Spectrum

# Air Intake Systems for Turbo Machinery

Spectrum

*Through the Industrial progression in India, one of the most nagging ailment has been the sullied effect of air contamination in various production processes.*

*Spectrum Filtration Pvt Ltd is a market leader in providing air filtration solutions in India. Spectrum has rapidly emerged into a Pan-Indian multi-product Air-filtration company. Apart from offering high quality filtration products, we have developed and perfected a Total Filter Management (TFM) program which has been successfully implemented at several customer sites, and they have benefited from better air quality and reduced operating costs. The distinction that Spectrum brings to the filtration market is its attention to customized solutions across varied industry segments.*

*At Spectrum we see technology as central to our ethos. Our technical tie-up with **'Filtration Group - Filtrair USA'** for the manufacture of high quality intake-air filter ensures that we have access to the latest technology. The Spectrum-FGI-Filtrair linkage brings world class air filtration products and practices to your doorstep. The Spectrum-BIS Gerber association brings to you world class Air Intake systems, enclosures and silencers.*

Filtrair

*Filtration Group was established in 1942 with a focused approach exclusively on Air Filtration Products and a clear vision to be global leaders in this sector. Filtration Group acquired Filtrair bv, Netherlands, a leading global manufacturer of air filter media with a lineup of very high quality air filtration products.*

*With over US$ 140 MM in turnover and 10 US and 2 European Filter Manufacturing facilities, Filtration Group enjoys a dominating presence in over 65 countries across the world.*

BIS Gerber

*In accordance with our growth roadmap of widening our offerings, we have collaborated with BIS Gerber, a leading European company in the field of intake air filter house, sound enclosures and silencers for gas turbines and other rotating machinery. BIS Gerber has more than 100 years of experience in this field and has a long list of installations around the world, including several in India.*

Quality wins 1997-2007

TÜV SÜD ISO 9001

***"We are committed to provide speciality filtration products and services, that meet or exceed our customer's expectation of quality and performance - on time, every time."***


