Guide to Fume Hood Selection

Introduction

Selection of the proper type of fume hood to use in a laboratory should be based upon two interrelated considerations:

1. The hood must allow the user to perform the work in a safe, efficient manner.
2. The need to reduce air conditioning cost.

The hood must be large enough to accommodate the required containers and apparatus within the prescribed safe work area of the hood (6" behind the plane of the sash). The configuration of the hood should be such that containers can be moved in and out of the hood easily. The sash opening of the hood must allow sufficient access for safely manipulating the containers and apparatus within the hood. The interior of the hood must resist the corrosive effects of chemicals. The hood understructure should provide for storage of the required chemicals for the work being done in the hood.

The total cost of a hood is greatly affected by its exhaust air requirements. The annual cost of heating and cooling the air exhausted by the hood can be as high as the initial cost of the hood itself. Choosing the proper hood type and sash configuration can significantly reduce these costs.

Types of Fume Hoods

Open by-pass fume hoods are designed for operation on constant air volume exhaust systems. The air by-pass provides for an alternate route for air to enter the hood as the sash is closed. The size of the by-pass is set so that, as the sash is closed, the velocity of the air increases to no more than three and one half times the velocity with the sash fully open. As a result, the static pressure loss through the front opening of these hoods is insignificant when compared to the pressure loss through the rear baffle and duct entry. Since the hood static pressure and the exhaust volume remain essentially constant, regardless of the sash position these hoods are classified as **Constant Volume** fume hoods.

Low constant volume fume hoods use a restricted sash opening or a lower face velocity, or both to reduce the exhaust quantity of air, measured in cubic feet per minute (CFM), necessary to contain fumes with a typical face velocity of 80-120 FPM. Traditionally, such fume hoods can reduce the exhaust CFM from 40% to 60% from open by-pass levels. Kewaunee's Dynamic Barrier and Supreme Air LV fume hoods actually reduce exhaust requirements up to 73%.

Restricted by-pass fume hoods are designed for operation on variable air volume (VAV) exhaust systems when used with a fume hood face velocity controller (not provided with hood). On standard restricted by-pass hoods, the size of the air by-pass provides sufficient area that, with 100 feet per minute by-pass velocity with the sash closed, the exhaust volume will be 25 CFM per square foot of internal hood worksurface. This by-pass size is not appropriate for all VAV applications due to functional differences in face velocity controllers and variations in room exhaust require-ments. If a different by-pass size is required, it should be specified at the time the hood is ordered. Hoods with horizontal and combination sashes are only cataloged as restricted by-pass hoods. In these hoods the size of the by-pass required for constant volume operation and for providing a minimum 25 CFM per squre foot of internal hood worksurface in VAV operation is the same.

Auxiliary air fume hoods are **Constant volume** hoods designed for use when it is not feasible to introduce the required make-up air through the room ventilation system. Up to 70% of the exhaust volume can be supplied through an auxiliary air chamber mounted above the hood. These hoods require a separate ducted fan system for the supply of the auxiliary air.

Open by-pass hoods are designated by a dash [**-**] in the ninth space of the part number. **Restricted by-pass** hoods are designated by the letter "**B**" in the ninth space of the part number. As an example H05K5472**-**00 is an open by-pass hood and H05K5472**B**00 is a restricted by-pass hood.

An **Auxiliary air** hood is designated by adding the appropriate auxiliary air chamber to the **Open by-pass** hood.

For answers to frequently asked questions about Kewaunee fume hoods visit the Kewaunee web site at:
http://www.kewaunee.com/lab/knowledge-center/faqs/fume-hoods.aspx

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Guide to Fume Hood Selection (continued)

Face Velocity

In a laboratory fume hood, the control of contaminants is achieved by drawing air through the face (sash) opening. The face velocity is defined as the average velocity of the air in this opening and is expressed in units of feet per minute (FPM). The Occupational Safety and Health Administration (OSHA) in its Laboratory Standard does not specify a required fume hood face velocity. As a result, hood users must look to published guidelines for recommendations on proper face velocities. The most authoritative of these published guidelines is the ANSI/AIHA Z9.5 American National Standard for Laboratory Ventilation. This publication recommends using an average face velocity of between 80 and 120 feet per minute.

