Oregon State University Environmental Health and Safety

Ductless Fume Hood Safety

Introduction

Ductless fume hoods are not acceptable alternatives to externally ventilated fume hoods because they do not offer the same level of protection. Activities conducted in a ductless hood must be limited to those that can be safely performed on an open bench, such as low-hazard chemicals and nuisance vapors or dusts. If they are not used properly, they fail to remove certain hazardous contaminants and may expose personnel. All ductless fume hoods must also comply with all NFPA 45 and ANSI Z9.5-2022 requirements.

Laboratories that wish to purchase or use a ductless fume hood must have approval through EH&S at ehs@oregonstate.edu and must follow the requirements outlined below.

Restricted Use

Ductless fume hoods should not be used for hazardous chemicals, multiple chemicals, or research environments where chemical use changes frequently. **EH&S does not recommend ductless fume hoods due to exposure risks and filtration limitations.**

Additional concerns include:

- Inability to reliably contain or remove chemical contaminants
- Unsuitability for varied or changing chemical use
- Filters saturated with flammable chemicals can be a fire hazard
- High filter replacement costs ($600–$1,200 every approximately 6 months)
- Requirement for hazardous waste disposal of used filters
- Need for periodic exposure monitoring to verify user protection

Proper Use

Once EH&S approval is granted, the following controls must be implemented:

- Conduct an evaluation of each intended application before use.
- Maintain a written Standard Operating Procedure (SOP) covering operation, training, and maintenance.
- Use only chemicals approved by the manufacturer for the specific installed filter.
- Use only small quantities of chemicals in the fume hood.
- Do not conduct reactions involving heat, which can damage the filters.
- Minimize storage of chemicals in the hood.
- Ensure all chemical containers remain capped in the hood, unless in use.
- Document all filter changes.

Required Documentation

The following documentation must be maintained and accessible:

1. Signage

Signage must be posted directly on the hood and include:

- List of allowable chemicals and maximum quantities
- Type and limitations of the filter media
- Filter change-out schedule
- A notice indicating that the hood recirculates air back into the laboratory

- Reference to the hazard analysis and its location
- Identification of the laboratory supervisor or Principal Investigator
- Instructions for responding to alarms and emergencies

2. Hazard Evaluation and Analysis

This document must be available to all users and reviewed at least annually by a qualified person. It must include:

- A hazard and risk review of the installed filters, including manufacturer statements on adsorption capacity and expected filter life
- Evaluation of safety monitoring features, alarms, and failure modes
- Review of permitted apparatus and activities, including limitations
- Documentation of any changes to chemicals used in the hood

3. Standard Operating Procedures

SOPs must be maintained for:

- Hood operation, including controls, alarms, chemical limitations, and emergency procedures
- Filter changes, including PPE requirements, waste handling, and documentation updates

4. Operations Log

The log must document:

- Types and quantities of chemicals used
- Operational issues, maintenance activities, and alarm or detection system performance

Filters

Contaminated filters shall be unloaded from the air-cleaning system following safe work practices to avoid exposing personnel to hazardous conditions and to ensure proper containment of the filters for final disposal. Airflow through the filter housing shall be shut down during filter change-out. Both new and used filters must be disposed of properly as hazardous waste.

Maintenance

- Annual testing and inspection of filters must be documented and include the filter change timeline, hazards associated with changing the filter, required PPE, and hazardous waste procedures.
- Visual inspection of the hood interior, sash, and ductwork; verification and calibration of airflow loss alarms; and face velocity airflow testing.
- Review of changes in work area conditions that may affect performance and confirmation of compliance with manufacturer instructions.

Training

All laboratory occupants must receive training on:

- Proper use protocols, including chemical use limitations
- Potential hazards associated with ductless fume hoods
- Alarm response procedures
- Emergency actions related to hood malfunction or failure

Spills / Emergency Response

A spill in a ductless fume hood could cause hazardous vapors to saturate or break through the filter, resulting in recirculation of contaminated air and potential chemical exposure. If a spill occurs:

1. Stop work immediately and close the sash, if possible.
2. Assess the spill.
3. Evaluate and service the hood filters. After any spill—even a minor one—the DFH filters must be evaluated for possible saturation or chemical breakthrough, since filters can load unpredictably. Filter replacement is likely required before the hood is used again. Do not use the hood again until EH&S or the hood vendor has confirmed filtration is adequate.
    - If minor or a low-hazard substance: use spill cleanup material and dispose of material properly. Follow all spill cleanup guidelines.
    - For large or hazardous spills: have individuals leave the room and call EH&S to assist with cleanup.

Regulations/References

The following regulations and standards apply to the use of ductless fume hoods in laboratory settings.

NFPA 45 – Standard on Fire Protection for Laboratories Using Chemicals

- Chapter 7 (Ventilation) – Addresses requirements for laboratory ventilation systems, including ductless fume hoods, fire and explosion hazards from recirculated air, and filter management.

ASHRAE 110-2016 – Method of Testing Performance of Laboratory Fume Hoods

- Provides the standard test method for evaluating fume hood containment performance, including face velocity and tracer gas testing applicable to ductless fume hoods.

ANSI Z9.5-2022 – Laboratory Ventilation

- Section 8 (Recirculating Systems/Ductless Fume Hoods) – Establishes requirements for the use of recirculating laboratory air-cleaning systems, including hazard assessments, filter selection, and monitoring.