## Few installations of Air Intake System by Spectrum

Gerber

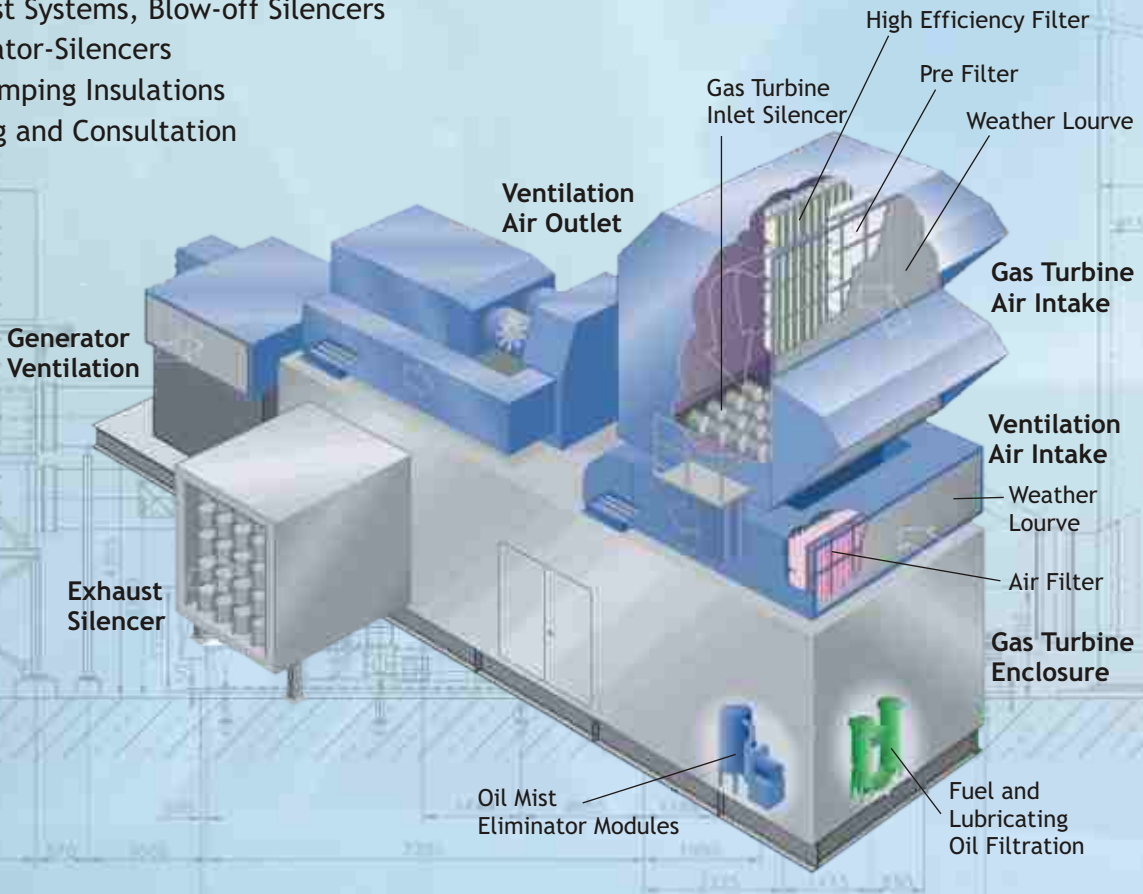
Landmark years for BIS Gerber -

1887 Rheinhold & Co., Hannover established.

2006 Rheinhold & Mahla AG renamed Bilfinger Berger Industrial Services AG.

## BIS Gerber offers a wide variety of solutions for Turbo machinery -

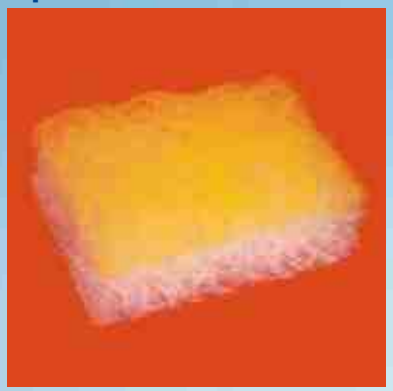
- Air Intake Systems for gas turbines
- Sound Enclosures
- Housings and Facades
- Silencers
  - Silencers for Cooling Towers
  - Exhaust Systems, Blow-off Silencers
  - Resonator-Silencers
- Sound Damping Insulations
- Measuring and Consultation




## Few installations of Air Intake System by BIS Gerber

# SPECTRA PAD PRODUCTS

## Spectra Pad - GF



| | |
|---|---|
| MERV | 7 - 8 |
| EN 779 | G4 |
| Eurovent 4/5 | EU 4 |

### Description

The Spectra Pad GF is a high efficiency, adhesive impregnated glass fiber pad, usually put in a reusable holding frame. They are very well suited for use as pre filter for engine, turbine, and compressor intake air systems.

The Spectra Pad GF is made from continuous filament fiberglass media and has progressive density construction to ensure that the entire depth of the media is loaded resulting in high dust holding capacity. A special non drying adhesive coating retains particles that are arrested by the media.

The 100 mm Spectra Pad GF is easily installed by compressing into a 50 mm Pad Holding Frame.

### Advantages

- High dust holding capacity.
- Colour coded for easy identification of air intake side.
- Available in 50 mm and 100 mm thickness.
- Progressive density filter media.
- Inexpensive, easy to deliver, store, install and dispose.

## Spectra Pad - Coalescer

### Description

The Spectra Coalescing Pad is especially designed for filtration of mist particles. They are very well suited for engine and compressor intake systems installed in extremely high humidity environments. The Spectra Coalescing Pad substantially reduces mist / moisture / fog from the air before it reaches the secondary filter. Progressive density of the fibers across the depth of the media guarantees high retention of mist particles.

### Advantages

- Available in Glass Fiber and Synthetic construction.
- Synthetic Coalescing media is available in rolls and cut pads.
- Inexpensive and easy to install.
- Glass media is colour coded to identify clean air side.
- Ex-stock availability.

## Benefit of lower pr drop

100 Pa less operating pr drop at intake system will increase the turbine output by approximately 0.2% and reduce the fuel consumption by approximately by 0.1%. Statistically, the cost of fuel represents approximately 80 to 85% the cost of generating electricity with gas turbine generating plant.

