



Filter On Electrostatic Air Filtration Systems

Your greatest benefits

- HEPA filters' life enhanced up to 3 to 4 times
- Great power saver systems
- Reduced particle count
- Reduced bio-load



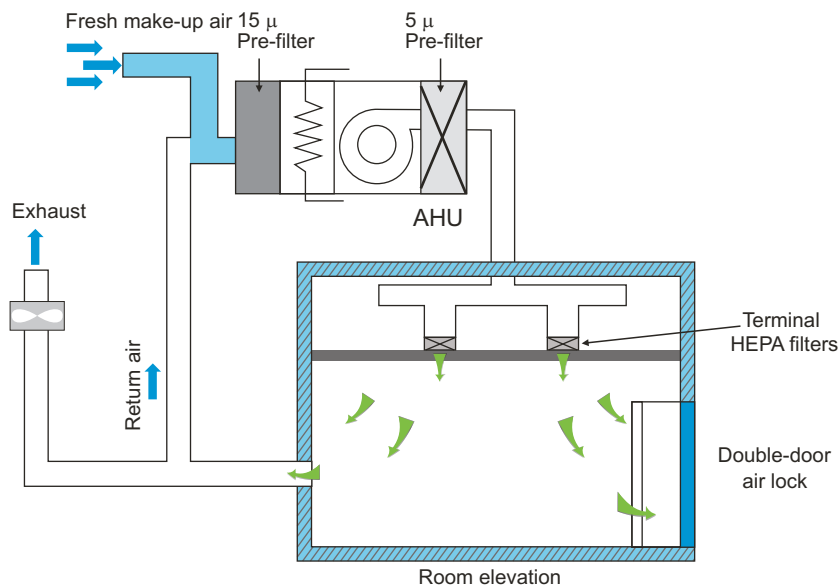
WOLF INTERNATIONAL

WI ESP Filtration Systems



Conventional HVAC systems

Conventional clean room systems



Present users of conventional clean room HVAC systems invariably face the following limitations.

■ Inefficient pre-filtration

Generally, 15 micron HDPE filters and 5 micron Microvee fine filters are used in clean room systems as pre-filters to HEPA. However, actually more than 95% of the particulate & bio-microbes load in a clean room environment is of submicron size. Thus, all the major

load of fine particles directly passes on to HEPA and chokes them early. Because of this, the overall pressuredrop of the system increases. This results in **higher power consumption** of blowers for the same air changes of air flow.

■ Frequent filter replacement

As HEPA filters get choked early, the replacement frequency is also more, which leads to higher recurring expenditure.

■ Downtime losses

Frequent replacement of HEPA filters leads to longer shut-downs, causing irrecoverable production losses.

■ Risk of multiplying bio-load

In case of media filters, the particles, along with various micro-organisms like bacteria, molds, fungus, etc. also get trapped in the upstream side of the filter. Because of these, bacteria colonies begin to form and multiply in the upstream side which is very dangerous for the system. Through ruptures or leaks in the filter elements, all such colonies can get transferred in the clean room environment and can spoil the entire production batch in case of pharmaceutical units.

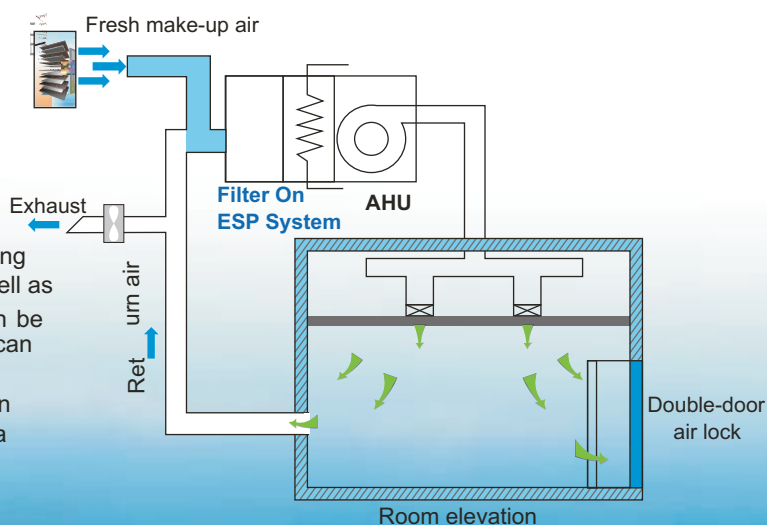
The most innovative and effective solution to overcome the limitations of conventional clean room HVAC systems is to use Filter On Electrostatic Precipitator(ESP) type Filtration Systems.

