



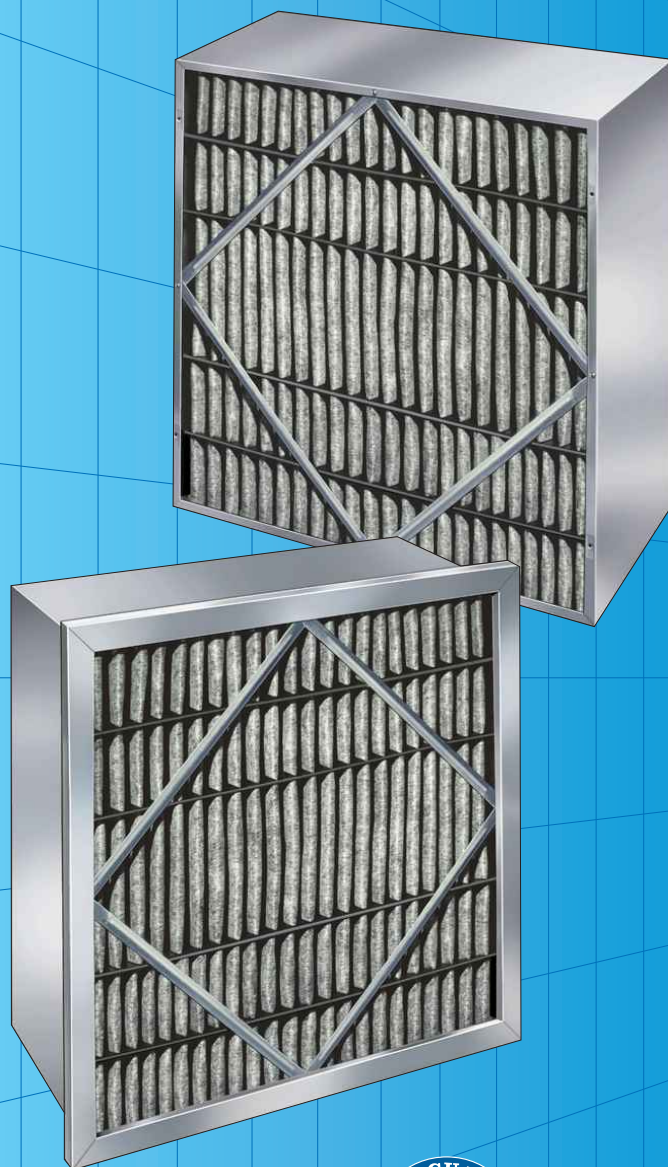
Vari-Klean™

Ultra High Efficiency Gas Phase Adsorbers

Chemical filtration for continuous removal of low level concentrations of Airborne Molecular Contamination (AMC) less than 500 parts per billion (ppb).

*Innovative
Clean Air
Solutions*

- Highest first pass removal efficiency
- Highest carbon loading
- Highest activity carbon
- Lowest carbon shedding
- Low resistance