Spectrum Filtration can workout for you the best and optimized combination of air filters through pr drop calculation and its effect on power generation.

### Key Check Points For Filter Selection -

- ✓ Particle collection efficiency
- ✓ Resistance to air flow
- ✓ Performance under turbulent conditions
- ✓ Resistance to high moisture environments
- ✓ Filter life
- ✓ Burst strength
- ✓ Filter rigidity

# SPECTRA PLEATED PRODUCT

## Spectra Pre - TM

### Description

An excellent panel type Pre Filter for Turbo-machine intake. The electro galvanized frame is sturdy and corrosion resistant and is of exceptionally high strength. The polyester felt media is pleated with a high carbon steel wiremesh backing. The media is washable to ensure that the panel filter can be repeatedly cleaned.

It is an excellent choice as pre filter for multi stage intake air filter house in turbo machinery.

### Advantages

- Exceptionally rugged construction makes the filter ideal for turbo machines installed in high dust concentration areas.
- Cleanable feature ensures long service life even in the most demanding environments.
- High dust holding capacity ensures long service life.
- Ensures adequate protection to down stream fine / final filter.

| | |
|---|---|
| MERV | 7 - 10 |
| EN 779 | G4 - F5 |
| Eurovent 4/5 | EU 4 - EU 5 |

# SPECTRA POCKET PRODUCT

## Spectra Pocket - PU

### Description

Filtrair's PU series Rigid Pocket filters serve as highly efficient Pre and Final filters in air intake systems of Turbo machinery. They are suitable for filtration in any environmental condition including - offshore, marine and in any climate - including tropical (high humidity). They efficiently remove fine, submicron airborne particulate matter and also remove mist and fog.

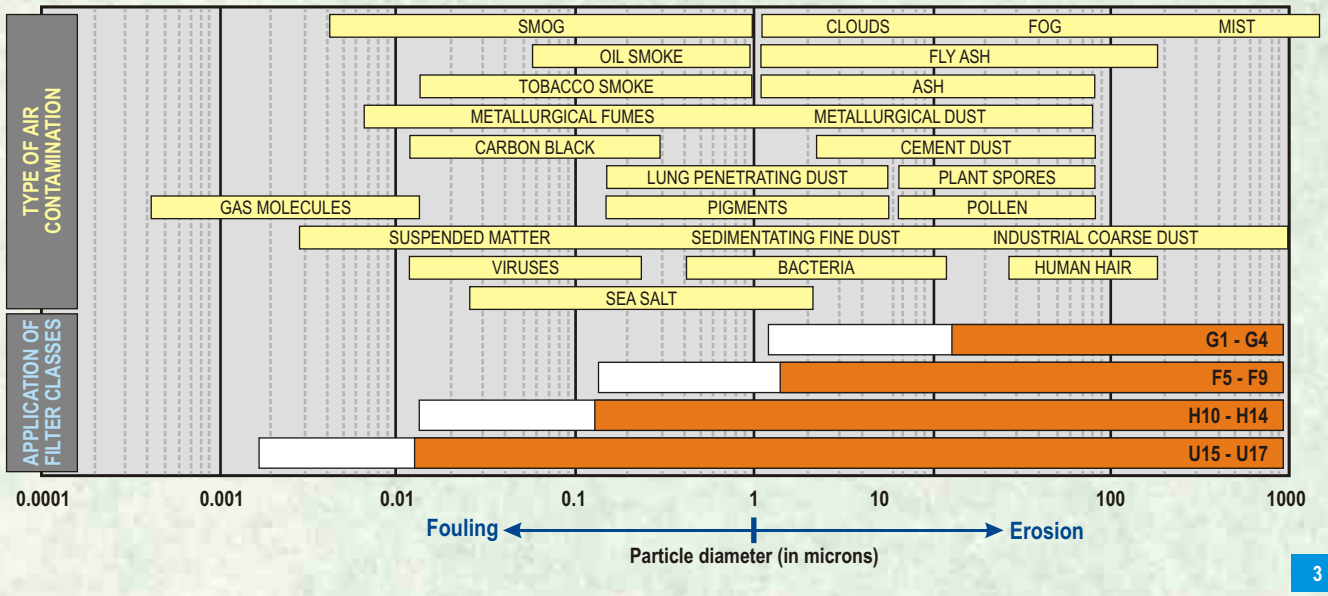
Filtrair manufactures its own thermally bonded synthetic medium for their PU rigid pocket filters. The depth-loading medium is manufactured in a progressive density multi-layering technique to ensure high dust holding capacity with lowest pressure drop. For the user, this results in long filter life, low energy consumption and maintenance costs.

