

Attachment 1 - Lab Hood Diagrams

TYPES OF FUME HOODS

1 Standard Fume Hoods (aka Constant Air Volume (CAV) fume hoods)

1.1 These hoods exhaust a constant volume of air. The velocity of the air passing through the face of a standard fume hood is inversely related to the open face area. Thus, if the sash is lowered, the inflow air velocity increases.

IMPORTANT: Face velocity that is too high may cause turbulence, disturb sensitive apparatus, or extinguish Bunsen burners.

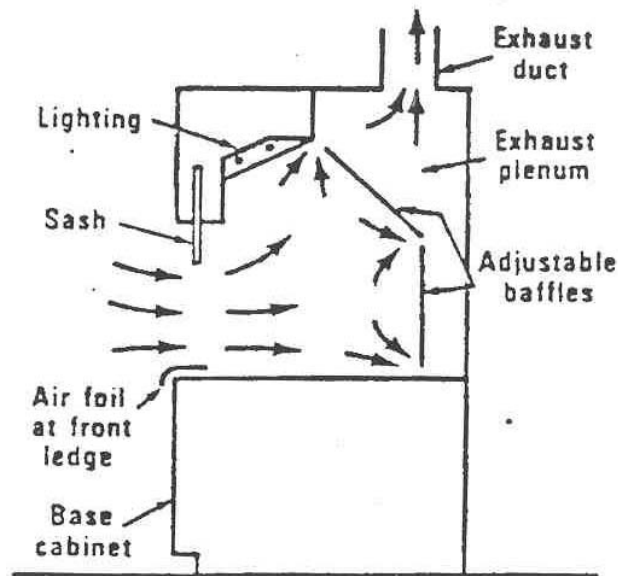


Figure 2

Diagram of a Standard Fume Hood

2 Bypass Fume Hoods

2.1 Bypass fume hoods are also constant air volume hoods, but with an improved design. These hoods are designed with a grille-covered opening above the sash. When opened, the sash blocks the grille and does not allow air through. However, as the sash is lowered, air is drawn through the grille, allowing a constant exhaust volume without increasing the

velocity of air at the face of the hood. This design helps keep the room ventilation system balanced and helps eliminate the problems with turbulence that high face velocity can cause.

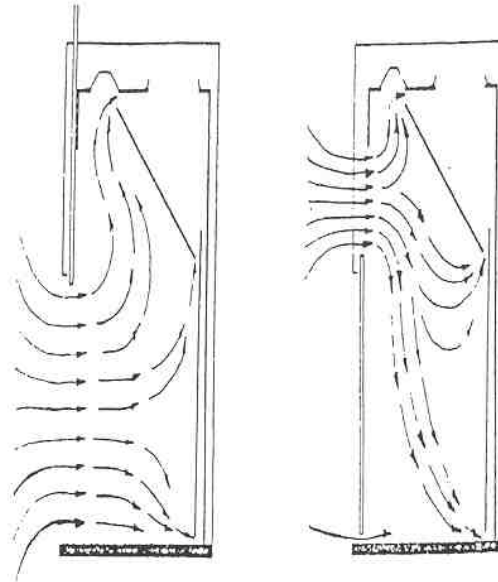


Figure 3

Diagram of a Bypass Fume Hood
(Left – with sash open; Right – with sash lowered)

3 Auxiliary Air Fume Hoods

- 3.1 Auxiliary air fume hoods are also known as "supplied air" or "make-up air" hoods. They use an outside air supply for 50% to 70% of the hood's exhaust requirements. This type of hood is designed to reduce utility costs and conserve energy by reducing the amount of conditioned room air that is pulled through the hood. One disadvantage, however, is that additional ductwork and fans increase the overall cost of these hoods. Also, if the supplied air is tempered, the energy savings is negated, while if it is not tempered, the user may be working under hot or cold air, depending on the season. Untempered air may also cause condensation in the hood, which can lead to rusting of the hood. The face velocity of an auxiliary air fume hood may vary.

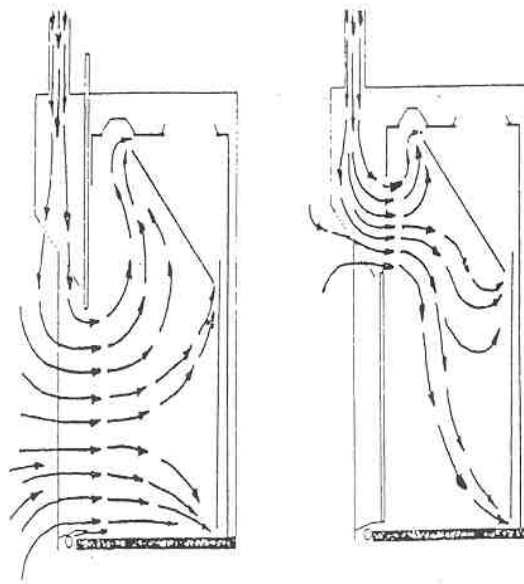


Figure 4

Diagram of an Auxiliary Air Fume Hood
(Left – with sash open; Right – with sash lowered)