Newer technologies (like Kewaunee's LV series) have allowed face velocities as low as 55 FPM to show good containment. Part of the reasoning for these newer, lower face velocities is that the face velocity by itself does not define the protection level of a fume hood. There are other factors which are as important such as: the design of the hood, the location of the hood within the laboratory, the quality of the supply air distribution, and most importantly the work practices of the user. The ANSI/AIHA Z9.5 recommendation assumes that these factors have been optimized through proper design and work rules.

Where local and state codes require the use of a specific face velocity, these codes should be followed.

Sash Arrangements

Vertical sash hoods provide the best horizontal and vertical access to the hood interior but they also have the highest exhaust requirements. The exhaust requirements can be reduced by using gravity sash stops, although, this restricts the vertical access into the work area. Split sash hoods can be used where needed for two work areas.

Auto-Return Vertical Sash hoods use a vertical sash that will automatically return to a pre-set position if released from a higher position. A full-open lock-out is provided for set-ups.

Horizontal sash hoods provide good access into the hood vertically and allow for lower exhaust requirements. These sashes do restrict the access across the hood for loading of equipment and apparatus. This limitation becomes less significant in larger hoods.

Combination vertical rising/horizontal sash hoods, as the name implies, provide the benefits of both the vertical and horizontal sash hoods. For normal operation the sash can be partially raised vertically, or the horizontal panels can be used. The sash can be fully opened vertically for loading equipment into the hood.

Telescoping combination sash used on Kewaunee's Dynamic Barrier fume hood uses an interlocking twin sash mechanism that combines a restricted combination vertical rising/horizontal sash and small vertical rising sash to allow a very large 37" vertical opening. This sash facilitates set-ups while keeping the work opening small.

Configurations

Bench hoods are set on a worksurface approximately 36" above the floor and provide a convenient work area for the standing position. A minimum of 42" of interior working height is provided.

Walk-in hoods are used where taller apparatus is required or equipment is rolled into the hood. These hoods provide a minimum 78" of interior working height.

Distillation hoods are used where taller apparatus is required and convenient access to the floor of the hood is needed. These hoods provide a minimum 77" of interior working height.

ADA fume hoods are designed in accordance with the guidelines for the Americans with Disabilities Act. These hoods are also used when a sitting position is desired for work at the hood. They provide the same size work area as the corresponding bench hoods.

Special Purpose Fume Hoods

Isotope hoods are designed for use with radioactive materials. The Type 304 stainless steel cove corner seamless welded construction eases cleaning and decontamination.

Perchloric Acid hoods are required when this acid is heated above ambient temperature. The Type 316 stainless steel liner is fabricated to eliminate the possibility of formation of perchloric acid deposits. This hood includes a water wash down feature.

For answers to frequently asked questions about Kewaunee fume hoods visit the Kewaunee web site at: **www.kewaunee.com/fume/faq.shtml**

Guide to Fume Hood Selection (continued)

Baffle Design

Fixed baffles come with fixed slots in the rear baffle. The size of the slots are optimized to provide the best performance for general purpose use.

In some instances (e.g. use of large hot plates) it is advantageous to be able to change the air flow patterns within the hood by adjusting the slots in the rear baffle. This adjustment should only be done by someone familiar with hood air flows and performance.

Internally adjustable baffles come with movable baffle strips which can adjust the relative size of the top and bottom slots. The middle slot in the baffle is fixed.

Single point adjustable baffles are adjustable by moving a selector knob, near the front of the hood, which restricts the flow to the lower slot, thus increasing the flow at the upper baffle slot. This adjustment can be done without disturbing the apparatus within the hood.

The fixed baffle is the default option in the part number. Internally adjustable baffles are chosen by adding the suffix "**A**" to the part number (H05K5472-00**A**). Single point adjustable baffles are chosen by adding the suffix "**C**" to the part number (H05K5472-00**C**).

