



Angelo State University
Operating Policy and Procedure

OP 34.04: Use of Laboratory Hoods, Biological Safety Cabinets, and Special Local Exhaust Ventilation

DATE: February 14, 2018

PURPOSE: The purpose of this Operating Policy/Procedure (OP) is to establish guidelines for the use of laboratory hoods, biological safety cabinets, and special local exhaust ventilation when using toxic or hazardous chemicals, pathogenic microorganisms, or radioisotopes in certain forms.

REVIEW: This OP will be reviewed in February every three years, or as needed, by the director of risk and emergency management with recommended revisions forwarded through the vice president for finance and administration to the president by March 15 of the same year.

POLICY/PROCEDURE

1. Definitions

- a. **Standard Chemical Laboratory Hood** - A regular laboratory-type ventilated enclosure that creates a negative air pressure within the hood and across the face of the hood to isolate and direct air contaminants away from the user and to prevent exposure to the user.
- b. **Perchloric Acid Laboratory Hood** - A hood of the same basic design as the standard chemical laboratory hood but with a wash-down feature and constructed of welded stainless steel.
- c. **Conventional Laminar Flow Cabinet (Clean Air Cabinet)** - The clean air cabinet, which was the result of industrial clean room technology, features a positive pressure that allows the air to flow **out** of the cabinet. Clean air cabinets are made in two basic configurations: horizontal (cross) flow and vertical (down) flow. Neither of these conventional types is considered a biological safety cabinet because personnel are potentially exposed to contaminated airflow from inside the cabinet, out and over the operator, and into the laboratory. Such units are suitable **only** for use with known "clean" materials where product protection is the only objective. Clean air cabinets are not for use with radioactive, corrosive, toxic, or infectious material.
- d. **Biological Safety Cabinet** - A ventilated enclosure that provides a physical barrier between a worker and a hazardous operation. It may be used with an open front (or open glove ports) and with a high rate of ventilation away from the operator (like a laboratory hood) or with a closed front and attached rubber gloves. In the latter use, protection depends upon a negative pressure maintained within the cabinet. The ventilation air exhausts through a high-efficiency filter.

- (1) **Class I** hood is a partial containment cabinet with a minimum inward face velocity of 85 to 100 fpm. It will remove particulate containment from within cabinet, pass it through HEPA filter for decontamination and out through the fume hood exhaust.
- (2) **Class II** cabinets consist of two types; A and B. Workers are protected by the curtain of room air entering the grill at the forward edge of the opening of the work surface. The air joins the recirculating air stream. Part of it passes through HEPA filter downward toward the work surface, providing a contamination free zone.
 - (a) **Type “A”** cabinet has a fixed opening with minimum inflow velocity of 75 linear feet per minute. It is NOT recommended for use with flammable solvents, toxic agents, or radioactive materials.
 - (b) **Type “B”** cabinets have a vertical sliding sash and is designed to maintain an inward airflow of 100 linear feet at a work opening of 8 inches. This design requires separate exhausting of approximately 70% of the air flowing through the work area; therefore, it may be used with a wider range of chemicals. The Type “B” cabinet however, is not recommended for use with explosive vapors.
- (3) **Class I or II** cabinets should be used for Biosafety Level 2 work; if the aerosolization potential increases the risk of exposure and disease to unacceptable levels.

2. Functions of Exhaust Systems

Operations involving hazardous chemicals, pathogenic microorganisms, or radioisotopes in certain forms must be performed within the enclosures defined above. Local exhaust systems are a prime safety feature for laboratory workers and serve three major functions:

- a. Confining hazardous materials and preventing airborne contaminants from coming into contact with persons working in the laboratory;
- b. Exhausting these hazardous materials to a point where they may be discharged safely into the atmosphere; and
- c. Providing sufficient air movement within the enclosure so that flammable vapor concentrations will be reduced below their lower explosive limits.

Ventilation used for work with highly pathogenic microorganisms will be fitted with HEPA filters to entrap these particles and prevent their discharge.

3. Precautions/Guides

- a. Laboratory hood face velocities will be sufficient to maintain an inward flow of air across the entire face of the hood under all operating conditions.
- b. Mechanical ventilation will remain in operation at all times when hoods are in use and for a sufficient time thereafter to clear hoods of airborne hazardous substances. When mechanical ventilation is not in operation, hazardous substances in the hood will be covered or capped off and hood sashes will be closed.

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- c. When determining the need for ventilation, consider threshold limit values (TLV), toxicity, vapor pressure, flammability, possible formation of toxic dusts, aerosols, mists, vapors or gases, smoke, and pathogenic or carcinogenic properties. Use a laboratory hood when in doubt. Environmental Health, Safety and Risk Management (EHSRM) can assist in making these determinations.
- d. Exhaust stacks of high hazards hoods will extend at least seven feet above the roof, parapet, and other prominent roof structures and will discharge vertically upward with an exhaust velocity of at least 2500 fpm. There should be no weather cap or other obstructions to prevent the exhaust discharge from rising straight upward.
- e. Most sashes are not designed as "safety shields"; therefore, supplementary shields must be used for body protection when working with potentially violent chemical reactions.
- f. All hoods should be maintained in a clean and orderly condition at all times. The use of laboratory hoods as a storage area should be avoided. Obstructions within the hood cause serious reduction in hood efficiency.
- g. Local exhaust ventilation (special exhaust systems designed to ventilate a small area) is used to collect contaminants from specialized procedures.
- h. Never allow your head to enter the plane of the hood opening. For vertical rising sashes, keep the sash below your face; for horizontal sliding sashes, keep the sash positioned in front of you and work around the side of the sash.
- i. Elevate large equipment at least two inches off the base of the hood interior.
- j. Keep all materials inside the hood at least six inches from the sash opening. When not working in the hood, close the sash.
- k. Know the hazards of the chemicals you are working with; refer to the chemical's safety data sheet (SDS), if you are unsure.

4. Responsibilities of Administrators, Department Heads, Supervisors

- a. Prevent any student or employee from working with a potentially hazardous substance that requires exhaust ventilation without the proper equipment in place and in good repair.
- b. Route plans through Facilities Planning and Construction/Facilities Management and EHSRM prior to modifying or adding additional exhaust equipment to determine if the installation can be accomplished and meets industry safety standards.
- c. Notify EHSRM if an exhaust system is not functioning properly. The sash should be closed and the hood "tagged" and taken out of service until repairs are complete.
- d. Obtain approval from EHSRM before the start up of hoods after initial installation or repairs on existing hoods.

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5. Responsibilities of Facilities Management

Requirements for the proper maintenance and function all fume hoods will be in accordance with 29 CFR 1910.1450.

- a. Ensure that personnel are aware of the potential hazards involved when performing repairs and maintenance on hood units and cabinets and ensure that personnel are using proper personal protection when performing such repairs.
- b. Maintain an inventory of all laboratory hoods, biological safety cabinets, and special local exhaust ventilation systems.
- c. Ensure all laboratory hoods, biological safety cabinets, and special local exhaust ventilation systems are properly maintained.
- d. Ensure all laboratory hoods and biological safety cabinets are properly inspected and certified on an annual basis.