Microelectronics



Museums



Airports

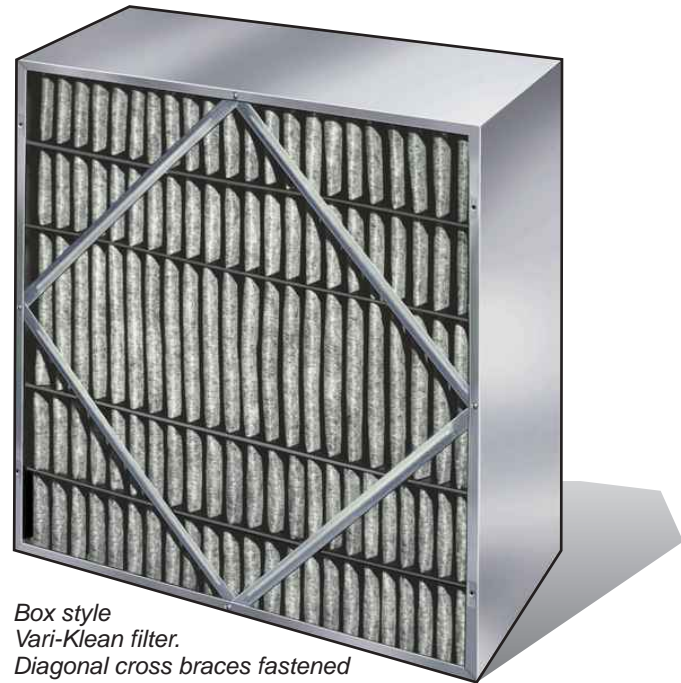


Highest First Pass Removal Efficiency for Maximum Indoor Air Quality Protection

Process designers, facilities engineers and quality control managers in critical manufacturing industries, such as microelectronics, cleanrooms and pharmaceuticals are becoming increasingly sensitive to the need for chemical filtration to remove low level concentrations of gases, referred to as Airborne Molecular Contamination (AMC). Concentrations in the low parts per billion (ppb) and parts per trillion (ppt) range can be detrimental to the quality of the product in these applications.

Removal of gases, vapors and odors in make-up and recirculated air in cleanrooms and other applications is taking on new significance to provide the required level of air quality for products, processes and people. Vari-Klean filters offer the latest technology in AMC control not only in low level concentrations, but also for intermittent spikes of higher concentrations up to 5 ppm.

- Highest first pass removal efficiency
- Highest carbon loading
- Highest activity carbon
- Low resistance
- Long service life
- Clean operation, lowest carbon shedding
- Easy to retrofit with standard filter hardware
- Two styles to choose from
- Filters individually packaged in a poly bag



Box style Vari-Klean filter. Diagonal cross braces fastened on both sides add rigidity to the filter and prevent racking.

Select from Four Medias for Maximum Control of Gaseous Contamination

Standard Activated Carbon (90% Activity)		Chemically Treated Carbon		
		Multi-Purpose	Acids	Amines / Bases
Food / Cooking Odors	VOC's	Formaldehyde	Hydrogen Sulfide	Ammonia
Industrial Process Odors	Cigarette Odors	Oxides of Nitrogen	Hydrochloric	Morpholine
Jet Engine Fuels	Hydrocarbons	VOC's	Hydrofluoric	NMP
Exhaust Odors	Boron	Sulfides	Nitric	Triethylamine
Diesel Fumes	Phosphorus	Diesel Fumes	Sulfuric	Trimethylamine
Ozone	Arsenics	Cigarette Odors		
		Ozone		

Chemical Filters Used in Critical Applications

Standard Activated Carbon General Purpose		Chemically Treated Carbon		
		Multi-Purpose	Acids	Amines / Bases
Airports	Microelectronics	Museums	Acid Etch Operations	Photolithography
Hospitals	Industrial Processes	Libraries	Sewage Treatment Plants	Blue Print Facilities
Office Buildings	Restaurants / Bars	Hospitals	Pulp and Paper Mills	Cleanrooms
Cleanrooms	Sports Arenas	Morgues	Petrochemical	Microelectronics
Pharmaceuticals	Nail Salons	Office Buildings	Pharmaceutical	Amine Etching Processes
		Diesel Exhaust		
		Casinos / Bingo Halls		
		Smoking Lounges / Bars		
		New Construction		

Compare features that produce results . . . *Vari-Klean delivers.*

No Other Brand Can Match Vari-Klean's Gas Adsorption Characteristics for Ultra High Efficiency Contamination Control.

1 - Activity Rating

The higher the activity of the carbon, the higher the capacity for contaminant removal.

Advantage: Vari-Klean – 90% activity (Carbon Tetrachloride)
Competition: Filters typically use 60 – 70% activity carbon

2 - Carbon Loading

Carbon loading is the weight of carbon per square meter of media. The higher the loading, the more carbon the filter contains.

Advantage: Vari-Klean – 600 grams per square meter
Standard model – 7 pounds; Premium model - 9 pounds.
Competition: Filters typically use media containing about 500 grams per square meter.

