

Stanford University

Laboratory Fume Hoods - Performance Criteria and Certification Protocol

I. Application

- Laboratory fume hoods are used to prevent harmful exposure to hazardous substances.
- This protocol is to be used by Stanford University in-house personnel (e.g., HVAC Shop) and contractors installing new fumehoods during the commissioning phase of new buildings/renovations. **[NOTE: For laboratory fume hoods intended to operate in the 60 fpm setback conditions when unoccupied, additional certification procedures apply; contact EH&S at 723-0448.]**
- This document does not apply to biosafety cabinets or other exhausted enclosures.

II. Definitions (per 8 CCR 5154.1 Ventilation Requirements for Laboratory-Type Hood Operations)

Laboratory-Type Hood: A device enclosed except for necessary exhaust purposes on three sides and top and bottom, designed to draw air inward by means of mechanical ventilation, operated with insertion of only the hands and arms of the user and used to contain hazardous substances.

Hazardous Substance: One which by reason of being explosive, flammable, poisonous, an irritant, or otherwise harmful is likely to cause injury or illness.

III. Use

Observation of the laboratory hood environment, maintenance, and work practices can provide an indication of proper exposure control performance. For example, if the sash(es) of the hood are left open during operation of the research activity, the hood is likely to reduce its functional effectiveness. Laboratory fume hood performance can also be compromised by the following factors:

- equipment blocking airflow to slots in baffle
- equipment placed within 6" from the plane of hood face
- hood sash or panels not replaced after equipment setup completed
- cross drafts – can be due to ventilation supply ducts or blowers/exhaust related to nearby equipment
- maladjustment of exhaust dampers
- worker leaning into the hood
- leaks in exhaust ducting
- turning off the hood fan during actual hood use

IV. New Laboratory Fume Hoods or other Special Purpose Hoods

New Equipment – New Facilities and Additions to Existing Facilities

- The project's contractor is responsible for the initial certification and balancing of the system using this protocol.
- Project managers are responsible for informing the appropriate unit when new laboratory fume hoods are coming on line:
 - For the main campus, contact: Stanford University's HVAC Shop at 723-3360.
 - For the School of Medicine, contact: Engineering & Maintenance at 723-5555.

Unauthorized Equipment

- If new fume hoods are identified (or removed) during the annual laboratory fume hood survey, report to the following:
 - For the main campus, contact: Stanford University's HVAC Shop at 723-3360.
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--For the School of Medicine, contact: Engineering & Maintenance at 723-5555.
This is important so that these hoods can be included in subsequent surveys and to determine if this additional equipment has created an unbalance in the building's HVAC laboratory exhaust systems.

V. Performance Criteria

To ensure proper laboratory fume hood exposure control performance, each of the following criteria must be observed:

A) Quantitative Assessment Criteria

Per 8 CCR 5154.1(c)(1), laboratory fume hoods shall provide a minimum average effective face velocity of 100 feet per minute (fpm), with a minimum 70 fpm at any point.

B) Qualitative Assessment Criteria

Laboratory fume hoods shall maintain an inward flow of air at all openings, which shall be demonstrated using smoke tubes or other suitable qualitative methods.

C) Quantitative Air Flow Indicator Requirement

Per 8 CCR 5154.1(e)(3)(A), a quantitative airflow monitor shall be provided. It must be located so that it is visible from the front of the fume hood.

- 1) Follow manufacturer's procedures for calibration during installation. Follow manufacturer's schedule for periodic calibration and maintenance parameters thereafter.
- 2) Performance criteria for various airflow indicators are as follows:
 - FPM Readout: Average readout is 100 fpm.
 - Airflow Alarm System with Audio or Visual Alarms: Go into alarm mode if average face velocity drops to 80 fpm.
 - Consult with EH&S on performance criteria for other acceptable devices

VI. Frequency of Certification

Laboratory fume hoods used to prevent harmful exposures are required to be certified:

- annually, at a minimum (*per 8 CCR 5143*)
- whenever a laboratory fume hood has been modified
- whenever the exhaust duct system connected to a hood has been modified.

