WESTERN CONNECTICUT STATE UNIVERSITY

LABORATORY FUME HOOD PERFORMANCE TESTING

PROCEDURE S-113

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Please direct any questions or comments about the applicability of this document to Luigi Marcone, WCSU Department of Public Safety

1.0 INTRODUCTION

The following testing method has been adapted from the ANSI/ASHRAE "Method of Testing Performance of Laboratory Fume Hoods" standard (ANSI/ASHRAE 110-1995). It provides for both a qualitative evaluation of hood performance (flow visualization) and a quantitative hood face velocity measurement.

Performance testing of laboratory fume hoods shall be performed at least annually.

2.0 GENERAL TEST CONDITIONS

The following must be observed:

a. Any room ventilating systems shall be in operation during these tests.
b. Any standard procedures for the laboratory shall be observed during these tests (e.g. limitations on the number of hoods in operation at one time, etc.)
c. The sash or sashes shall be located in the design position or positions.
d. If the hood has an auxiliary supply, the supply shall be in operation during the tests. If the supply is capable of convenient adjustment by laboratory personnel, the adjustments shall be as specified.
e. General activity in the laboratory shall be maintained in as normal a state as possible.
f. The tests shall be conducted with normal hood apparatus in place and in operation.

3.0 FLOW VISUALIZATION TEST

Purpose

The purpose of the flow visualization test is to visualize the hood's ability to contain vapors and render an observation of hood performance as it is typically used. The test includes both a small local challenge and a gross challenge to the hood.

Equipment

a. Controllable source of visible smoke (e.g. titanium tetrachloride or another source of persistent, neutral buoyancy aerosols that can be discharged under the control of the person conducting the test).
b. Watch or other timer.
c. Notebook for recording observations.

Procedure

Local Visualization Challenge

In the following tests, it is expected that all smoke shall be carried to the back of the hood and exhausted. Any movement of smoke towards the face of the hood is defined as negative airflow, and any lack of movement is defined as dead air space.

If there is visible smoke flow out of the front of the hood during any of these tests, the hood fails the test and shall be taken out of service.

Perform the following challenges. In all cases, airflow patterns and time for hood clearance should be recorded.

a. Bottom Air Bypass Air Foil - run smoke under the air foil. Smoke should be exhausted smoothly and not be entrained in the vortex at the top of the hood.

b. Walls and Floor - discharge a stream of smoke along both walls and the floor of the hood in a line parallel to the hood face and 6 in. (150 mm) behind the face of the hood and along the top of the face opening.
c. Back of Hood - discharge smoke in an 8 in. (200 mm) diameter circle on the back of the hood.
d. Top of Hood - discharge smoke at top of hood and observe airflow patterns and time for hood clearance.
e. Equipment in Hood - discharge smoke around any equipment in hood.

Large Volume Visualization Challenge

In the following test, a release of smoke from the hood that is steady and visible is an indication of failure and the hood shall be taken out of service.

a. A large volume of smoke shall be released inside the hood and observations of containment shall be made from the side of the hood face, as well as time for hood clearance.
b. The smoke shall be released from the center of the sash opening on the work surface, 6 in. (150 mm) inside the rear edge of the sash.
c. The smoke should not have an unacceptably high directional component to it that would affect hood performance (e.g. a jet of high velocity smoke), nor should the smoke source be designed/used in a manner that disrupts hood performance.

4.0 FACE VELOCITY MEASUREMENTS

Purpose

The purpose of this test is to quantitatively measure air velocity at the hood face.

Equipment

a. Anemometer, either mechanical or electrical, that has been recently calibrated. It shall be capable of measuring in the range of 50 to 400 fpm (0.25 m/s to 2.0 m/s) with an accuracy of ± 5% of the reading.
b. Notebook for recording observations.

Procedure

The minimum acceptable velocity for each hood face cell shall be 100 lfm. If any cell fails to meet this requirement, the hood fails the test and shall be taken out of service.

a. Divide the hood opening into a grid of equally spaced 1.0 ft^2 imaginary cells.
b. Air velocity measurements shall be taken with a properly calibrated anemometer fixed at the center of each cell, with the anemometer held in the plane of, and parallel to, the hood sash (if the airflow is not perpendicular to the plane of the sash opening, the anemometer should be held perpendicular to the airflow, even if this causes it to not be parallel with the sash opening). Care should be taken to stand to the side during measurement so as to affect the airflow as little as possible.

c. Velocity measurements shall be integrated over a period of at least five (5) seconds. If the anemometer takes only instantaneous readings, at least four (4) readings shall be taken at each point.
d. Calculate the average of the velocity measurements, noting the minimum and maximum measurements as well.
e. Compare measured face velocities with manufacturer specifications.