3 - Carbon Blinding

The more surface area of the carbon granules that is blinded by the bonding method, the lower the capacity and efficiency of the filter.

Advantage: Vari-Klean – Less than 1.5% of the surface area is blinded. (See highly magnified photos below.)

Competition: A larger percentage of the carbon granule surface is blinded by the adhesive or other method of bonding the granules to the fibrous substrate.

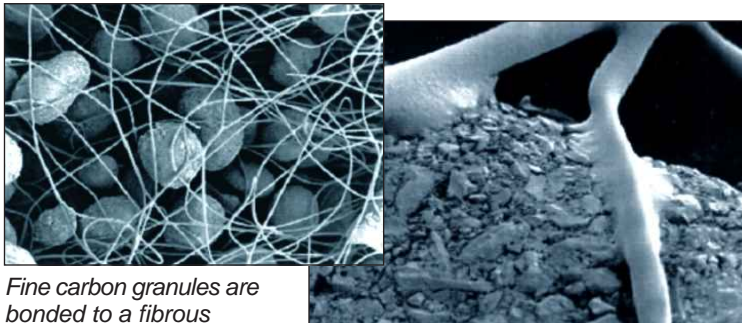
4 - Media Area

The more media, the more total weight of carbon the filter contains. Total carbon weight directly affects the amount of contaminant the filter can hold before breakthrough occurs.

Vari-Klean: Standard Model – 56 square feet
Premium Model – 73 square feet

Unique Carbon Bonding Process Maximizes Carbon Surface Area

The fine mesh carbon granules are bonded to a fibrous substrate by a unique process that requires minimal coverage of the granule surface. Less than 1.5% of the surface is blinded. No adhesive is used. Greater than 98.5% of the surface is exposed to contaminated air for maximum gas adsorbing efficiency and capacity.



Fine carbon granules are bonded to a fibrous substrate.

Highly magnified photo shows how individual granules are bonded to the fibers without adhesive.



Header style

Vari-Klean filter. The filters can be easily retrofitted into front or side access systems using standard filter hardware.

5 - Granule Size (Mesh Size)

The smaller the granule size of carbon, the greater the amount of surface area exposed to contaminated air. Granule size affects first pass removal efficiency, capacity, and time to breakthrough.

Vari-Klean: U.S. Mesh Size 20x50

6 - Residence Time

The more media and therefore carbon contained in the filter, the longer the time contaminated air is exposed to the carbon adsorbent.

Vari-Klean: Standard Model - .037 seconds
@ 500 FPM Premium Model - .046 seconds

Sealed Carbon Media Provides Clean Product, No Carbon Dusting

Vari-Klean media consists of a very fine granular carbon (90% activity, 20x50 mesh) with 600 grams per square meter. The granules are bonded to a synthetic fiber substrate which is sealed within a sleeve of spun bonded synthetic scrim to prevent carbon dusting. No post filter is needed to contain particle shedding often associated with carbon filters.