Liner Material

KMER, **Kemglass**, and **Phenolic Resin** are general purpose liners with very good to excellent chemical resistance. **Type 304 stainless steel** is usually used where cleanability and/or heat resistance are the prime requirements.

Phenolic Resin (T) liner is reinforced with cellulose fibers and is surfaced with white melamine material. The brown phenolic resin is visible at the edges of the sheet material.

Kemglass (G) is white fiberglass reinforced polyester sheet material.

KMER (K) is a white modified epoxy resin sheet, reinforced with glass fibers.

Type 304 stainless steel (S) is 14 gauge stainless steel sheet with a No. 4 finish.

HOOD LINER CHARACTERISTICS

LINER MATERIAL	RESISTANCE TO HEAT	CHEMICAL RESISTANCE ACIDS	CHEMICAL RESISTANCE SOLVENTS	CLEANABILITY
Phenolic Resin	**G**	**E**	**E**	**G**
Kemglass	**G**	**E**	**G**	**G**
KMER	**G**	**E**	**E**	**G**
Stainless Steel	**E**	**F**	**E**	**E**

E = Excellent G = Good F = Fair P = Poor

Work Tops

Epoxy Resin work tops are available in four colors, have excellent chemical resistance, and good heat resistance. They are the normal choice for general purpose hoods and highly corrosive applications.

Stainless Steel work tops are available in Types 304 and 316. They are used where cleanability and heat resistance are important. Type 316 is preferred where improved chemical resistance is desired.

The hood work top is specified by a separate part number from the hood for all hoods except Isotope and Perchloric Acid hoods..

For answers to frequently asked questions about Kewaunee fume hoods visit the Kewaunee web site at: **www.kewaunee.com/fume/faq.shtml**

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Fume Hood Selection Chart

	Hood Number	Purpose	Sash Type	By-pass	Page No.
Constant Volume					
Bench	H05	General Purpose	Vertical	Open	12-13
	H08	ADA	Vertical	Open	18-19
	H20	Isotope	Vertical	Open	24-25
	H25	Perchloric Acid	Vertical	Open	26-27
Walk-In	H30	General Purpose	Vertical	Open	32-33
Distillation	H36	Distillation	Vertical	Open	40-41
Low Constant Volume					
Bench	LV05	General Purpose High Performance	Vertical Self-closing	Dynamic Barrier	10-11
	H50	General Purpose Ultra Low Volume	Telescoping Combination	Dynamic Barrier	14-15
	H07	General Purpose	Combination	Restricted	16-17
	H09	ADA	Combination	Restricted	20-21
	H10	General Purpose	Split Vertical	Open	22-23
	H05	General Purpose	Vertical w/Sash Stop	Open	12-13
	H70	General Purpose	Horizontal	Restricted	28-29
	HOP	General Purpose	Combination	Restricted	30-31
Walk-In	H52	General Purpose	Low-flow Combination	Dynamic Barrier	34-35
	H32	General Purpose	Combination	Restricted	36-37
Variable Air Volume (VAV)					
Bench	H05	General Purpose	Vertical	Restricted	12-13
	H07	General Purpose	Combination	Restricted	16-17
	H70	General Purpose	Horizontal	Restricted	28-29
	H20	Isotope	Vertical	Restricted	24-25
	HOP	General Purpose	Combination	Restricted	30-31
	LV05	General Purpose High Performance	Vertical Self-closing	Dynamic Barrier	10-11
Walk-In	H30	General Purpose	Vertical	Restricted	32-33
	H32	General Purpose	Combination	Restricted	36-37
	H34	General Purpose	Horizontal	Restricted	38-39
Distillation	H36	Distillation	Vertical	Restricted	40-41
Auxiliary Air					
Bench	H05 & H01	General Purpose	Vertical	Open	12-13
	H10 & H01	General Purpose	Split Vertical	Open	22-23
	H08 & H01	ADA	Vertical	Open	18-19
	H20 & H01	Isotope	Vertical	Open	24-25
	H25 & H01	Perchloric Acid	Vertical	Open	26-27
Walk-In	H30 & H01	General Purpose	Vertical	Open	32-33
Distillation	H36 & H01	General Purpose	Vertical	Open	40-41

