

1.0 INTRODUCTION

- 1.1 A laboratory hood is not performing its function unless it captures and retains the atmospheric contaminants generated within it. A hood is not intended to capture contaminants that become airborne elsewhere in the laboratory, nor is a hood generally designed to contain explosions
- 1.2 Successful performance requires an optimum (not maximum) velocity of air moving through the hood. Factors which affect the air movement through the hood are cross-currents, entrance shapes, thermal loading, mechanical action, exhaust slot design, inadequate makeup air, and obstructions.
- 1.3 Successful performance of a hood may also depend upon its ability to confine a fire, to withstand corrosion, to be readily cleanable if contaminated and to collect certain contaminants such as radioisotopes and pathogens before they enter the exhaust system.
- 1.4 Additionally, regardless of the system involved, in order for laboratory hoods to operate efficiently, they must be used correctly.

2.0 PURPOSE AND SCOPE

- 2.1 This procedure outlines the proper steps to take when using a laboratory hood as an engineering control for airborne contaminants. These practices apply to laboratory hoods used to control chemical hazards (including walk in style hoods) and not to biosafety cabinets or clean (laminar flow) benches.
- 2.2 The provisions of this procedure shall apply to all DRI employees, temporary workers, visiting scientists, contractors and consultants whose job duties require the use of laboratory hoods.

3.0 RESPONSIBILITY

3.1 Division Executive Directors are responsible for:

- 3.1.1 Verifying that the Safe Work Practices for Using the Laboratory Hood are implemented, as appropriate, in all areas under their direction.

3.2 Principal Investigators, Laboratory Supervisors, Project Leaders are responsible for:

- 3.2.1 Educating their employees in the proper use of the hood.
- 3.2.2 Requiring good housekeeping in the work area, including in the hoods.
- 3.2.3 Observing hood use practices on a regular basis to verify that safe work practices are followed.
- 3.2.4 Informing his/her employees of any hood that failed to be certified instructing, them not to use the hood until further notice.

3.3 Facilities is responsible for:

- 3.3.1 Maintaining the laboratory hood fans and the static pressure or magnehelic gauges and filter systems, if present.
- 3.3.2 Maintaining air balancing of rooms/areas where hoods are installed.

- 3.3.3 Coordinating calibration of all laboratory hoods at least annually (See minimum calibration requirements in Section 6.0) and maintaining the calibration records for a minimum of three (3) years.
 - 3.3.4 Posting arrows (at the appropriate sash height) with the date of calibration and average face velocity on the hoods that passed and prominently posting signs on any hood that failed. (At a minimum this sign should be dated and state “ Do Not Use this hood until it is serviced and certified. Do Not Remove this Notice.”)
 - 3.3.5 Notifying the lab PI if any hoods in his/her lab failed on the day the tests were conducted. Once the hood has been repaired and passes, removing the sign and notifying the PI the hood is back in service.
- 3.4 The Environmental Health & Safety Department is responsible for:
- 3.4.1 Assisting job hazard analysis (JHA) teams with engineering control recommendations, including, but not limited to ventilation controls.
 - 3.4.2 Assisting Principal Investigators (P.I.s) and Laboratory Supervisors in hood purchase selection.
 - 3.4.3 Developing materials for P.I.s and laboratory supervisors to use for training and educating their employees on the use of various ventilation controls, including the laboratory hood.
- 3.5 The employee, temporary worker, etc. is responsible for:
- 3.5.1 Following the work practices outlined in Section 4.0 so that maximal protection is obtained when using a laboratory hood.
 - 3.5.2 Reporting any hood malfunction to their supervisor and the Facilities Department.

4.0 WORK PRACTICES FOR LABORATORY HOODS

- 4.1 The following work practices are recommended by the American Conference of Governmental Industrial Hygienists as requirements to obtain the best hood performance:
- 4.1.1 Minimize activity around the hood in order to decrease crosscurrents at the face (they can easily pull contaminants into the room).
 - 4.1.2 If the hood is near the door, keep the door to the room either closed or open to decrease cross drafts caused by door movements.
 - 4.1.3 Minimize storage in the hoods. Storage of chemicals and/or equipment can block the internal air flow patterns necessary for proper function in most hoods. Equipment may be set on 0.5" x 1.5" square channel stock to allow air to sweep under it and over the work surface.
 - 4.1.4 Be sure that the air slots are not blocked or accidentally closed. These slots will be adjusted annually or more often, if necessary, by trained personnel. Do not attempt to adjust the baffles yourself.
 - 4.1.5 Do not obstruct or divert room makeup or hood auxiliary air vents. This can cause a decrease in airflow through the hood.