### Advantages

- Molded header does not corrode and can be incinerated.
- Self supporting, leak-free welded pockets - stay rigid in turbulent airstreams - eliminate shedding.
- Synthetic media allows pockets to withstand 100% humidity environments.
- Designated for leak free operation even in the most rigorous air pressure and high dust-laden environments.
- High dust holding capacity and low resistance.
- UL 900 Class 2 conforms to US fire classifications.
- Low resistance design greatly reduces operating costs.

| | |
|---|---|
| MERV | 7 - 12 |
| EN 779 | G4 - F6 |
| Eurovent 4/5 | EU 4 - EU 6 |

### Local conditions : Particle Types, Sizes and Filters



# SPECTRA SPECIALITY PRODUCTS

## Spectra Auto Viscous

### Description

Spectra Auto Viscous filter is a self-cleaning viscous air filter using a rotating curtain of metal panels as the filtering mat. Behind the filter mat is an endless roll of oil drop eliminator. A timer controlled, totally enclosed thermally protected geared motor rotates the filter media and oil drop eliminator which pass through a viscous oil bath located at the bottom of the filter. The viscous oil cleans the filter media and the oil drop eliminator minimizes the carry over of oil droplets into the air stream. The sludge collected in the oil bath needs to be cleaned periodically.

### Advantages

- The Spectra Auto Viscous filter is especially suitable for areas with high dust concentration like steel, chemical and cement plants.
- Can be offered as complete system with Pre Cleaner louver, auto viscous filter and secondary filter.
- Requires little or no maintenance for a prolonged period of time.
- Available in a variety of standard and custom built sizes.
- Negligible operations cost.

| | |
|---|---|
| MERV | 5 - 6 |
| EN 779 | G3 |
| Eurovent 4/5 | EU 3 |

## Spectra Spin Tube

### Description

The Spectra Spin Tube Inertial Separator is a high efficiency, low pressure drop, one-piece molded polypropylene air cleaner. Each unit contains 54 small tubes with stationary air spinners that impart a high radial velocity to the air at the inlet face. The resulting centrifugal force causes the dirt particles to move to an annular space from which they are removed by the flow of bleed air which is generally 10% of the total dirty airflow. The clean air is withdrawn through the center of the inner tubes out the exiting air face while the dirty bleed air is exhausted out the end of the filter element through bleed ducts.

Multiple elements can be used in banks with bleed air ducts connected to a common bleed air exhaust duct.

### Advantages

- Very useful for applications where there is extremely high dust concentrations in the inlet air.
- Self cleaning and do not increase in pressure drop over time.
- Polypropylene offers excellent resistance to corrosion, abrasion, UV treatment guards against deterioration to exposure to sunlight.
- Negligible operational cost. Does not require to be replaced.

## TYPES OF ENGINE DAMAGE CAUSED BY IMPROPER FILTRATION

### Foreign object damage (FOD)

- Most catastrophic of all types of damage
- Caused by large objects
- Easily filterable
- Usually a result of poor maintenance

### Fouling

- Most common reason for gas turbine performance loss
- ~70% off all gas turbine performance losses attributed to compressor fouling
- Caused by smoke, oil vapors and various other contaminants
- Particles adhered to rotor and stator blades, decreasing compressor efficiency
- Particles are in the sub-micron to 5 mm size range
- Requires a high level of filtration for protection

### Erosion

- Caused by particles ~5 mm and greater in size
- Particles blunt leading edges of compressor blades, decreasing efficiency
- Thinning of blades, which increases thermal fatigue
- Requires a good level of filtration for protection

### Corrosion

- Caused by solvated salts suspended in an air stream
- Salts can oxidize compressor blades
- Occurs mainly in offshore and coastal applications
- Also occurs in turbine section with the presence of sulfur in fuel source.