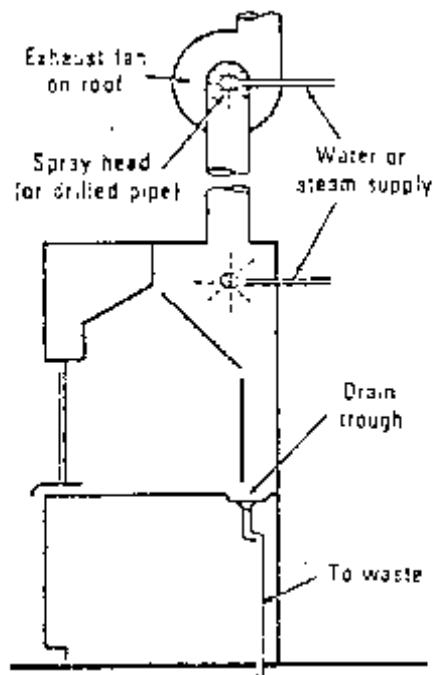
4 Variable Air Volume Fume Hoods

- 4.1 Just as their name suggests, variable air volume (VAV) hoods are designed to vary the amount of air being exhausted from the fume hood based on the sash position. By varying the exhausted air, these hoods are able to maintain a constant face velocity, no matter where the sash is positioned. VAV hoods are often equipped with an audio/visual alarm to notify the user if the hood is not operating properly.

5 Special Fume Hoods

- 5.1 Special fume hoods are necessary when working with certain chemicals and operations. Examples of special fume hoods include the following:
- 5.1.1 Perchloric acid fume hoods: Anyone working with perchloric acid must use a perchloric acid fume hood. These special fume hoods are equipped with a water spray system to wash down the entire length of the exhaust duct, the baffle, and the wall of the hood. Perchloric acid vapors can condense on the hood ductwork, forming dangerous, explosive metal perchlorates. Also, perchloric acid can react with organic materials to form organic perchlorates, which are also explosive. For this reason, organic solvents should *never* be used or stored in a perchloric acid fume hood, and the

hood should be labeled “Perchloric Acid Use Only; No Organic Chemicals”. The water wash down system, used periodically or after each use of the hood, removes any perchlorates or organic materials that may have accumulated in the hood exhaust system. The wash down system should be activated *only* when the exhaust fan has been turned off, so that complete coverage can be achieved.



- 5.1.2 **Walk-in hoods:** These fume hoods have single vertical sashes or double vertical sashes and an opening that extends to the floor. These hoods are typically used to accommodate large pieces of equipment.



5.1.3 Radioisotope hoods: These hoods are labeled for use with radioactive materials. The interiors of these hoods are resistant to decontamination chemicals. These hoods are also often equipped with High Efficiency Particulate Air (HEPA) filtration.

5.1.4 Ductless hoods: Ductless hoods are designed with a filtration system. Generally, however the filters are not appropriate for use with all chemicals. Also, it is difficult to know when the filters need to be replaced, even if a strict change-out schedule is followed. PVAMU and EHS do NOT approve of ductless fume hoods.

6 OTHER LABORATORY VENTILATION SYSTEMS

6.1 Biological Safety Cabinets (BSCs)

6.1.1 BSCs provide containment for pathogenic materials and are not intended for use as a chemical fume hood. When used and maintained correctly, Class II biosafety cabinets protect the user from exposure to harmful biological agents and also protect the product from contamination by filtering the air inside the cabinet through High Efficiency Particulate Air (HEPA) filters. Before using a biological safety cabinet, laboratory personnel should be thoroughly trained on how to properly use and maintain the cabinet. Follow these instructions for safe use of a biological safety cabinet:

6.1.1.1 Only biosafety cabinets that are certified according to National Sanitation Foundation (NSF) Standard # 49 may be used with pathogenic or recombinant DNA materials. BSCs must be certified upon installation, upon being moved, after major repair, and at least annually. BSCs that are not certified annually or that fail certification will be tagged “Not Safe For Use With Pathogens.”



6.2 Canopy Hoods

- 6.2.1 These hoods capture upward moving contaminants and are good for heat-producing operations only. Canopy hoods should not be used as chemical fume hoods, as workers may be exposed to contaminants if they work



6.3 Glove Boxes

- 6.3.1 Glove boxes are designed to be leak-tight and can be used with highly toxic or air-reactive chemicals and materials. Some glove boxes may also be appropriate for use with some radioactive materials. The leak-tight design provides a controlled atmosphere, protecting both the product and the worker by preventing vapors/moisture, gases, and particulates from entering or leaving the box.

6.4 Laminar Flow Hoods

- 6.4.1 Also known as clean benches, laminar flow hoods provide a continuous flow of HEPA filtered air across the work surface. This design helps prevent contamination of the product, but does not offer any protection to the worker. Laminar flow hoods should only be used with non-hazardous materials. Laminar flow hoods may be certified at the user's discretion. Contact EHS for more information.

6.5 Snorkel Hoods

- 6.5.1 Snorkel hoods are small fume exhaust duct connections. They are designed with flexible ducts and are able to be positioned directly over a work area at the bench. For best performance, the snorkel hood should be placed within six inches of the item needing ventilation. Snorkel hoods should *only* be used to exhaust heat and

nuisance odors. They should never be used with highly toxic or flammable chemicals.