

**UNIVERSITY OF HOUSTON
ENVIRONMENTAL HEALTH AND SAFETY
POLICIES AND PROCEDURES**

SECTION: ENVIRONMENTAL HEALTH AND SAFETY

SUBJECT: LABORATORY FUME HOOD VALIDATION

I. PURPOSE

The following laboratory fume hood validation procedures detail Environmental Health and Safety's (EHS) efforts to determine if the airflow rate is adequate for safe use by laboratory personnel. A fume hood is generally used in a laboratory as a safety device to provide local control and removal of airborne contaminants, ventilation, containment, shielding, or other uses. The proper operation of fume hoods is vital to the safety of the laboratory user. EHS will inspect all fume hoods as part of the regularly scheduled annual laboratory safety inspection program. These procedures apply to all fume hoods located on the main campus, ERP, and College of Pharmacy located in the Texas Medical Center.

II. PROCEDURES

The fume hoods should be operated at the proper working sash height or door opening as follows:

- ❑ Bench fume hood with horizontal sash - 18" working sash height, measured from fume hood deck, not outer lip
- ❑ Bench fume hood with vertical sliding doors – 18" working gap between doors
- ❑ Walk-in fume hood with horizontal doors – determined by the needs of the specific investigator and the manufacturer specifications
- ❑ Walk-in fume hood with vertical doors – determined by the needs of the specific investigator and the manufacturer specifications

In general, Plant Operations (PO) is responsible for routine maintenance of belts and motors. EHS will advise Principal Investigator (PI) to immediately report all fume hoods found to be deficient to Plant Operations Customer Service Center – (FIXIT) by phone or online request at <https://ssl.uh.edu/plantops/services/online-request/index.php>. Other needed repairs, such as malfunctioning low-flow alarms or inoperative sashes or doors, should also be reported to plant operations by laboratory personnel. EHS may be required to determine if fume hoods are safe for PO personnel to work where chemicals or radioactive materials are used.

A database of all fume hoods is maintained by EHS. Each fume hood will have a Fume Hood ID number (FH/BLDG#/ROOM#/#). Inspection dates and flow rates found during EHS

validation will be maintained by EHS and recorded in the Safety Equipment Database found at P:\EHRM\Lab Safety Program\Database.

The following equipment is needed to perform the fume hood validation:

1. Air velocity meter to measure fume hood flow rates
2. Tape measure
3. Calculator
4. Yellow verification of measurement label with sash height arrow and sharpie
5. Smoke Testing Equipment - Wizard Stick/Super Fluid/AA batteries
6. Fume Hood Face Velocity Measurement form
7. Notice of Fume Hood Deficiency form

The following measurement techniques are to be used:

- 1) All readings will be taken with the hot wire anemometer or similar instrument. The anemometer is used to measure inward linear air (face) velocity in ft/min on the same plane as the fume hood sash or doors at 25% (4.5") and 75% (13.5") of an 18" sash height, which is measured from the fume hood deck, not the outer lip.



25% (4.5")



75% (13.5")

- 2) Place the tape measure down along the length of the fume hood opening. Equally spaced air velocity readings will be taken per foot of the entire length of the fume hood (see page 7) and recorded on Fume Hood Face Velocity Measurements form, as follows:
 - Bench fume hood with horizontal sash – sash at working height (18") from the fume hood deck
 - Bench or walk-in fume hood with sliding doors – consult with investigator for normal working opening and/or contact manufacturer for equipment specifications
 - Walk-in fume hood with horizontal sashes - consult with investigator for normal working opening and/or contact manufacturer for equipment specifications

3) The average face velocity will be calculated by averaging the velocity readings

Criteria used for satisfactory face velocity

The target range of desired face velocities for conventional bench type fume hoods will be between **80-120 ft/min**. As stated previously, walk in fume hoods will be handled on an individual basis with the specific investigator and manufacturer involved.

