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What Is A Fume Hood - A laboratory chemical fume hood is first and foremost a safety device. Users need to be able to rely on their fume hood as a primary containment device to protect them from the hazards within. It is connected to a remote exhaust system and provides operator protection by drawing air around the operator and into the hood chamber through the working opening. When the sash is closed, the exhaust system continues to operate to maintain the working chamber and exhaust ducting at negative pressure and provide containment of fumes and vapors. Fume hoods are generally served by either constant air volume (CAV) or variable air volume (VAV) exhaust systems.

Automatic Compensating By-Pass - A typical by-pass fume hood can be used on a constant volume system. This is due to an alternate path being created to allow air to enter the fume hood when the sash is closed. Automatic compensating by-pass hoods can be manufactured with vertically rising sashes only.
Certain types of fume hoods can't be made in an automatic compensating by-pass configuration. Such cases include fume hoods that include horizontally sliding panels as well as double hung vertically rising sashes. While the velocity increase is more noticeable as the sash is closed, such hoods can be used successfully with a CAV exhaust system.

Restricted By-Pass - A restricted by-pass hood is needed when using a hood with a VAV exhaust system. When the sash is closed, a smaller alternate opening is provided to allow for the minimum required airflow.

The Cost Of Safety - Fume hoods and other exhaust devices are the single largest energy consumer in a typical laboratory. It is therefore essential to explore options to minimize the energy consumption. When seeking to lower the energy consumption of fume hoods there are, broadly speaking, three approaches:

- Reduce the size of the working sash opening while maintaining a conventional face velocity of 80 - 100 feet/minute.
- Reduce the face velocity to 50 - 60 feet/minute while maintaining a generous working opening.
- Implement usage-based controls such as VAV so that energy consumption is minimized while the fume hood is not in use.

Mott supports all these options with our product range which includes restricted by-pass hoods for VAV use, high performance hoods that operate at 50-60 feet/minute and the Low Volume model which features a reduced size working opening.
Mott also offers auto lowering sashes in both spring return and motorized versions that can help conserve energy and provide increased safety.

Types Of Fume Hoods

General Purpose Bench Top - The most common type of fume hood utilized in most types of labs. The liner selected is generally fiberglass reinforced polyester (FRP) which has a broad applications.

General Purpose Floor Mount - Floor mounted hoods are used where the dimensions of the apparatus exceed what can be accommodated in a bench mounted fume hood or where the weight involved precludes placing the apparatus on a bench top.

High Performance Hoods - High Performance fume hoods are capable of providing containment with the sash fully open and the face velocity lowered to 60 feet per minute or less. They allow greatly reduced face velocities at full working height, resulting in a 40-50% reduction in energy use as compared to a general purpose hood. These are generally restricted to common bench top general purpose applications, suitable for VAV or CAV use.

Student Workstations - Student workstations are generally deployed in undergraduate teaching lab settings and are used by students while under supervision by an instructor. Accordingly, materials of construction are adjusted to suit less demanding chemical resistance needs. Glass side and back windows are often provided. Often these hoods are placed on an island and are manufactured in a back-to-back configuration with two working chambers.

Acid Digestion Hoods - For operations involving heating and evaporation of acids, special materials are used in the construction of the hood interior. The principle changes include a PVC or polypropylene liner, polytetrafluoroethylene (PTFE) coated sash frame, lower airfoil and exhaust connection. In addition, if the hood will be used with hydrofluoric acid, then the sash glass and light lens is changed from glass to polycarbonate.

Perchloric Acid Hoods - For operations involving heating and evaporation of perchloric acid, special fume hoods are produced. These hoods are always bench top models with the addition of a wash-down system and drain trough to remove hazardous perchlorate residues from the hood interior. Perchloric acid hoods are always connected to a dedicated exhaust system which is also equipped with a water wash system. Perchloric acid hoods can be equipped with a stainless steel liner if they will be used with perchloric acid only or a PVC liner if they will be used with other acids as well.

Radioisotope Hoods - Radioisotope hoods are designed for use with radioactive materials and have a smooth coved stainless steel liner with an integral dished work surface. The work surface is reinforced to support the weight of heavy shielding which may need to be utilized by the user.