Installations of Filter On Electrostatic filtration systems

Filter On M-03 model of required capacity can be introduced as a pre-filtration unit either at fresh air intake end or can be attached to the AHU in the mixing chamber.

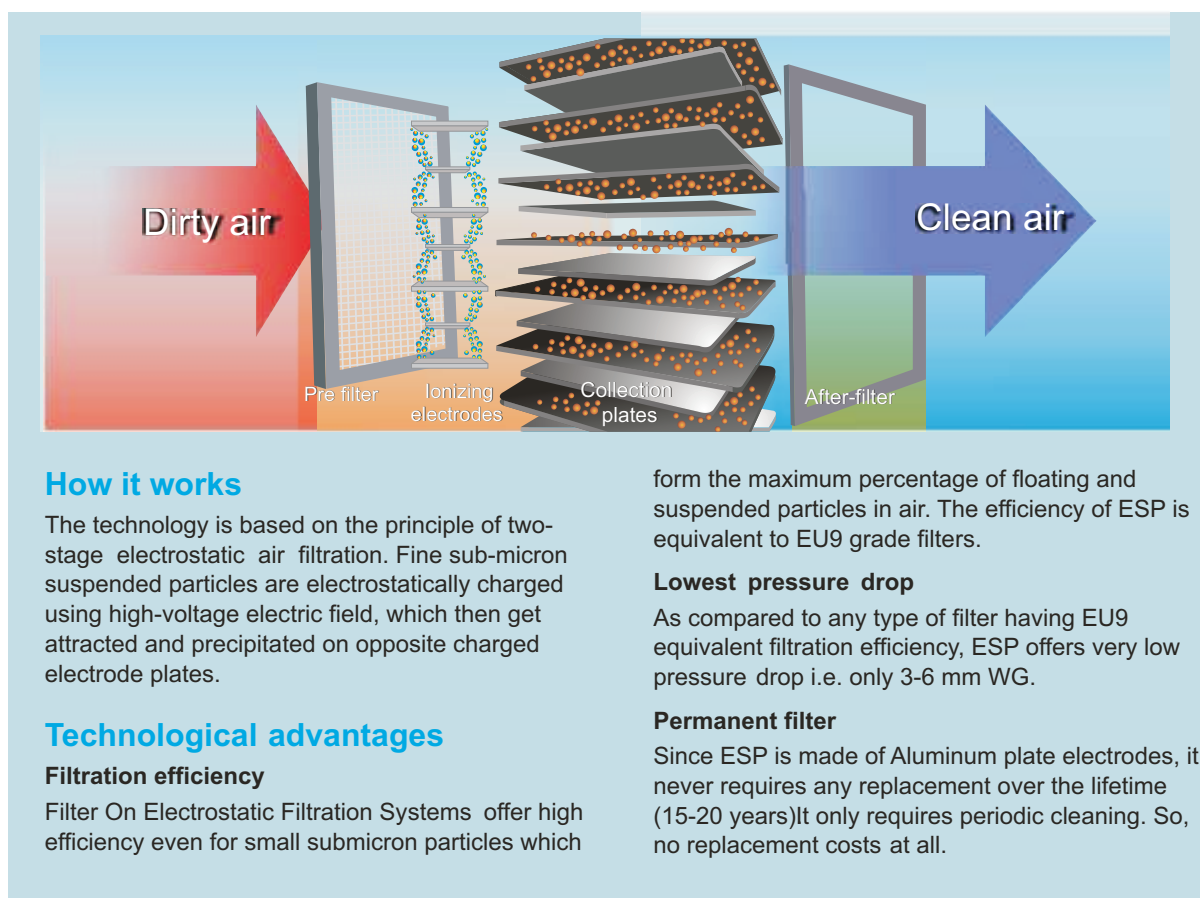
Filter On systems can be introduced at the mixing chamber of fresh and return air just before the cooling coils of AHU. For Class 100,000 clean rooms, as well as for dust proofing and dust control systems ESP can be introduced just before the cooling coils. ESP alone can achieve class 100,000 environments if proper air changes (generally 20-25 per hour) are maintained in the system. Also, in cases where HEPA filtration is a must, ESP can act as an efficient pre-filter to offer various benefits.

At fresh air - For class 10,000 and more stringent clean rooms, ESP can be introduced as efficient fresh air filter to have the same benefits.