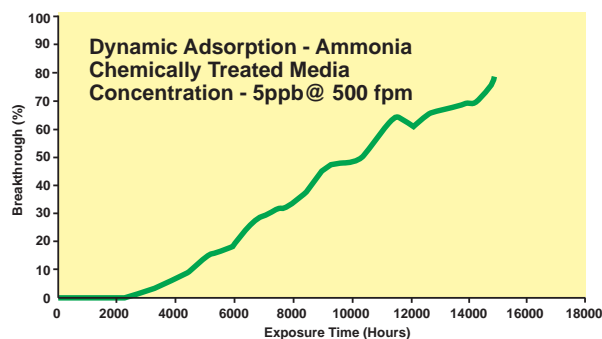
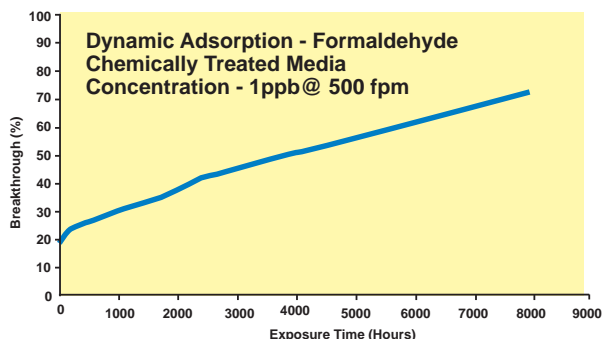
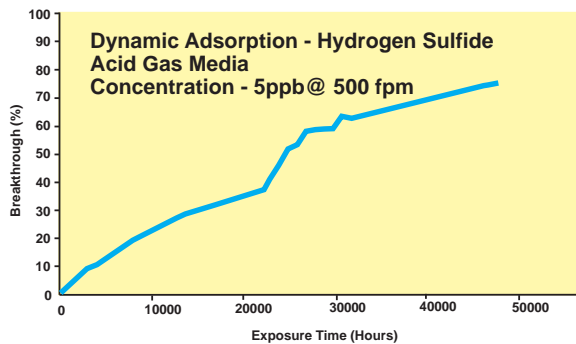
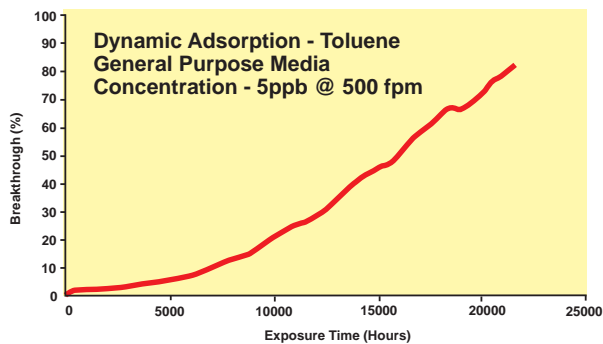
Sealed carbon media is pleated to maximize surface area.

Performance Data Vari-Klean Premium

Dynamic Adsorption – Measurement of the filter's ability to remove a gaseous contaminant at rated air flow.

Breakthrough – Percentage of gas passing through the filter. (Opposite of efficiency.)

Capacity - Weight in grams of contaminant the filter can retain over the life of the test.



Performance Summary

	General Purpose	Chemically Treated		
	Toluene	Hydrogen Sulfide	Formaldehyde	Ammonia
Time at greater than 98% Removal Efficiency (Hours)	2,427	240	—	2,760
Time to 50% Breakthrough (Hours)	16,180	24,500	4,100	10,400
Time to 70% Breakthrough (Hours) (Recommended Change Out Point)	20,100	41,500	7,800	14,500
Removal Capacity at 70% Breakthrough (Grams)	947g	527g	10g	111g

Estimated Service Life with Typical Contaminant Gases

Toluene	Hydrogen Sulfide
100,500	207,805
Formaldehyde	Ammonia
7,800	72,500

Estimated service life for continuous exposure to each contaminant at a concentration of 1 ppb at 500 FPM, to a 70% breakthrough.

Vari-Klean Premium filters operating at 500 FPM at a continuous concentration of 5 ppb (1ppb for Formaldehyde). All data is based on accelerated testing of flat sheet media extrapolated to reflect filter performance under actual operating conditions.

Sizes

Nominal Size (WxHxD) (Inches)	Actual Size (WxHxD) (Inches)	Media Area (Sq. Ft.)				Carbon Weight (Lbs.)			
		Standard Model		Premium Model		Standard Model		Premium Model	
		Box Style	Header Style	Box Style	Header Style	Box Style	Header Style	Box Style	Header Style
24 x 24 x 12	23-3/8 x 23-3/8 x 11-1/2	56	49	73	65	7.0	6.0	9.0	8.0
12 x 24 x 12	11-3/8 x 23-3/8 x 11-1/2	30	24	36	31	4.0	3.0	4.5	4.0
Initial Resistance @500 FPM		Standard Model - Box Style - .30" W.G. Header Style - .40" W.G.				Premium Model - Box Style - .40" W.G. Header Style - .50" W.G.			



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