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Other Exhaust Devices - While canopy hoods are not generally considered fume hoods and do not provide containment, they do have application in laboratories where large quantities of heat or nuisance odors need to be removed. The Oval Air Station ventilated island bench is useful in undergraduate labs where potential hazards are low and normal fume hoods are not needed.

Fume Hood Sash Types - Mott provides fume hoods with a variety of sash configurations. The most common type for bench hoods is the vertically rising sash. This sash travels up and down only and generally provides maximum protection for the operators face when it is used approximately half open. The combination sash is essentially a vertically rising sash frame with smaller inset horizontally sliding panels. In general this should be reserved for operations that require frequent access to the upper portion of the fume hood chamber. Larger floor mount fume hoods can be provided with double hung vertically rising sashes or top hung horizontally sliding panels. Various combinations of the above sashes can be specifically designed to meet your exact needs.

Plumbing Types & Materials - Fume hoods can be preplumbed in the factory as required. Mott uses the following materials unless otherwise specified:
Non-flammable gases including vacuum and water – 0.375" OD, ASTM B280 refrigeration copper with all joints made up using double ferrule instrument grade swage type fittings.
Burning gas – 3/8" schedule 40 black pipe with threaded joints (USA), 0.375" type G copper with double ferrule swage fittings (Canada and overseas).
Pure Water – 0.375" OD polypropylene with polypropylene compression fittings.

Counter Top Materials - Counter tops can be provided for hoods in either stainless steel (note limitations in liner section) or cast epoxy resin. Epoxy is most commonly selected due to its very broad chemical resistance.

Exhaust Duct Connections - While most fume hood duct connections are round, please note that some fume hood models are designed with a rectangular duct connection to reduce turbulence inside the hood. If needed, an optional duct transition from rectangular to round can be ordered separately.

Exhaust Duct Materials - Particular attention should be paid to the exhaust ducting materials to ensure they are resistant to the chemicals which will be used in the lab. Common materials include: stainless steel, galvanized steel, polypropylene, polyethylene, PVC, and, fiberglass reinforced polyester. If the lab work will include extensive use of acids then uncoated galvanized or stainless steel should not be used.

Fume Hood Liner Materials - Fume hoods must have a liner appropriate to the task. For the vast majority of applications Mott recommends the fiberglass reinforced polyester (FRP) liner which provides excellent resistance to chemical and physical damage and is a Class A fire rated material with a flame spread rating below 25. In addition, we provide other liner materials to suit specific applications including polyvinyl chloride (PVC) for Acid use and stainless steel for solvent and wet applications. It is important to keep the limitations of hood liners in mind when selecting materials. Stainless steel, for example, is never recommended for general acid use and is also vulnerable to chlorides.

FRP
- White color, excellent general purpose liner
- Good resistance to most solvents, bases and acids
- Low flame spread rating
- Strong structural strength

316 Stainless Steel Square Corners
- Resistant to solvents and bases
- Subject to attack by some acids
- High tolerance to flame and heat
- Excellent structural strength

316 Stainless Steel Rounded Corners
- Resistant to solvents and bases
- Subject to attack by some acids
- Recommended for radioisotope and perchloric acid applications
- High tolerance to flame and heat
- Excellent structural strength
- Excellent cleaning characteristics
- Integral work surface

Phenolic Resin
- White color
- Good resistance to most solvents, bases and acids
- Low flame spread rating
- Strong structural strength

Poly Vinyl Chloride (PVC)
- White color
- Excellent resistance to bases and acids
- Poor tolerance to flame and heat
- Strong structural strength

Epoxy Resin
- Off white color
- Excellent resistance to solvents, bases and acids
- Moderate tolerance to flame and heat
- Moderate structure strength