Foreign Object Damage (FOD)

Fouling

# SPECTRA SPECIALITY PRODUCTS

## Spectra Pocket - Drop Safe

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|---|---|
| MERV | 8 & 12 |
| EN 779 | G4 & F6 |
| Eurovent 4/5 | EU 4 & EU 6 |

### Description

The Filtrair Drop Safe (DS) rigid filter is a pre-filter combined with very high efficiency coalescer. For application in air intake systems of Turbo machinery, in any environmental condition including - offshore, marine and in any climate - including tropical (high humidity). They efficiently remove airborne particulate matter along with snow, mist and fog, acting as a filter and a coalescer. A specially designed water drainage system drains out free water and air borne salt crystals.

### Advantages

- Unique - combined coalescer and particle filter in one.
- Made for extreme environments: high moisture and water mist content, high velocity, offshore, marine etc.
- Patented sealed boot pocket design - coalesces water inside the pockets and drains it out upstream of filter.
- Self supporting, leak-free welded pockets - stay rigid in turbulent airstreams - eliminating shedding.
- Pockets integrated in injection moulded, impact-proof PU header - gives filter a burst strength of ≥ 6000 Pa.
- Unique proprietary Filtrair filter media provides maximum dust holding.
- Can be disposed of by incineration.

## Universal Holding Frame

### Description

Spectrum Universal Filter Holding Frames are designed for simple and cost-effective construction / remodeling of filter banks. Its unique modular design is ideal for quick and hassle free installation at site. The frames come in a variety of standard sizes and can also be delivered in custom made sizes. The frames come with 4 quick clamp spring clips to ensure positive seal. The holding frames are available in Extruded Aluminum, Galvanised and Stainless Steel construction. Option of silicone free gasket is available.

### Advantages

- Variations available to fit Spectra Pocket filter (25mm), Spectra Pre Filter (50 mm), combination Pre Filter + Pocket (50 mm + 25 mm) and for 150 mm and 300 mm deep HEPA filters.
- Self adhesive polyurethane gaskets provides a positive seal between the filter and holding frame.
- Pre-punched holes / slots on the sides of the frame make filter bank construction easy and trouble-free.
- A choice of holding clips is available to accommodate different types of filters. Filter installation with these clips is easy and eliminates the use of time consuming nuts & bolts.
- Filter change time is reduced by upto 75%.

### Local conditions : Climate Zone / Region

| Region | Rural | Urban Industrial | Offshore | Coastal | Desert | Tropical | Arctic |
|---|---|---|---|---|---|---|---|
| Climatic Conditions | Sun, Rain, Snow, Mist, Mostly Dry | Sun, Rain, Snow, Fog, Ice | Sun, Spray, Rain, Wind, Fogs squalls, Salt | Sun, Rain, Fog squalls, Salt, Wind, Mist | Dry and Hot, Sun, Little rain, Wind, Storms | Humid and Hot, Fog, Monsoon rain, Mist | Cold, Snow, Ice Fog, Frost, High winds |
| Temp. Range | -20 to +35 °C | -20 to +35 °C | -20 to +30 °C | -20 to +30 °C | -0 to +50 °C | -5 to +45 °C | -50 to +20 °C |
| Particle Size | 0.01 to 30 µm | 0.01 to 10 µm | 0.1 to 100 µm | 0.01 to 7 µm | 0.01 to 30 µm | 0.01 to 30 µm | 0.1 to 15 µm |
| Dust Concentration | 0.02 to 10 mg/m$^3$ | 0.05 to 0.5 mg/m$^3$ | 0.1 to 10 mg/m$^3$ | 0.01 to 0.1 mg/m$^3$ | 0.1 to 700 mg/m$^3$ | 0.02 to 10 mg/m$^3$ | 0.01 to 0.3 mg/m$^3$ |
| Contaminants | Fine, Coarse and Erosive Dry Dust, Insects | Corrosive fine dust, Soot, Fibres, VOC's | Drilling dust, Grit, Burning smoke, Salt | Dry fine dust, Salt, Sulphate, Magnesium | Dry fine sand cont.: Calcium, Silica, Magnesium | Wet fine dust, Salt, Smoke, Insects | Silica, Quartz, Carbon, Oxides, Some insects |
| **Possible Gas Turbine Damage** | **Erosion Fouling** | **Fouling Corrosion** | **Wet & Hot Gas, Erosion, Fouling** | **Fouling, Gas path Corrosion, Erosion** | **Severe Erosion, Corrosion** | **Fouling Corrosion** | **Wet corrosion icing, Fouling** |