Electrostatic (ESP) Filtration Technology

For enhancing the performance of clean rooms



- Improvement in particle count
- Reduction in bio-load inside the clean room
- Power saving in blower, as well as Air-conditioning system
- Reduction in operating costs of filter replacement & duct cleaning



Application areas of Filter On Filtration Systems

Health Care

Health care facilities
Hospitals - OTs / ICUs
Pharmaceutical manufacturing
Medical devices manufacturing
Biotech laboratories
Food products processing

Micro Electronics

Semiconductor manufacturing
Disk drive manufacturing
Hybrid circuits / IC manufacturing
Hybrid TV picture tube manufacturing

Others

Aerospace engineering
Photographic processing
Offices of consultants, BPOs, IT industries
Turbo-charged diesel engines, gensets, turbines
Transmission rooms at TV centers
Compressors, H.V. alternators
Process industries (textile, spinning, ceramics, cement, steel, etc.)
Power plants
Nuclear fuel processing

Benefits of Filter On Systems



Cooling coil

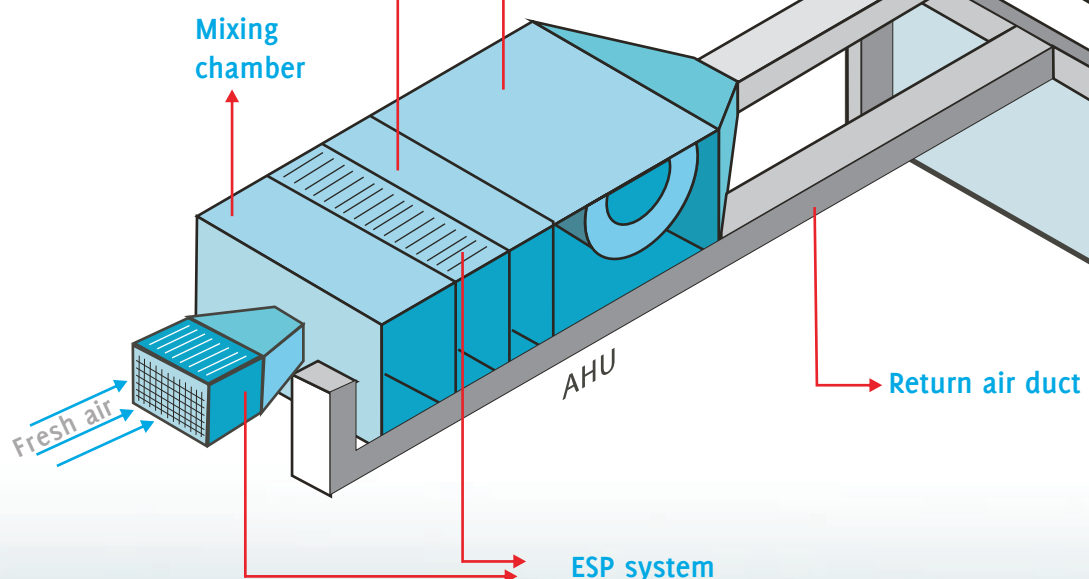
Power saving on AC system

As Filter On system is installed just before the cooling coils in the system, depositions on coilfins is reduced to a great extent. Cleaner cooling coils result into better heat transfer efficiency and lower wastage in heat transfer, which ultimately is effective power saving.

Blower motor section

Lower system pressure drop

Because of very low pressure drop caused by Filter On systems and subsequent reduced choking of HEPA filters, the overall system pressure drop reduces drastically. Thus, there is lesser load on the blower, causing subsequent power saving of the blower motor. It is possible to reduce the number of air changes required to achieve the same particle count with ESP as pre-filter. This further adds to the power saving.-to the tune of 25-30%



ESP system

Zero replacement cost on pre-filtration

Since ESP is a permanent filter, there is virtually zero replacement cost with Filter On system as pre-filters.



Supply air duct

Duct cleaning cycle reduced

Since ESP takes care of the major dust load, the need for frequent duct cleaning and the subsequent down-time get reduced .

Return air grills

Clean Room

Improvement in particle count

Since Filter On systems offer very high filtration efficiency for submicron particles as compared with any other conventional pre-filtration system (like microvee/5 micron etc.), there is remarkable improvement in the particle count in the room with the same air changes as the air gets filtered with higher efficiency.

Reduction and control of bio-load

ESP works on high voltage electric corona discharge. Because of this, the microbes traveling through this high voltage electric field get killed and the bio-load in the room environment is controlled effectively. On the other hand, in case of media-type filters hazardous bacteria colonies are formed on the upstream side. There is a possibility of the filter getting punctured and all these microbes entering the clean room environment. Filter On systems can very effectively prevent such a situation.