For fume hoods that **DO NOT** meet the minimum flow rate (80 ft/min), the following steps will be taken:

- 1) Inform the PI or designated lab personnel that the fume hood has failed the validation procedure and should not be used until repairs are completed by PO personnel.
- 2) The PI or designated lab personnel is responsible for contacting the Physical Plant Customer Service Center – (FIXIT) at 3-4948 or online request at <https://ssl.uh.edu/plantops/services/online-request/index.php> to report the deficiencies.
- 3) The PI or designated lab personnel must remove all chemicals from fume hood before signing the Notice of Fume Hood Deficiency form
- 4) The PI or designated lab personnel must sign the Notice of Fume Hood Deficiency form
- 5) Post the Notice of Fume Hood Deficiency on the fume hood
- 6) Record results on the Fume Hood Face Velocity Measurement form and in the Safety Equipment Database found at P:\EHRM\Lab Safety Program\Database
- 7) Follow up with the PI or designated lab personnel within 5-7 business days to schedule fume hood revalidation after repairs are made

For fume hoods that fall in the target range (80-120 ft/min), the following steps will be taken:

- 1) Record date, expiration date (1 year from test date), average face velocity, and initials of inspector on the yellow verification of measurement sticker
- 2) Post the sticker at the sash working height (18")
- 3) Record results on the Fume Hood Face Velocity Measurement form
- 4) Include Fume Hood Face Velocity Measurement form in Inspection Report

- 5) Record results in the Safety Equipment Database found at P:\EHRM\Lab Safety Program\Database

For fume hoods that exceed the target range (> 120 ft/min), the following steps will be taken:

- 1) Refer to the smoke test results
- 2) If the fume hood passes the smoke test, record date, average face velocity, and initials of inspector on the yellow verification of measurement sticker
- 3) Post the sticker at the sash working height (18")
- 4) Record results on the Fume Hood Face Velocity Measurement form
- 5) Include Fume Hood Face Velocity Measurement form in Inspection Report
- 6) Record results in the Safety Equipment Database found at P:\EHRM\Lab Safety Program\Database

Smoke testing procedures (pass/fail)

1. Using a Wizard Stick run the smoke along the outside perimeter of the sash opening.
2. Next, run the smoke along the inside perimeter of the sash.

All smoke should be pulled inward. If smoke breaches containment of the fume hood sash opening the equipment has failed. Record results on Fume Hood Face Velocity Measurement form.



All smoke must be pulled into the fume hood.

III. EQUIPMENT USE INSTRUCTIONS

AIR VELOCITY METER (MODEL 9525)

The model 9525 air velocity meter is powered with four size AA batteries. Install batteries by loosening the screw in the battery access cover (see image) located on the back of the instrument.



Using the telescoping probe

The telescoping probe contains the velocity sensor (see picture). When using the probe, make sure the sensor window is fully exposed and the orientation dimple is facing upstream.

Extending the Probe - To extend the probe, pull the black tip of the probe from the center of the instrument

Retracting the Probe - To retract the probe align the sensor window so that you can view straight through the window from the front of the instrument. Grasp probe tip and push firmly straight into instrument case.

Operation

ON/OFF Switch – used to turn on or turn off power. When the instrument is turned on, it will display approximate battery life in percent for five seconds.

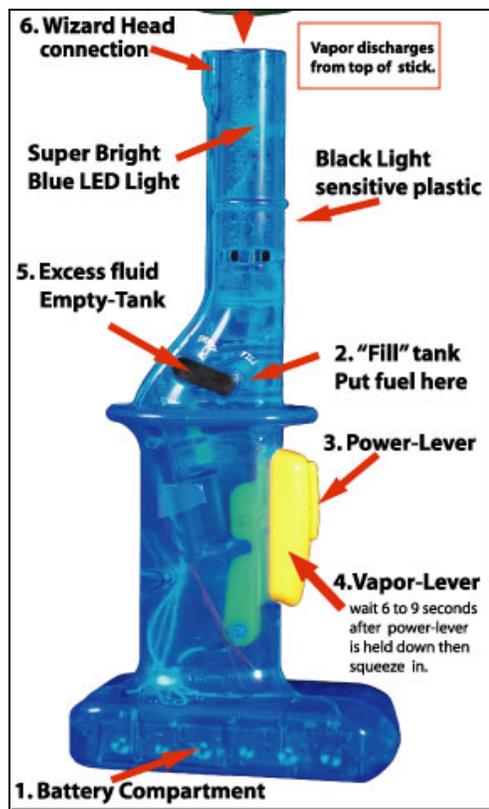
BATT/VEL Switch – This switch is used to change display to read air velocity or approximate percentage of remaining battery life.