# SPECTRA ASHRAE GRADE PRODUCTS

## Geopleat

| | |
|---|---|
| MERV | 10 - 13 |
| EN 779 | F5 - F7 |
| Eurovent 4/5 | EU 5 - EU 7 |

### Description

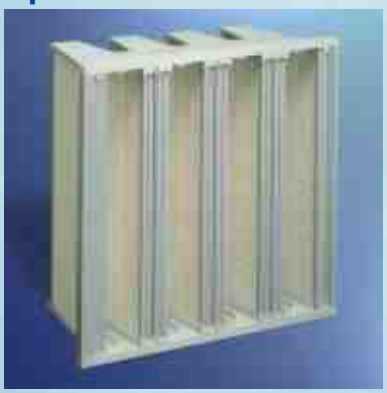
Filtrair Geopleat Filter serve as highly efficient final filters in air intake systems of combustion engines, in any climate and environmental condition. It removes airborne fine particulate matter, providing full protection for the turbine's key components from fouling, corrosion and erosion. They offer optimised efficiency / life time relationship at lowest pressure drop.

Geopleat uses a unique dual-layer filter media made from a blend of synthetic and glass fibres, A thermal embossing pleating and glue bead media separation technique creates a three-dimensional pleat in the media. This unique pleat design and spacing allows the air stream to smoothly transition into the media and evenly throughout the depth of the media.

### Advantages

- Advanced pleat geometry for even dust loading and maximum service life.
- Very low resistance to air-flow results in lower energy costs.
- Complete media utilization gives longer filter life.
- Glue bead pleat separation technique completely adheres to the media and has no sharp edge which eliminates the risk of damage to the filter media during transport, handling and installation.
- UL Class 2 certified.

## Spectra Cell V



| | |
|---|---|
| MERV | 9 - 15 |
| EN 779 | F5 - F9 |
| Eurovent 4/5 | EU 5 - EU 9 |

### Description

The Spectra Cell V bank filter features a fire retardant, water resistant micro glass fiber media housed in a sturdy polystyrene frame. The pleats are separated with thermoplastic (hotmelt) separators. A very high ratio of media to filter face area ensures that the filter is capable to handle very high air flow volume at relatively low pressure drop.

The rigid construction of this filter ensures trouble free operation even in turbulent air flow conditions.

### Advantages

- Provides full protection for the turbines key components from fouling, corrosion and erosion.
- Specially designed for gas turbines, diesel engines, compressors and air conditioning units for power plants.
- Low replacement and maintenance over-heads due to Longer filter life.
- Lower pressure drop to air flow promotes major energy savings.
- Unaffected by variable air flow in system.
- May be operated up to 5000 $m^3/h$ and in either air flow direction.
- High efficiency Microfiberglass medium.
- High dust holding capacity and long filter life.

## Spectra Cell

| | |
|---|---|
| MERV | 9 - 15 |
| EN 779 | F5 - F9 |
| Eurovent 4/5 | EU 5 - EU 9 |

### Description

The Spectra Cell is a ruggedly constructed, heavy duty, high efficiency filter. A special dual layer, graded density micro glass fiber media ensures extremely high dust holding capacity and low operating pressure loss. The pleats are separated by safety edge corrugated aluminum spacers. The high efficiency and moisture resistance of the filter keeps the inside clean and protects against moisture and salt.

### Advantages

- Suitable for high humidity and high dust application.
- Robust construction makes it suitable for turbine air intake.
- Time tested filter design.