- 4.1.6 Do not remove or alter the airfoil design, if present.
- 4.1.7 Use of materials and/or procedures should be consistent with hood design. For example, perchloric acid work requires a specially designed hood system or capture system.
- 4.1.8 Place work at least 6-8" inside the sash. Contaminants created or released well within the hood have less of a chance of leakage as a result of cross drafts than those created at the face.
- 4.1.9 A hood is designed to control hazardous vapors, gases, mists, etc. Do not lean into the hood. Only your hands and forearms should be inserted beyond the face of the hood when hazardous materials that could be released are present.
- 4.1.10 Adjust the sash position to the smallest opening that is still comfortable to work. Sash opening should at least be as small as the position arrows on the side of the hood. This will provide you with additional protection from contaminants.
- 4.1.11 Prior to using a hood, confirm the hood is operating. All hoods should have a means to monitor airflow. If a magnehelic gauge or other airflow-monitoring device is not present, a strip of ribbon or KimWipe attached to the bottom of the sash will demonstrate that air is moving through the hood. If a monitoring device is present, know how it works and what are acceptable and unacceptable readings. Check the reading each time you use the hood and report any unacceptable readings immediately to your supervisor.
- 4.1.12 Hoods being used with particularly dangerous substances (such as ethylene oxide gas, ricin, hydrogen cyanide, etc.) should be equipped with an airflow monitor that sounds an alarm if the airflow falls below a predetermined level.
- 4.1.13 Remember that the face sashes on most hoods are not a substitute for explosion shields, which may be necessary for some experiments.
- 4.1.14 Eye protection is essential here as in all laboratory work. Do not assume the face sash will protect your eyes. Follow appropriate eye protection procedures for the task being conducted.
- 4.1.15 If there is a fire or smoke in a hood, immediately close the sash. Leave the hood on and follow the emergency procedures for notification and if necessary, evacuation.
- 4.2 If a hood appears to be malfunctioning, stop work in that hood. Close the sash and immediately report the problem to Facilities.

5.0 HOOD INSTALLATION

- 5.1 Laboratory hoods shall be installed where necessary to prevent employee exposures to chemical vapors, mists or gases or other airborne hazards as appropriate.
- 5.2 New hood installation (including hoods to be installed due to relocation or remodeling) will follow the requirements of the current Uniform Mechanical Code. In addition, the following guidelines should be considered when determining the placement of a lab hood.
 - 5.2.1 Hoods should be located away from doors, room air intakes or exhaust vents, windows that open, and frequently used paths of travel.

- 5.2.2 Hoods used for hazardous materials work should not be placed along routes of lab egress, especially those that lead to the primary exit door.
- 5.2.3 Hoods should not be installed opposite each other (i.e., facing another hood), especially if both will be used simultaneously.
- 5.2.4 To avoid dead air space (and thus the potential for uneven flow through the hood's face), hoods should not be installed flush to a side wall. Leaving 12 to 18 inches between the room wall and the hood will improve movement of air into the hood opening

6.0 CALIBRATION PROTOCOL

- 6.1 Upon initial installation hoods will be calibrated. Using the full ASHRAE (Knudsen-Caplen) protocol as published in the most current ANSI/ASHRAE Standard 110 is the preferred method. (If multiple hoods (same style and manufacturer) are installed at the same time, applying the ASHRAE standard to ~25 % of the hoods and calibrating the balance by the use of an anemometer is acceptable.)
- 6.2 ASHRAE testing should be repeated anytime a significant change (e.g., additional hoods are added to an existing system, hoods are relocated, etc.) occurs.
- 6.3 Additional calibration requirements include as a minimum annually* conducting faces velocity and smoke tests. (* Note: The face velocity of hoods used to handle OSHA regulated carcinogens and highly toxic materials should be verified at least semi-annually.)

7.0 REFERENCES

- 7.1 Title 29 Code of Federal Regulations 1910.1450(e)(1) & (3).
- 7.2 American Conference of Governmental Industrial Hygienist, Committee on Industrial Ventilation. Industrial Ventilation: a Manual of Recommended Practice, ACGIH, Cincinnati Ohio.
- 7.3 American National Standard Institute ANSI/ASHRAE 110 "Method of Testing Performance of Laboratory Fume Hoods."
- 7.4 McDermott, Henry J. 1985. Handbook of Ventilation for Contaminant Control, 2nd edition.
- 7.5 Uniform Mechanical Code.