FAST/SLOW Switch – This switch is used to change the display average of the Model 9525. When set to FAST, the display average is approximately 3 seconds. When set to SLOW, the display average is approximately 12 seconds.



SMOKE TEST EQUIPMENT

1. Install 6AA batteries per instructions in battery compartment.
2. Fill Fluid tank about $\frac{3}{4}$ full with Super Zero Fluid.
3. Press power-lever down gently until Bright Blue LED light glows indicating power is on. When you release the Power-Lever the power will go off.
4. While holding the Power-Lever down wait 6-9 seconds for the vapor generator to heat up, then squeeze the Vapor-Lever to create a full plume of vapor. Note: The longer the Power-Lever is held down before the Vapor-Lever is squeezed the better the vapor production.
5. If the excess Fluid Tank is full, suck out the fluid, with the Super Zero Fuel bottle and put the fluid back into the FILL tank to re-use.
6. For best operation,
 - a. tilt Wizard Stick forward before squeezing the Vapor-Lever
 - b. Empty excess fluid from Empty tank when $\frac{1}{2}$ full



IV. REFERENCES

ANSI/ASHRAE 110-1995, "Method of Testing Performance of Laboratory Fume Hoods." (1995 or most recent addition)

"Prudent Practices in the Laboratory: Handling and Disposing of Chemicals" National Research Council, National Academy Press, Washington, D.C. (1995 or most recent edition)

University of Houston

NOTICE OF FUMEHOOD DEFICIENCY

Building: _____

Room No: _____

Fume Hood ID Number (FH/BLDG#/ROOM#/#): _____

As part of the laboratory safety inspection program, this fume hood was validated by Environmental Health and Safety Department (EHS) personnel, and was found to have the following problem(s):

- Low Flow Rate (< 80ft/min)
- No Flow (< 25 ft/min)
- Flow Blocked by Equipment Inside
- Flow Blocked by Equipment Outside
- Failed smoke test
- Sash Inoperative
- Other _____

REPORT TO: Plant Operations Customer Service Center – (FIXIT) by phone or online request at <https://ssl.uh.edu/plantops/services/online-request/index.php>

ALL CHEMICALS MUST BE REMOVED FROM FUME HOOD

THIS FUME HOOD SHOULD NOT BE USED UNTIL THE REPAIRS ARE COMPLETED AND THIS NOTICE HAS BEEN REMOVED BY ENVIRONMENTAL HEALTH AND SAFETY PERSONNEL.

Inspected by: _____

Date: _____

PI/lab personnel signature: _____

FUME HOOD FACE VELOCITY MEASUREMENTS

Building: _____ Date: _____

Room Number: _____ Check after repairs Date: _____

Fume Hood I.D. (FH/BLDG#/ROOM#/#) _____

Type of Fume Hood: _____ Bench hood with horizontal sash
 _____ Bench hood with vertical sliding doors
 _____ Walk-in with horizontal sashes
 _____ Walk-in with vertical sliding doors
 _____ Other: _____

Air Velocity Measurements for Bench Hood with Horizontal Sash at Working Height (18")

Reading at 75% sash opening								
Reading at 25% sash opening								
	1ft	2ft	3ft	4ft	5ft	6ft	7ft	8ft

1) Average Face Velocity PASS
 _____ ft/min FAIL

2) Smoke Test Results: PASS
 FAIL

3) Fume Hood Identifier Label (FH/BLDG#/ROOM#/#) applied to fume hood *check box*

- 4) Deficiencies noted:
- Low Flow Rate (< 80 ft/min)
 - No Flow (< 25 ft/min)
 - Flow Blocked by Equipment Inside
 - Flow Blocked by Equipment Outside
 - Sash Inoperative
 - Failed smoke test
 - Other _____
 - None