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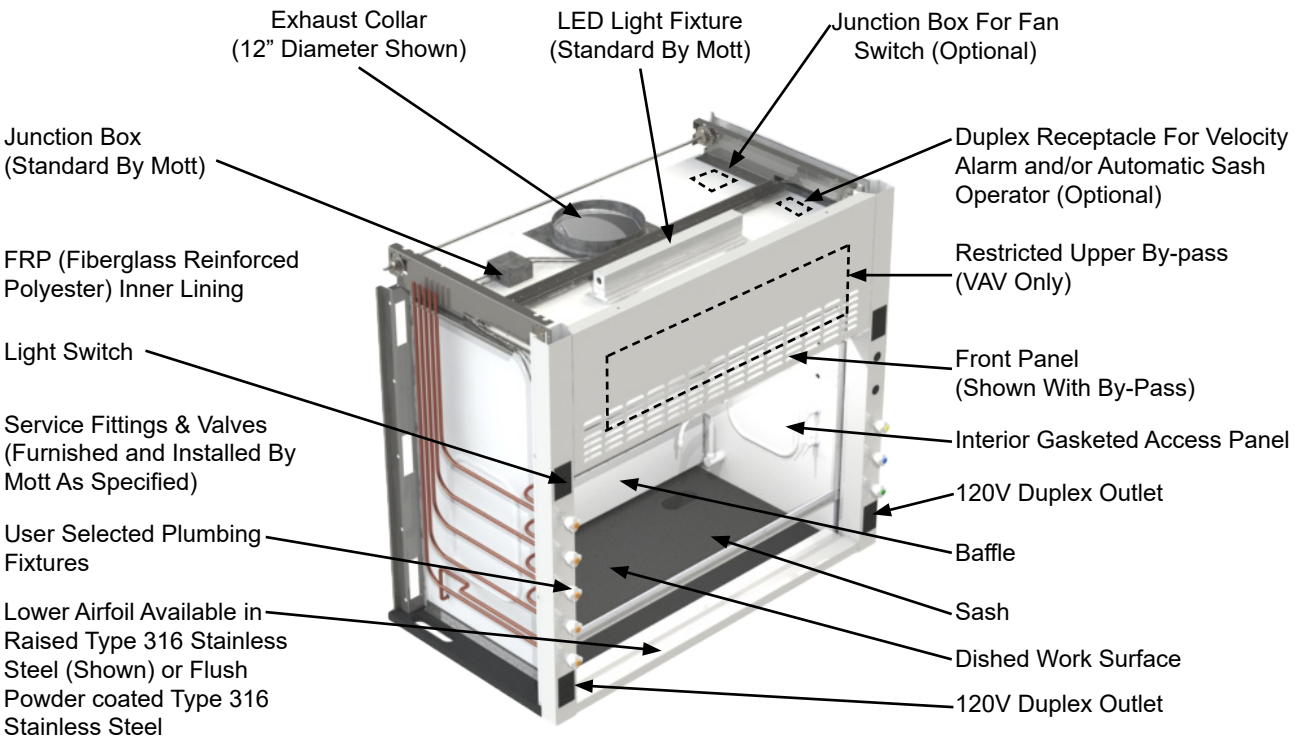
Agency Approvals & Hood Certification - Fume hoods generally require agency approval in order to satisfy local authorities. Accordingly, Mott maintains a UL1805 classification to cover virtually all the standard and special fume hoods we produce. Most models are also CSA certified.

Custom Hoods - Mott Manufacturing has provided countless custom and special fume hoods and we have the expertise to assist with solutions to unique fume hood situations. Custom hoods require performance testing before use. Testing should be performed on-site after installation and in some cases a factory test will also be required. Exceptionally special hood will require an electrical inspection.

Fume Hood Positioning In The Lab - Fume Hood performance and safety is substantially dependent on the layout of the laboratory and particular attention should be paid to supply air grille/diffuser location, fume hood location, and escape routes. In general, the laboratory layout and supply air conditions need to ensure that drafts in the area in front of the fume hood are maintained below 1/3 of the fume hood face velocity. In addition, attention should be paid to escape routes keeping in mind that the need to cross in front of a fume hood during an evacuation must be avoided.

Features Of A Typical Laboratory Fume Hood



Pro Series Fume Hood Shown
(Exterior access panel removed for clarity)