Clean Room

Return air risers

Terminal HEPA filters

Enhancement in HEPA filters' life

Since ESP absorbs the major particle load in the system, only fractional load is passed on to HEPA filters. Thus, the life of HEPA filters gets enhanced. It is observed that practically their life gets enhanced by almost 400% as compared to a conventional system. This means a great saving in replacement costs of HEPA.

Reduced downtime for filter replacements

Production shutdowns required for HEPA filter change are reduced leading to lower wastage of production time and increased production.

Benefits of ESP



Clean air class essential at different locations

Health Care Units	10	100	1000	10,000	100,000
Aseptic Filling Room					
Aseptic Receiving Area					
Aseptic Changing Room					
Solution Preparation Room					
Clean Chang ing Room					
Material Entry Air Locks					
Operation Th eaters					
ICU Rooms					
Micro Electronic Processing	10	100	1000	10,000	100,000
Photolithography					
Semiconduct or Processing					
Multilayer Processing					
Fabrication of CDs					
Surface Treatment Zone					
ICs & Hybrid Circuit Making					
TV Transmitter Control Room					
Optic Cable Manufacturing					

Range of Products

Model M-03 Modular Electrostatic Air Filters

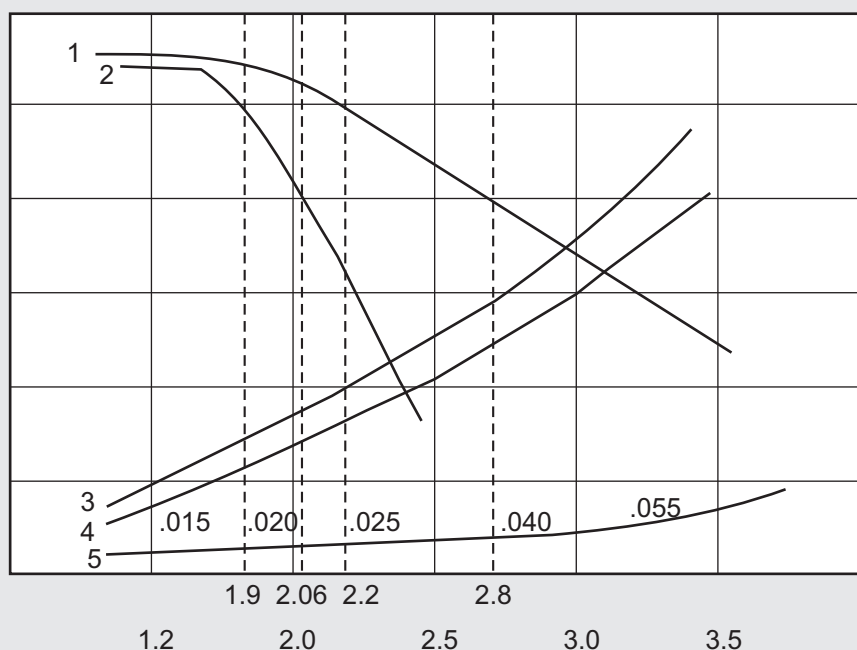


M-03 / 16k

Filter Elements

M-03 / 50K

Suitable size. Compatible to AHUs from 500 to 72000 Cu Mtrs / Hr capacity



EFFICIENCY - CURVES 1 AND 2

- 1) ASHRAE STANDARD 52-76
DUST SPOT TEST METHOD
ATMOSPHERIC AIR.
- 2) DOP DIOCTYIPHALATE AEROSOL
USING PENETRATING METER.

PRESSURE DROP ACROSS UNIT -CURVES 3 AND 4

- 3) CELL WITH 40% OPEN
PERFORATED PLATE
FRONT AND REAR.
- 4) CELL WITH METAL
MESH FILTER
FRONT AND REAR.
- 5) CELL ONLY.

