



## Fume Hoods Standards and Practices

### General

Laboratory exhaust ventilation systems designed, constructed, maintained, and used at Cal State Fullerton must comply with the specifications and standards set forth in this document. Failure to meet these standards shall be referred to the NSM Safety Committee.

New or renovated fume hood systems will be tested using the procedures below. Fume hoods that do not meet the testing criteria and specifications will not be approved for use by Environmental Health and Safety.

Laboratory fume hoods serve to control exposure to toxic, offensive or flammable vapors, particulates, gases and aerosols. Fume hoods are the primary method of exposure control in the laboratory. It's important to use the right hood for the job:

- 1. General Purpose Hoods include**
  - Standard Chemical Fume Hood
  - Bypass Hood, or Constant Volume Hood
  - Variable Air Volume (VAV) Hood
- 2. Radioisotope Hood**—These hoods have been authorized by Radiation Safety for use with volatile radioactive materials.
- 3. Biosafety Cabinet (BSC)**—Specialized hoods to prevent or minimize the exposure of humans and/or the environment to biohazardous and infectious agents or materials. The three general types (class I, II, III) are specific for certain biohazards and applications and have distinct performance characteristics. Each utilizes High Efficiency Particulate Air (HEPA) filters that filter out 99.97% of all particulates at 0.3  $\mu\text{m}$ .
- 4. Perchloric Acid (PCA) Hoods** *must* be used when working with PCA (e.g., acid digestion procedures). These hoods prevent the formation of perchlorates which could lead to explosions. They are constructed with special materials and have built-in water wash down capabilities that help prevent the buildup of shock, heat, and friction sensitive perchlorates.
- 5. Laminar Flow Hoods or Clean Benches**- hoods that are designed to protect biological specimens and material by bathing the work area with particulate free air. Clean benches force air out the back of the unit, across the work surface and toward the researcher. The air is re-filtered (of particulates only) before being exhausted back into the lab, not to the outside as with a chemical fume hood.
- 6. Glove Boxes**- should be used if protection from atmospheric moisture or oxygen is needed or when a fume hood may not provide adequate protection from exposure to the substance; e.g., a protection factor of 10,000 or more is needed.
- 7. Snorkels or Elephant Trunks**- flexible duct or hose connected to an exhaust system. It can only capture contaminants that are very close to the inlet of the hose, typically less than a distance equal to one half of the diameter of the duct. They can be effective for capturing discharges from gas chromatographs, pipe nipples or the end of tubing. However, the

effectiveness of the snorkel should be carefully evaluated before they are used to control releases of hazardous substances.

8. **Gas Cabinets-** Highly toxic or odorous gases should be used and stored in gas cabinets. In the event of a leak or rupture, a gas cabinet will prevent the gas from contaminating the laboratory.
9. **Some hoods are labeled for special use when practical.**

## Regulations

1. California Code of Regulations (CCR), Title 8, Section 5154.1, Ventilation requirements for laboratory type hood operations
2. California Code of Regulations, Title 8, Section 5209, Carcinogens
3. Code of Federal Regulation (CFR) 10, Parts 20 and 35
4. National Fire Protection Association (NFPA) Handbook 45, Standard on Fire Protection for Laboratories Using Chemicals

## Good Work Practices

1. *Never put your head inside a hood while operations are in progress.* The plane of the sash is the imaginary boundary that should not be crossed except to setup or dismantle equipment. Also, remain alert to changes in air flow.
2. Work at least 6 inches back from the face opening of the hood; this will avoid turbulence at the sash edge and provide greater protection. A stripe on the bench surface is a good reminder.
3. Always use chemical splash goggles, and wear a full faceshield if there is a possibility of an explosion or eruption.
4. Do not make quick motions into or out of the hood, use fans, or walk quickly by the hood opening. All will cause airflow disturbances which reduce the effectiveness of the hood.
5. Substitute less hazardous or less volatile chemicals where possible
6. Place apparatuses and equipment as far back as possible in hood for safety and optimal performance. Equipment should be placed a minimum of 8 inches inside the hood. Keep electrical connections outside of hood.
7. Ensure that equipment or materials do not block the baffle vents in the back of the hood.
8. When using a large apparatus inside the hood, place the equipment on blocks, when safe and practical, to allow adequate airflow beneath it.
9. Do not place electrical apparatuses or other ignition sources inside the hood when flammable liquids or gases are present. Keep in mind that liquids with low flash points may ignite if they are near heat sources such as hot plates or steam lines.
10. Report airflow problems and problems with the physical structure of the hood to Physical Plant as soon as possible at x3494.
11. *Do not dismantle or modify the physical structure of the hood or exhaust system* in any way without first consulting Physical Plant personnel at x3494.

## Waste Disposal

Do not use the hood as an evaporative waste disposal mechanism. Apparatuses used in a hood should be fitted with condensers, traps, or scrubbers to contain and collect waste solvents, toxic vapors or dust.

## Good Housekeeping Practices

1. *Keep hood storage to an absolute minimum.* Keep only items needed for ongoing operation inside the hood.
1. Store hazardous chemicals such as flammable liquids in an approved safety cabinet;
2. Keep caps tight on chemical reagent bottles and check fittings on laboratory glassware to minimize vapor loss;
3. Always use good housekeeping techniques to maintain the hood at optimal performance levels. Excessive storage of materials or equipment can cause eddy currents or reverse flow resulting in contaminants escaping from the hood.
4. Clean up spills as soon as possible.

## Proper Sash Use

1. Do not remove sashes from sliding sash hoods. *Lower the sash completely* when you are not physically working in the hood.
2. Use sliding sash for partial protection during hazardous work.
3. Do not remove the sash or panels except when necessary for apparatus set-up. Replace sash or panels before operating.
4. Keep the slots of the hood baffles free of obstruction by apparatuses or containers.
5. Keep the hood sash closed as much as possible to maximize the hood's performance and maximize energy conservation.

## Fume Hood Operations

1. Hoods should be evaluated by the user before each use to ensure adequate face velocities and the absence of excessive turbulence. In case of exhaust system failure, shut down all fume hood operations and lower the sash completely. Leave the area immediately and notify Physical Plant at x3494 or the Safety Office at x7233 (S-A-F-E).
2. **The required face velocity is 100 feet per minute.** This velocity is capable of controlling most low-velocity cross drafts and turbulence created by normal working practices at the face of the hood. All hoods should have a sticker or label designating the maximum safe sash height. Keep the sash at the appropriate level to ensure optimal face velocity.
3. When determining the minimum flow rate through the fume hood, the sash stop position may not be lower than 18 inches above the work surface.

## Testing

Operable fume hoods shall be tested and certified annually by an approved, licensed contractor for minimum average face velocity.

**Updated:** 9/22/11, 1/2022