use.
- Ensure students utilize CFH in a safety manner and as intended by the manufacturer.
- Immediately cease using CFH (s) when malfunction is detected.
- Report any CFH malfunctions to Risk/EHS Manager.
- Resume use of CFH only after notified by Risk/EHS Manager.

**Student/Visitor/Contractor**

- Immediately cease using CFH (s) when malfunction is detected.
- Report any CFH malfunctions to instructor.

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## *LABORATORY CHEMICAL FUME HOODS*

**Chemical Fume Hoods**

Engineering controls are the first line of defense against workplace hazards. This includes local exhaust ventilation (i.e., chemical fume hoods) to prevent exposure to gases, chemical vapors and aerosols. The category of laboratory hood found in the procedure is chemical fume hoods (CFH). This policy outlines the design face velocity requirements and test procedures for CFH.

**Location**

CFH shall be located and used in areas where chemicals and/or products what give off vapors, aerosols, or toxic byproducts will be worked with. CFH 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 CFH containment ability

**Safe Work Practices**

Lab personnel shall employ work practices that minimize/eliminate their exposures when working with hazardous materials in CFH's:

- Instructors/students should not place their upper body in the CFH except during initial setup of equipment inside the CFH, and before any hazardous materials have been placed inside the CFH.
- Hazardous materials should be placed > 6" inside the CFH for proper containment of chemical vapors.
- CFH shall not be used for permanent storage of hazardous materials.
- Equipment inside the CFH shall 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 CFH.
- The CFH 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 CFH sash or panels shall not be removed except for initial experimental setup and before hazardous chemicals are placed in the CFH.
- Each CFH shall be posted with a sticker showing the date of last certification. If the CFH failed the performance test, it shall be taken out of service until repaired, or posted with a restricted use notice.
- Filters to remove contaminants, though rarely used for specific operations like volatile radioactive materials, shall be maintained as recommended by the manufacturer.

**Performance Testing Procedure**

Performance tests for CFH’s require

1. Exhaust rate measured by a calibrated orifice;
2. Linear air velocity measured in the plane of the CFH face (face velocity); or
3. Heavy and light smoke tests at different CFH sash positions.

NOTE: The linear air velocity method is used to document performance of CFH by the Risk/EHS Office. If additional problems are suspected with a particular CFH, all three performance tests may be performed.

Face Velocity

The measurement of CFH face velocity is important for quantitatively determining the effectiveness of a CFH in capturing and removing materials emitted within it. The average face velocity (V, in ft/min or fpm) is the volumetric flow rate of the CFH (Q, in ft3/minute or cfm) divided by the area of the CFH face (A, in ft2). Adequate face velocity ranges from 80-120 linear fpm. Minimum face velocity is the minimum acceptable velocity at any point on the operating opening, for example 80 fpm. 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 120 fpm to prevent creation of turbulent air currents within the CFH.

Responsibilities and Procedures

Risk/EHS shall ensure CFH testing and certification is perform annually. Average face velocity is determined by measuring velocity at evenly distributed points in the plane of the CFH face in the following manner:

- The sash is placed at the lowest working height, usually twelve inches. The plane of the CFH face is divided into (at least) three equal in area sections. Face velocity is measured at the center of each section. The CFH face velocity is the average velocity of these measurements.
- The tester will place a certification sticker on the front of the CFH, 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.
- CFH testing records are maintained by the Risk/EHS Office. These records include name of the individual conducting the test, department, building, room number, CFH ID #, date, velocity (fpm) and tester initials.

CFH certification is characterized as follows:

- **Certified:** A CFH 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 CFH is considered not certified. A DO NOT USE sticker shall be placed on the sash.

**Scheduled Maintenance**

- All CFH's shall undergo annual checks including ductwork as a part of preventive maintenance.
- CFH's that are being repaired, or that are malfunctioning shall have "Do Not Use" signs placed on them.
- During this time, no procedures shall be conducted inside the affected CFH.
- CFH undergoing maintenance shall be lockout and tagout so that they cannot be used.
- All hazardous materials inside the CFH's must be in closed containers or removed.
  Once maintenance has completed, the lockout device(s) shall be removed and Risk/EHS notified.
- Risk/EHS shall reevaluate such CFH's and give clearance for use when maintenance is complete.

Roof Work

CFH exhaust stacks are located on the roof, which may release chemical contaminants outdoors. CFH 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 of any building containing CFH exhaust(s), notification shall be provide to the individuals doing the work.

**Monitoring Devices**

New and reconditioned CFH's should be equipped with an airflow-monitoring device that provides an indication of the face velocity. For uniformity the selection must be reviewed by Risk/EHS. The device should be checked and recalibrated by Risk/EHS annually at the time of recertification. Malfunctioning or damaged shall be taken out if service until such time as repairs and/or calibrations can be preformed. If the monitor alarms close the sash immediately, and keep the sash closed until the monitor ceases to alarm. If monitor continues to alarm evacuate the immediate area and contact maintenance. Do not begin to use CFH until the source for the alarm is identified and corrected.

**Fires and Evacuation**

If a fire starts in a CFH, pull the sash down (if it can be done safely). If the fire is small and you have been trained to use a fire extinguisher, do so. If the fire is large or there are flammable chemicals/products in the CFH, do not attempt to fight the fire; locate and pull the nearest fire alarm and evacuate the building. Notify appropriate parties so that the details about the fire can b communication to the fire department when they arrive.

**Removing from Service**

When a CFH is to be removed from service, ensure all hazardous materials have been removed and the CFH has been properly decontaminated. If radioactive materials have been used in the CFH, an officer certified to deal with radiation shall survey the CFH for radioactive contamination. After decontamination and final survey, clearance for removal is given by Risk/EHS.

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## REFERENCES

Please contact Risk/EHS Manager for more information.