Pa INCHES, WG. EFF. %

125 0.5 95

100 0.4 90

75 0.3 85

50 0.2 80

25 0.1 75

MODEL	AIR CAPACITY AT 450FPM			AIR CAPACITY AT 630FPM		
	INDUSTRIAL APPLICATION			GENERAL APPLICATION		
	DOP DIOCTYIPHALATE AEROSOL USING PENETRATION METER		Pr.Drop With Metal Mesh filter in front & back.	ASHRAE STANDARD 52-76 DUST SPOT TEST METHOD ATMOSPHERIC AIR		Pr.Drop With Metal Mesh filter in front & back.
	CMH	CFM	Pa	CMH	CFM	Pa
4K	4,000	2,400	40	5,600	3,360	75
6K	6,000	3,600	40	8,400	5,040	75
8K	8,000	4,800	40	11,200	6,720	75
12K	12,000	7,200	40	16,800	10,080	75
16K	16,000	9,600	40	22,400	13,440	75
20K	20,000	12,000	40	28,001	16,800	75
24K	24,000	14,400	40	33,601	20,160	75
28K	28,001	16,800	40	39,201	23,520	75
32K	32,001	19,200	40	44,801	26,880	75
36K	36,001	21,600	40	50,401	30,240	75
42K	40,001	24,000	40	56,001	33,600	75
48K	46,668	28,000	40	65,335	39,200	75
54K	53,334	32,000	40	74,668	44,800	75
60K	60,001	36,000	40	84,002	50,400	75
66K	66,001	39,600	40	92,402	55,440	75
72K	72,001	43,200	40	100,802	60,480	75

MODEL	SIZE IN MM			NO OF CELLS		POWER PACK		POWER REQD	INPUT VOLTAGE	WEIGHT
	LENGTH	HEIGHT	WIDTH	4000	3000	TYPE	NOS	W	V/PH/HZ	KG
4K	740	760	585	1	-	P03	1	25	220-230/1/50	135
6K	1100	760	585	-	2	P03	1	25	220-230/1/50	150
8K	740	1520	585	2	-	P20	1	90	220-230/1/50	190
12K	1100	1520	585	-	4	P20	1	90	220-230/1/50	250
16K	1460	1520	585	4	-	P20	1	90	220-230/1/50	280
20K	1830	1520	585	2	4	P20	1	90	220-230/1/50	325
24K	2275	1520	585	6	-	P20	1	90	220-230/1/50	390
28K	2510	1520	585	4	4	P20	2	180	220-230/1/50	460
32K	2930	1520	585	8	-	P20	2	180	220-230/1/50	530
36K	2170	2280	585	9	-	P20	3	270	220-230/1/50	625
42K	2550	2280	585	6	6	P20	3	270	220-230/1/50	690
48K	2880	2280	585	12	-	P20	3	270	220-230/1/50	780
54K	3310	2280	585	-	18	P20	3	270	220-230/1/50	850
60K	3640	2280	585	6	12	P20	3	270	220-230/1/50	925
66K	4020	2280	585	3	18	P20	3	270	220-230/1/50	1025
72K	4400	2280	585	18	-	P20	3	270	220-230/1/50	1170

PRODUCT RANGE



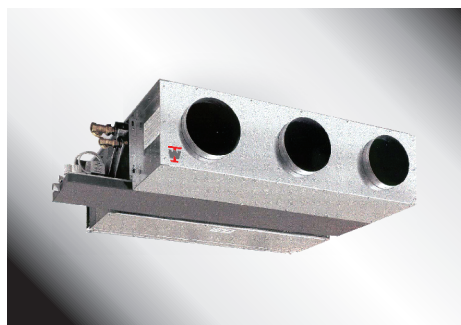
CHILLED WATER AHU



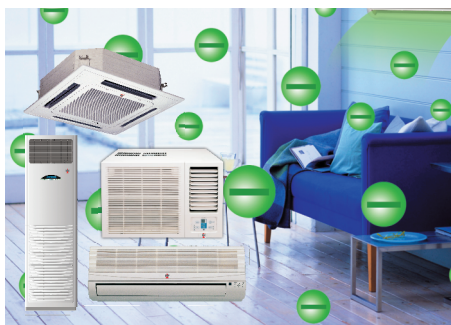
CLOSE CONTROL UNITS



SMART AC-VRV SYSTEM



FAN COIL UNITS



DECORATIVE A/C UNITS



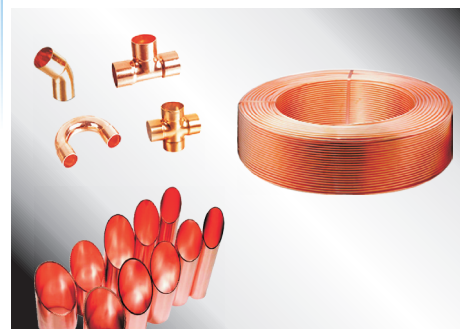
DUCTED UNITARY PRODUCTS



SOLAR SYSTEM



FLOW DEVICES



COPPER PIPES & FITTINGS

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