# SPECTRA ASHRAE GRADE PRODUCTS

## Optipleat

| | |
|---|---|
| MERV | 12 - 15 |
| EN 779 | F6 - F9 |
| Eurovent 4/5 | EU 6 - EU 9 |

**Description**

Filtrair's Optipleat serve as highly efficient final filters in air intake systems of combustion engines.

Filtrair's 'Optipleat' filters represent the latest advancement in pleated filter technology. Due to its optimized, wide-open and patented fixed pleating structure, the Optipleat pack sports a unique V-supported deep pleat with an unmatched 10 mm wide air entry pleat throat. This results in an excellent combination of pressure drop and dust holding capacity. The Optipleat Filter uses a Unique blended glass-synthetic fibre filter media.

**Advantages**

- The unique construction of the Optipleat makes it the ideal choice even under High air velocity, Variable air flow and Moisture laden air.
- Offer optimised efficiency / life time relationship at lowest pressure drop.
- High burst strength (> 6250 Pa), in dry and in wet condition (100% humidity).
- Resistant to media puncture and handling damage.
- Patented V-shaped, thermo-formed deep-pleat design - features lowest pressure drop for given efficiency.
- Vertical deep-pleats - increased moisture coalescence and water drainage - low turbulent flow.

# SPECTRA PULSE JET PRODUCTS

## Spectra Cartridge Filters - Pulse and Static

| | |
|---|---|
| MERV | 14 - 15 |
| EN 779 | F8 - F9 |
| Eurovent 4/5 | EU 8 - EU 9 |

**Description**

The Spectra Cartridge filter range covers filters for Pulsing and Static applications. Media options for cartridges are Water Repellent Microglass Fiber, Resin Impregnated Cellulose, Cellulose and synthetic blend, or wet laid synthetic i.e. 100% moisture resistant.

A rigid expanded metal is used as inner core and outer core that protects each element from extreme differential conditions and handling damage respectively. The inner and outer cores are bonded with the pleated media with spiral hot-melt adhesive for better result.

**Advantages**

- Low pressure drop.
- Replacement available for all standard makes of cartridge filters.
- Wide choice of media to suit local environmental condition.
- Incorporates advanced features like spiral hot melt, foam in place urethane gasket etc.
- Zero bypass design.
- Quick delivery time on all standards sizes.

## Spectra Cartridge Wrapper

| | |
|---|---|
| MERV | 7 - 8 |
| EN 779 | G4 |
| Eurovent 4/5 | EU 4 |

**Description**

Spectra Pre Filter wraps are made from Filtrair's bv Netherland's superior high loft synthetic filter media. The wrap is designed to add a stage of pre filtration on static cartridges and protect them from leaves, pollens, insects and other large airborne contaminants. Wraps can be installed / removed while the system is running.

Spectrum also offers a specially designed hydrophobic wrapper which acts as a coalescer and prevents moisture, rain water, and mist from getting into the cartridge.

**Advantages**

- Prevents larger particles from choking the surface of the cartridge filter.
- Inexpensive pre filter; increases life of expensive cartridge filter.
- Hydrophobic wrapper prevents cartridge filter from getting wet.
- Easy installation using Velcro.
- Available for all cartridge filter sizes.