VII. Equipment/ Materials Required For Certification

- Thermal anemometer (calibrated as specified by manufacturer)
- Titanium tetrachloride, dry ice in water, or other means of visualizing airflow
- Tape measure
- Laboratory Fume Hood survey forms

VIII. Certification Procedure

To attain certification, a laboratory fume hood must pass both the quantitative and qualitative evaluation and have a functioning quantitative airflow indicator.

A) Qualitative Evaluation – “Smoke Test”

- 1) Position the sash at the 15” height.
- 2) Generate “smoke” in direction perpendicular to exhaust flow from locations of containment.

- 3) Generate “smoke” around the perimeter of the designated face, and any other location within the fume hood where turbulent airflow is thought to exist (i.e., around any large obstructions).
- 4) If the smoke is contained within and exhausted from the fume hood, the unit has PASSED the qualitative evaluation.
- 5) Record all collected data on Laboratory Fume Hood Survey Form, or equivalent.

B) Quantitative Evaluation - Face Velocity Measurement

- 1) Position the sash at the 15” height.
- 2) Set a simple grid pattern w/ grid intervals of 1 foot or less.
- 3) Locate thermal anemometer at center of every segment and measure/ record velocity.
- 4) Calculate average face velocity and identify minimum value.
- 5) If average face velocity is greater than or equal to 100 fpm, with a minimum of 70 fpm at any point, the unit has PASSED the quantitative evaluation.
- 6) Record all collected data on Laboratory Fume Hood Survey Form, or equivalent.

C) Air Flow Indicator

- 1) Record the type and condition of airflow indicator on the Laboratory Fume Hood Survey Form.
- 2) If the air velocity indicator is not functioning, contact Fac/Ops Zone manager to issue work order to evaluate if it is out of calibration, broken, etc. and to repair it.

D) For units that PASS both the Quantitative and Qualitative Evaluations and has a *functioning* Air Flow Indicator:

- 1) Document that unit has passed performance inspection on the Survey Form and affix a certification sticker. The unit is certified for use to prevent harmful exposures to hazardous substances.
- 2) Mark sash position at the 15” height at which the hood performance was certified.

E) For units that FAIL, immediately:

- 1) Inform users, FacOps Zone Manager or Engineering & Maintenance, and building manager that the unit has FAILED performance inspection and CANNOT be used for containment of hazardous materials until the unit has been certified.
- 2) Document that the unit has failed performance inspection on the Survey Form.
- 3) Affix signage to hood stating that it CANNOT be used for preventing harmful exposures to hazardous chemicals.
- 4) If fume hood appears to have failed certification due to improper hood use/ setup (i.e., due to equipment blocking baffles), indicate as such on the Survey Form and communicate to the Laboratory Manager for correction prior to any retesting.
- 5) If fume hood appears to have failed certification due to mechanical deficiencies, immediately request Fac/Ops Zone manager or Engineering & Maintenance to initiate repairs to reduce hood downtime.
- 6) Repeat performance evaluation after necessary corrections have been made.

Stanford University Laboratory Fume Hood Survey

Date:	
Technician/Company:	
Survey Equipment:	
Thermal anemometer Model #	
Unit #	
Last Date of Calibration	
Fume Hood Information	
Building, Room #	
Fume Hood Local ID	
Make/Model of Fume Hood	
Program ID # (assigned by Stanford)	
Fan System #	
Comments (e.g., hood clear or cluttered, sash at appropriate height)	

Smoke Test:

Smoke generated around face of perimeter contained? Y/N

Velocity Measurements:

Average Velocity (fpm): (or attach digital printout)	Minimum Velocity (fpm)	Accept (Y / N)	Comments:

Air Flow Indicator:

Type of Indicator (check box)	Describe Status	Comments
FPM Readout	FPM:	
Audio Alarm	Alarm sounds: yes or no	
Visual Alarm	Green mode or red mode (circle)	
Other:		

Field Data:
