



GAS PHASE FILTRATION



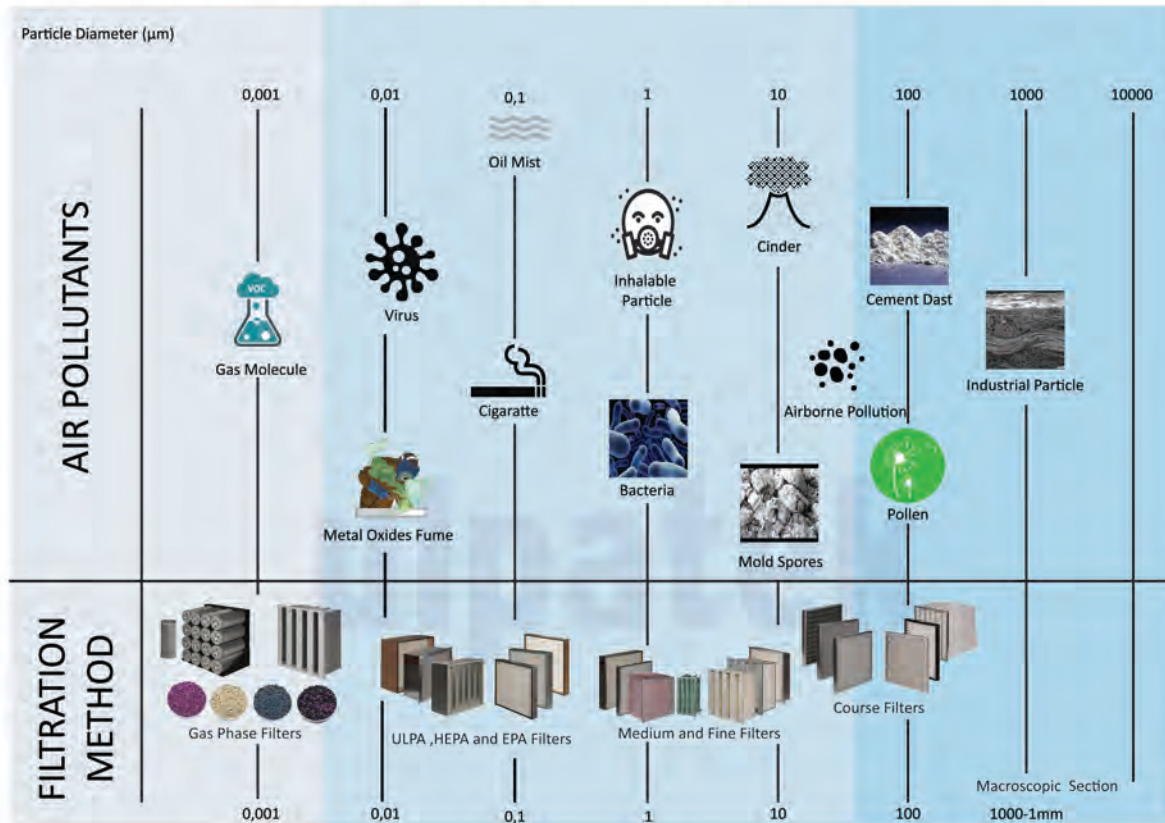
AIR FILTER TECHNOLOGY



ADVANCED FILTRATION FOR A BETTER FUTURE!

Airborne pollution sources are various which can be from natural sources like volcanos, thermal sources, pollens, sand storms and from industrial life like factories, automobile emissions, jet fuels, garbage dumps etc.

Pollutants are divided in to three physical conditions as solids, liquids and gases. Effective pollution control can be easily made by particulate and gas phase filtration. These filtration methods and applications are defined at EN779, ISO16890, EN1822, ASHRAE 62.1 and ISA-71.04 standards. Airborne pollutants comparison chart shows size differences related particulate and gas phase filtration.



In order to apply the control methods for the gas phase pollutants, we have to know the pollutants and it's effects. Main airborne pollution effects;



Corrosion Problems



Odour Problems



Toxic Problems



IAQ Problems

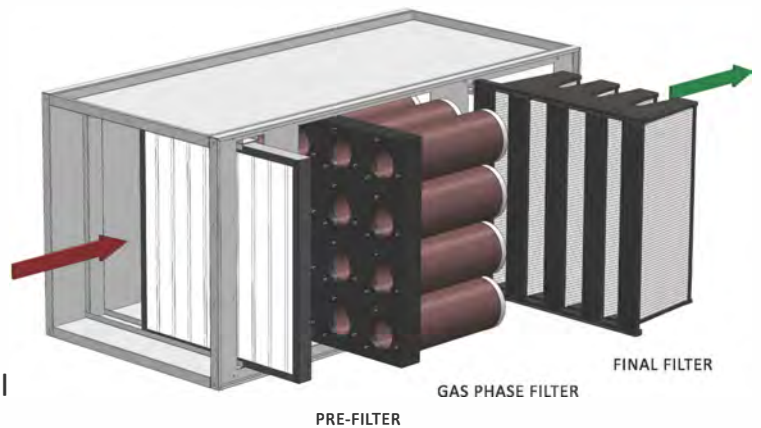
Ulpatek has various type of media which are selected according to the target pollutants.

Product Family	Gas Phase Pollutants												
	C _x H _y	Cl ₂	Odors	VOC's	H ₂ S	SO ₂	NO ₂	HCHO	HCl	Hg	R.active Iodine	Merc.	NH ₃
ULP-Bi-On AC Active Max	✓		✓	✓									
ULP-Bi-On +11%					✓	✓	✓	✓					
ULP-Bi-On +11% / AC					✓	✓	✓	✓	✓				
ULP-Bi-On KOH		✓			✓	✓			✓			✓	
ULP-Bi-On KI4%					✓	✓		✓		✓	✓	✓	
ULP-Bi-On ACPA				✓									✓
ULP-Bi-On Cl		✓											
ULP-Bi-On S										✓			
ULP-Bi-On Triple Blend		✓	✓	✓	✓	✓	✓						

GAS PHASE FILTRATION

Gas phase filtration and particulate filtration work together for acceptable indoor air quality in controlled environments. Gas pollutants are filtered with Ulpatek's gas phase air filters which are produced from one or mix filter media. Particulate pollutants are controlled with particulate filters which are mentioned in related standards as coarse, fine and absolute filters.

Gas phase filter media (pellets) generally are produced using carbon, zeolite, alumina or coconut-based media. Gas phase filtration occurs with the two different methods which are physical and chemical.



Gas pollutants are filtered on media surface with weak van der Waal's forces in physical method. That works also reversible after the removal capacity saturate.

Gas pollutants reacted to media's surface via chemical bonds in chemical method. Chemical adsorption is irreversible.



ULP-Bi-On KOH

- Potassium Hydroxide
- Greatest purity and bigger surface area
- Broad spectrum of gas removal



ULP-Bi-On Cl

- Sodium Thiosulphate
- Chlorine and acid gases removal



ULP-Bi-On KI4%

- Potassium Iodure
- Formaldehyde and organic aldehydes removal



ULP-Bi-On +11%

- Potassium Permanganate
- Irreversible removal



ULP-Bi-On AC Active Max

- Thermally activated bituminous carbon
- No impregnates
- High gas removal capacity



ULP-Bi-On Triple Blend

- Contains a 50:25:25 blend, respectively of ULP-Bi-On KOH, ULP-Bi-On AC Active Max, ULP-Bi-On +6%



Cartridge Type Filter



PP12 Module



PP18 Module

Cartridges and modules are the most popular gas phase filter application types in air filter equipment.

For local applications drum and indoor air cleaner devices are used for gas removal and indoor air quality.



Drum Scrubber



Air Purifier Device

INDUSTRIAL APPLICATIONS

Corrosion Control



Petrochemical Refinery

Process control systems, data centers and other rooms that have instrumentation which has to be environmental controlled must supply G1 classification according to ISA requirements. Achieving room ventilation design requirement must supply a minimum room pressurization of 1-3 air changes per hour and recirculation of 6-12 air changes per hour. Temperature is typically 22°C (±2°C) with humidity lower than 50% relative humidity. Tightness of the room is also another parameter while defining the design parameters. In addition to these parameters, hazardous pollutants are main parameter which must be removed from the enclosed space. According to the ANSI/ISA 71.04, contamination concentration levels are defined as follows.



Corrosion

Severity Level	Gas	G1 / Mild	G2 / Moderate	G3 / Harsh	GX / Severe
Contaminant		Concentration (ppbv)			
Reactive Species	H ₂ S	< 3	< 10	< 50	≥ 50
	SO ₂	< 10	< 100	< 300	≥ 300
	Cl ₂	< 1	< 2	< 10	≥ 10
	NO _x	< 50	< 125	< 1,250	≥ 1,250
	HF	< 1	< 2	< 10	≥ 10
Group B	NH ₃	< 500	< 10,000	< 25,000	≥ 25,000
	O ₃	< 2	< 25	< 100	≥ 100

*ANSI/ISA 71.04 Environmental Conditions for Process Measurement and Control Systems: Airborne Contaminants, Table B1-Contaminant concentrations versus severity levels

Monitoring for gas phase air filters is made by passive monitoring or online monitoring.

Passive Monitoring: It is made with copper-silver coupons which must be used at the site with 30-90 days periods for defining remaining life and design parameters. **Online Monitoring:** It has an instant measurement of gas contamination. **Particulate Filters Monitoring:** Differential pressure gages are used for filter life monitoring.



Copper-Silver Coupon

Severity Level	G1 / Mild	G2 / Moderate	G3 / Harsh	GX / Severe
Copper reactivity level (in angstroms)	< 300	< 1000	< 2000	≥ 2000
Silver reactivity level (in angstroms)	< 200	< 1000	< 2000	≥ 2000

*ANSI/ISA 71.04 Environmental Conditions for Process Measurement and Control Systems: Airborne Contaminants, Table B1-Contaminant concentrations versus severity levels



Online Monitoring

Odour & Toxic Gas Control

Odours are generally formed from commercial and industrial facilities like biogas, waste water treatment plants, etc.



Biogas Plant

Toxic gas scrubbing is generally needed for filtration and neutralizing of chlorine (Cl₂), sulfur dioxide (SO₂) or ammonia (NH₃).



Waste Water Treatment Plant



Drum Scrubber

COMMERCIAL APPLICATIONS

Indoor Air Quality

People usually spend their time in closed spaces like offices, schools, shopping malls, restaurants, cafes, hospitals, hotels, factories etc.

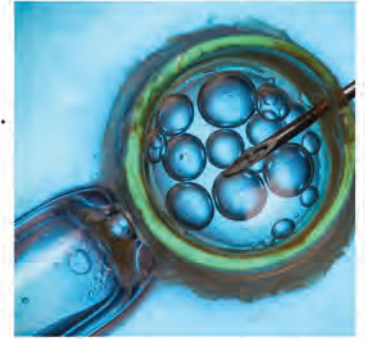
Air pollution continuously increase due to the urbanization and industrialization. That's why controlling airborne pollutants is critical to maintaining sufficient indoor air quality.

There are particulate and gas pollutants in the environment. The pollution sources are from outside (the automobile emissions, kitchen exhaust, industrial factories) or from inside (as cleaning aerosols, bio effluents, furnishing, printings etc.) of the building. Particulate and gas pollutants must be filtered for sufficient indoor air quality.



Museum

(Protection of antiques & artworks)



IVF Laboratory

(Increase pregnancy rates)



Hospital



Office



Airport



Hotel

(Supply Sufficient Indoor Air Quality)

IAQ & Energy Conservation
According to ASHRAE Standard 62.1



Indoor contaminants are controlled with minimum required airflow " $34\text{m}^3/\text{h} \times \text{person}$ " according to ASHRAE's "Ventilation Rate Procedure". Thus, outdoor air requirement can be reduced to " $8,5\text{m}^3/\text{h} \times \text{person}$ " according to the IAQ Procedure of AHRAE's Standard 62.1.

Sick Building Syndrome (SBS)

Increasing real estate market prices made offices, high rise buildings more populated. Some buildings are surrounded with sick building syndrome due to the change of user requirements and insufficient HVAC designs.

Inadequate ventilation has a lot of parameters, but the most important parameter is the contamination control. Gas phase and particulate filtration help the buildings for recovering from the sick building syndrome.



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