Guide to Fume Hood Selection (continued)

Supreme Air Fume Hood Catalog Number Explanation

H05K5472-00 A...9

Fume Hood Type
- **H01** = Auxiliary Air Chamber
- **H05** = Vertical Sash Bench Hood
- **H07** = Combination Sash Bench Hood
- **H08** = ADA Vertical Sash Bench Hood
- **H09** = ADA Combo Sash Bench Hood
- **H10** = Split Sash Bench Hood
- **H20** = Isotope Bench Hood
- **H25** = Perchloric Acid Bench Hood
- **H30** = Vertical Sash Walk-In Hood
- **H32** = Combination Sash Walk-In Hood
- **H34** = Horizontal Sash Walk-In Hood
- **H36** = Vertical Sash Distillation Hood
- **H50** = Dynamic Barrier Bench Hood
- **H52** = Dynamic Barrier Walk-In Hood
- **H70** = Horizontal Sash Bench Hood
- **HOP** = HOPEC Bench Hood

Interior Liner Material
- **G** = Kemglass (fiberglass reinforced polyester)
- **K** = KMER (Kewaunee Modified Epoxy Resin)
- **L** = Type 316 Stainless Steel
- **S** = Type 304 Stainless Steel
- **T** = Phenolic Resin

Hood Height
- **13** = Air Chamber
- **54** = Bench Hood
- **90** = Walk-In Hoods & Distillation Hoods

Hood Length
- **48** = 4'-0" / 48"
- **60** = 5'-0" / 60"
- **72** = 6'-0" / 72"
- **96** = 8'-0" / 96"
- **20** = 10'-0" / 120"
- **44** = 12'-0" / 144"

By-Pass Option
- **-** = Open By-Pass
- **B** = Restricted By-Pass

Special Configurations

Add On Options
See list below

Add On Options Lettering Code:

- **A** = Adjustable Baffles
- **C** = Single Point Adjustable Baffles
- **D** = Distillation Rack
- **E** = Fire Extinguisher
- **F** = Two Extra GFI Receptacles (120 VAC 20 amp – replaces bottom fixture holes on each side)
- **G** = Front Load Fittings
- **H** = Pre-wired/UL Listed
- **I** = Safety Shield
- **J** = T8 Fluorescent Light Ballast
- **K** = Vapor Proof Light
- **L** = Explosion Proof Light
- **M** = Air Alert 600 Airflow Alarm
- **O** = Stainless Steel Deflector Vane
- **Q** = Stainless Steel Sash Handle
- **R** = Extra GFI Receptacle on right side (replaces bottom fixture hole)
- **S** = Extra GFI Receptacle on left side (replaces bottom fixture hole)
- **T** = Sight-Tight Chevron Grille
- **V** = Vision Panel
- **W** = Air Alert 300 Alarm (location 1)
- **Z** = Air Alert 300 Alarm (location 2)
- **1** = Frameless Tempered Glass Sash
- **2** = Framed Safety Glass Sash
- **3** = Framed Tempered Glass Sash
- **4** = St. Steel Safety Glass Sash
- **5** = St. Steel Tempered Glass Sash
- **6** = Tissue Screen
- **7** = Type 316 Stainless Steel Duct Collar
- **8** = Gravity Sash Stop
- **9** = Work Shelf Supports

Supreme Air LV Fume Hood Catalog Number Explanation

LV05K543472-00 A...9

Fume Hood Type
LV05 = Vertical Sash Bench Hood

Interior Liner Material
- **G** = Kemglass (fiberglass reinforced polyester)
- **K** = KMER (Kewaunee Modified Epoxy Resin)
- **S** = Type 304 Stainless Steel
- **T** = Phenolic Resin

Hood Height
54 = Bench Hood

Hood Depth
34 = 34 1/2"

Hood Length
48 = 4'-0" / 48" **60** = 5'-0" / 60" **72** = 6'-0" / 72"
84 = 7'-0" / 84" **96** = 8'-0" / 96"

Special Configurations

Add On Options
See list above