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## Fume Hood Testing and Reporting Protocol

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**Applies to:** (examples; Faculty, Staff, Students, etc)

Staff

**Policy Overview:**

Issued: 02-01-2017

Next Review Date: 06-15-2022

Frequency of Review: Annually

Applies to Office of Environmental Health & Safety and Facilities Department.

**Definitions:**

Term
Hot wire anemometer
Inspection record sticker (figure 1)
Smoke bottle
Arrow/hood sash placement sticker (figure 2)
Tape measure

**Details:**

1. Summary of Procedure
  - a. To ensure laboratory fume hoods meet accepted performance criteria established by University of Health Sciences and Pharmacy in St. Louis.
2. Scope and Application
  - a. Fume hoods are a necessary element of any research or teaching laboratory. In order to assure proper performance, a comprehensive inspection and tracking program is required. The program must:
    - i. Assure hood performance by assessing visual/qualitative hood parameters and tracking and maintaining the face velocities of the hoods
    - ii. Place all hoods in an ANNUAL routine inspection system at minimum
    - iii. Track repairs and problem hood systems that should be evaluated
    - iv. Provide accurate data and effortless (user friendly) extraction
    - v. Incorporate a university wide utility.

**Procedures:**

1. Visual/Qualitative Assessments:
  - a. Assure that all components are intact (i.e. has a sash or airfoil been removed by the user).
  - b. Visually assess the possibility of cross drafts via supply air diffusers, utilize smoke test if necessary.
  - c. Assure sashes are functional and working properly.
  - d. Assure that the hood is not cluttered with equipment, have the lab remove unnecessary equipment and elevate equipment when possible to 1 inch above the working surface of the fume hood and perform a smoke test if necessary.
  - e. If the hood fails the qualitative/visual assessment, then the appropriate action should be taken (e.g. informing the lab that they cannot remove the airfoil, calling in a work order to address potential cross drafts/non-functioning sash, informing the lab that equipment should be elevated or removed when possible).
  - f. Smoke tests (small visible challenges) should be conducted if items 2 and or 4 are in question from above. Smoke tests should be conducted in the following manner per ASHRAE 110-1995:

- i. "The operation of the bottom air bypass air foil shall be tested by running the smoke source under the air foil. Smoke shall be exhausted smoothly and not be entrained in the vortex at the top of the hood."
- ii. A stream of smoke shall be discharged from the source along both walls and the floor of the hood in a line parallel to the hood face and 6 inches behind the face of the hood and along the top of the face opening."
- iii. If circumstances do not allow discharge of smoke 6 inches behind the face of the hood then conducting the challenge 6 inches in front of the face of the hood is acceptable.
- iv. All smoke should flow to the rear of the hood to be exhausted. Areas identified with little or no smoke or air movement, smoke or flow out of the hood should be noted and discussed with the occupants of the lab.
- v. **\*\*\*Smoke tests are strictly qualitative and should only be used as a visual aid in assessing hood containment/performance.**

## 2. Testing:

- a. Face velocities for fume hoods are typically measured at 14" sash height (14" from the working surface of the fume hood) or center open horizontal pane configuration (exceptions should be considered, i.e.  $Q=VA$  or ASRAE report/sticker) using a hot wire anemometer. The mark indicating the 14 inch sash height will be indicated using adhesive arrows (figure 1). A minimum of four readings will be taken within an imaginary grid at the sash opening, preferably at the vertical midpoint of the sash opening as depicted in Diagram 1 for vertical or horizontal pane configuration.

## 3. Reporting

### a. Compliant fume hoods:

- i. Performance criteria - Fume hoods pass if a face velocity requirement of  $>80$  fpm and  $<120$  fpm at a 14 inch vertical sash height is obtained (older hoods typically do not have a horizontal sash component). Newer hoods are passed if the flow rate of the hood is  $>60$  fpm or  $<120$  fpm at 14 inch vertical opening or center horizontal pane(s) full open.
- ii. Data tracking - For passing fume hoods, data are recorded on the inspection record sticker affixed to the fume hood as well as in the database for UHSP.
- iii. If there is an ASHRAE test sticker somewhere on the hood, and the hood has been tested and approved with a given face velocity and sash height or sash configuration on the sticker, then one should consider testing the hood in this configuration.

### b. Non-compliant fume hoods:

#### i. "Yellow-tagged" fume hoods:

- i. Performance criteria - Old fume hoods with face velocities  $<80$  fpm but  $>50$  fpm or  $>120$  fpm but  $<150$  fpm shall be addressed through standard work order process. The same applies to new or low flow fume hoods that fall within the following range,  $<55$  fpm but  $>50$  fpm or  $>120$  fpm but  $<150$  fpm. These hoods should be posted with the yellow "Caution: Fume Hood Deficiency" sign (see figure 3).
- ii. Placing Work Orders - Work orders will be placed using University of Health Sciences and Pharmacy in St. Louis Work Order system. Information to be included when placing a work order: Building and room number, fume hood number, current face velocity. Work orders can also be generated if the problem is not face velocity related as well.
- iii. Completed Work Orders - If re-testing is done by Facilities staff, they will also record the post-service face velocity on the sticker on the front of the fume hood. If not, then an EH&S staff member should follow up to assure face velocity meets established criteria.
- iv. Data tracking - If performance meets the established passing criteria (see above), testing data will be entered into the EH&S database updating the face velocity records with an adequate face velocity measurement.

#### ii. "Red-tagged" fume hoods:

- i. Performance criteria - Older fume hoods with face velocities  $<50$  fpm or  $>150$  fpm shall be "red tagged". New hoods with face velocities  $<50$  fpm or  $>150$  fpm shall be red tagged as well. Red-tagged fume hoods are closed temporarily and shall be posted with a Temporary Closure sign (see Figure 4). The PI and/or lab manager will be notified verbally and by e-mail.
- ii. Placing Work Orders - Work orders will be placed to Facilities. Upon notification, Facilities staff will give this job high priority and will promptly investigate the fume hood/HVAC system in question. EH&S staff will assist the Facilities staff with adjustments and immediate re-testing.
- iii. Completed Work Orders - If re-testing is done by Facilities staff, they will also record the post-service face velocity on the sticker on the front of the fume hood. If not, then an EH&S staff member should follow up to assure face velocity meets established criteria. Once the repairs/adjustments are complete, EH&S staff will notify the PI and/or lab manager verbally and by e-mail.
- iv. Data tracking - If performance meets the established passing criteria (see above), testing data will be entered into the EH&S database updating the face velocity records with an adequate face velocity measurement.

- c. Unsolved systemic deficiencies: Certain buildings may have HVAC performance issues stemming from antiquated design. For such problem areas, Facilities, EH&S, and VP Operations will work together to develop and implement solutions. Lab Managers, PIs, Department Chairs and Deans will be notified of status as needed. Permanent closure of certain fume hoods may be required until the necessary repairs can be made.

- d. Decommissioned fume hoods (i.e. permanent closure): When necessary (e.g. "red-tagged" fume hoods), fume hoods will be closed by posting a Decommissioned Fume Hood sign (See Figure 5). PIs, lab managers (safety contacts), Department Chairs and Facilities Department will be notified. Alternatives will be offered to the affected labs. Closed fume hoods will be recorded in the EH&S database.

**Responsibilities:**

<b><u>Position/Office/Department</u></b>	<b><u>Responsibility</u></b>
Office of Environmental Health & Safety	Testing and reporting of fume hood procedure

**Policy Contacts:**

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