

Standard Operating Procedure Laboratory Fume Hood	SOP No. 8.009
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Page No.: 1 of 5

1 Purpose

- 1.1 To establish a standard procedure for testing the performance of a laboratory fume hood.

2 Scope

- 2.1 This procedure applies to a laboratory fume hood by performing face velocity profile and flow visualization.

3 References

- 3.1 ASHRAE Application Handbook HVAC Applications, I-P Edition, 1995.
- 3.2 NEBB Testing Adjusting Balancing Manual for Technicians, First Edition, 1986.
- 3.3 California Code of Regulations, Title 8, Subchapter 7 "General Industry Safety Orders", Group 16 "Controls of Hazardous Substances", Article 107 "Dust, Fumes, Mists, Vapors and Gases", Section 5154.4 "Ventilation Requirements for Laboratory-Type Operations".

4 Definition

- 4.1 CFM Cubic Feet per Minute
- 4.2 Dry Ice Frozen Carbon Dioxide pellets
- 4.3 FPM Feet Per Minute
- 4.4 ft² Square Feet
- 4.5 NEBB National Environmental Balancing Bureau
- 4.6 Nebulizer A device used to create cold steam using de-ionized water
- 4.7 Specified Test Height (Fume Hood Sash) Sash height at which sash stops and/or limit arrows clearly marking the maximum sash height allowed during hood use are installed

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Revision No.	SOP No.	Page
2	8.009	2 of 5

4.8 TAB Test, Adjust, and Balance

5 Responsibility

- 5.1 TAB technicians shall carefully study the mechanical drawings, noting the intended CFM and pressure differentials between areas and rooms before doing any testing.
- 5.2 In an existing installation, TAB technicians shall measure the "As-found" room pressure relationship of the room containing the fume hood and any adjoining room before any Fume Hood adjustments are made.
- 5.3 TAB technicians shall record all test readings on Form FN 8.009.1 (Laboratory Fume Hood Test Report).
- 5.4 All test reports shall be saved in files, located in the TAB Department of Therma.
- 5.5 All test equipment utilized shall be in calibration in accordance with NEBB Standards and traceable to the National Institute of Standards and Technology (NIST).

6 Materials Requirement

- 6.1 Titanium Tetrachloride or
- 6.2 Dry Ice or
- 6.3 De-ionized water

7 Test Equipment

- 7.1 Anemometer
- 7.2 Manometer
- 7.3 Pitot Tube
- 7.4 Tape Measure
- 7.5 Smoke Gun or
- 7.6 Nebulizer

8 General Procedures

- 8.1 Ensure that the room HVAC system is in a normal running mode.

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Revision No.	SOP No.	Page
2	8.009	3 of 5

- 8.1.1 Ensure that there are no unusual conditions in the space surrounding the tested hood such as large objects in the front of the hood.
- 8.1.2 Ensure that the tested hood is free of any apparatus that could impede the air flow.
- 8.1.3 Record all required information, including room number(s), hood number(s), and designed CFM and FPM on Form FN 8.009.1 (Laboratory Fume Hood Test Report).
- 8.1.4 Measure the inlet fully opened with the sash in the upright position record the size of width and height.

8.2 Face Velocity Profile

- 8.2.1 Ensure the exhaust blower is running with the fume hood sash at the specified test height. Wait 5 minutes to allow the fume hood to equalize before measuring face velocities.
- 8.2.2 Measure the inlet opening with fume hood sash at the specified test height and record the size of height and width.
- 8.2.3 Calculate the tested area.
- 8.2.4 Measure the velocities in the geometric center of equal area rectangles within the net free area of the sash opening using an anemometer.

Note: do not exceed one foot in either dimension.

- 8.2.5 Calculate the average velocity by dividing the total of the measured velocities by the number of readings.
- 8.2.6 Check the appropriate "Velocity Test" box indicating the "Pass" or "Fail" result.
- 8.2.7 Calculate the actual CFM through the tested opening using the following equation:

$$\text{Actual CFM} = \text{Average Velocity} \times \text{Tested Area (Sq. Ft.)}$$

Note:

- 8.2.7.1 In order to obtain an accurate measurement of the ducted exhaust, the duct must have adequate straight

Revision No.	SOP No.	Page
2	8.009	4 of 5

duct, preferably 6 to 10 duct diameters per NEBB reference.

8.2.7.2 If the exhaust duct configuration prohibits an accurate Pitot tube traverse, a correction factor is applied to the opening CFM to correct for the additional air that enters the fume hood through openings other than the tested sash opening.

8.2.7.3 The correction factor is obtained from either the manufacturer's design data or airflow leakage tests on the fume hood conducted by TAB technician(s).

8.2.8 Observe the air movement toward the face of the hood or the lack of movement in dead airspace using a smoke gun with titanium tetrachloride or a nebulizer with de-ionized water or a container with de-ionized water and dry ice. Move smoke/steam source around the perimeter of the hood at a distance of approximately 1 inch from the front of the fume hood, ensuring full containment and lack of reflux from the fume hood back into room at any point of the fume hood entry plane.

8.2.9 Test the operation of the deck airfoil using the smoke gun.

8.2.10 Check the appropriate "Velocity Test" box indicating the "Pass" or "Fail" result.

8.2.11 Record all data on the Form FN 8.009.1 (Laboratory Fume Hood Test Report).

If Certification of Fume Hood is Required:

8.2.12 Record pertinent data from Form FN 8.009.1 (Laboratory Fume Hood Test Report) onto "Certification" label.

8.2.13 Attach "Certification" label to a prominent location on the front of the fume hood.

8.2.14 Check the appropriate "Yes" or "No" box indicating whether "Label/Arrows are Applied"

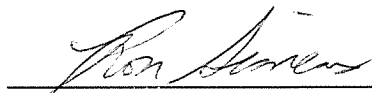
9 Review and Approval

9.1 Return the Form FN 8.009.1 (Laboratory Fume Hood Test Report) to the TAB Department for review.

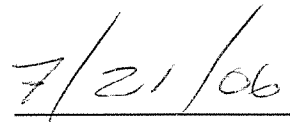
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Revision No.	SOP No.	Page
2	8.009	5 of 5

Document Approval



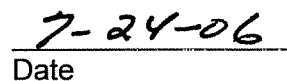
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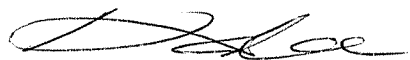
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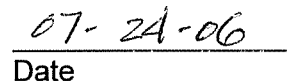
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