| | APPLICATION AREAS | SUGGESTED FILTERS |
|---|---|---|
| SURFACE FINISHING TECHNOLOGY | 1 Car Plants<br>2 2 Wheelers<br>3 Trucks & LCV<br>4 Tractors & Construction Equipment<br>5 After Market Booths / Body Shops | **A Coarse Filter**<br>i) Spectra Pre (Pad, Pleated)<br>ii) Spectra Pocket AP, FP, FPS<br>**B Fine Filter**<br>iii) Spectra Pocket AP, FP, FPS, PU<br>**C Filter Housing**<br>iv) Universal Holding Frame<br>**D Specialty Filter**<br>v) Ceiling Diffusion Filter Mat<br>vi) Paint Arrestance Media<br>vii) Spectra Roll filter<br>viii) Spectra HT ASHRAE & HEPA Filter |
| CLEAN ROOMS | 6 Pharmaceutical Plants<br>7 Semi-conductors<br>8 Medical Equipments<br>9 Biotechnology<br>10 Operation Theaters<br>11 Food & Beverage<br>12 Research & Laboratories<br>13 Image Processing Industries | **A Coarse Filter**<br>i) Spectra Pre (Pad, Pleated)<br>ii) Spectra Pocket AP, FP, FPS<br>**B Fine Filter**<br>iii) Spectra Fine (Pleated)<br>iv) Spectra Pocket AP, FPS, SMF<br>v) Optipleat<br>vi) Spectra Cell<br>vii) Spectra Cell V<br>viii) Sub HEPA<br>ix) Spectra Cell Compact<br>x) Geopleat<br>**C HEPA Filter**<br>xi) Spectra Guard HEPA (Lite, Standard, Hi-Flow, Super Flow)<br>xii) Spectra Minipleat HEPA (Standard, Hi-Flow)<br>**D Filter Housing**<br>xiii) Universal Holding Frame<br>xiv) Ceiling HEPA Housing<br>xv) Bag In Bag Out<br>xvi) Spectra Seal V Bank<br>**E Specialty Filter**<br>xvii) Spectra HT ASHRAE Filter<br>xviii) Spectra HT HEPA Filter<br>xix) Spectra Gas Phase Filter |
| COMFORT AIR | 14 Commercial Building<br>15 Facilities Management<br>16 Residential<br>17 Museum<br>18 Hotels<br>19 Hospital Building<br>20 Airports<br>21 Railway Coaches<br>22 Underground railway Stations<br>23 School and University Buildings<br>24 Underground Parking Spaces | **A Coarse Filter**<br>i) Spectra Net<br>ii) Spectra Pre (Pad, Pleated)<br>iii) Nova Pleat<br>iv) Spectra Pocket AP, FPS<br>**B Fine Filter**<br>v) Spectra Fine (Pleated)<br>vi) Spectra Pocket AP, FPS, SMF<br>vii) Optipleat<br>viii) Spectra Cell<br>ix) Spectra Cell V<br>x) Sub HEPA<br>xi) Spectra Cell Compact<br>**C Filter Housing**<br>xii) Universal Holding Frame<br>**D Specialty Filter**<br>xiii) Spectra Gas Phase Filter |

| | APPLICATION AREAS | SUGGESTED FILTERS |
|---|---|---|
| TURBO MACHINERY | 25 Gas Turbine<br>26 Compressors<br>27 Diesel Engines | **A Coarse Filter**<br>i) Spectra Pad - GF<br>ii) Spectra Pocket - PU<br>iii) Spectra Pre - TM<br>**B Fine Filter**<br>iv) Spectra Pocket - PU<br>v) Spectra Cell<br>vi) Spectra Cell V<br>vii) Optipleat<br>viii) Geopleat<br>**C Specialty Filter**<br>ix) Spectra Auto Viscous Filter<br>x) Spectra - Spin Tube<br>xi) Spectra Cartridge Filters - Pulse / Static<br>xii) Spectra Pad - Coalescer (Glass / Synthetic)<br>xiii) Spectra Pocket - Drop Safe<br>**D Accessories**<br>xiv) Universal Holding Frame |
| NUCLEAR APPLICATION | 28 Nuclear Power Station<br>29 Nuclear Fuel Recycling Station<br>30 NBC<br>31 On Site Air Shelters | **A Coarse Filter**<br>i) Spectra Pocket AP, FP, PU Header<br>**B Fine Filter**<br>ii) Spectra Pocket AP, FP, PU<br>iii) Optipleat<br>iv) Geopleat<br>v) Spectra Cell Compact<br>**C HEPA Filter**<br>vi) Spectra Guard HEPA (Standard, Hi-Flow, Super Flow)<br>**D Filter Housing**<br>vii) Universal Holding Frame<br>viii) Bag in Bag Out<br>**E Specialty Filter**<br>ix) Spectra HT ASHRAE Filter<br>x) Spectra HT HEPA Filter<br>xi) Spectra Gas Phase Filter |
| PRECISION MANUFACTURING | 32 CD ROM<br>33 Picture Tube<br>34 Manmade Fibre<br>35 Hazardous Chemical<br>36 Computer Hardware Assembly<br>37 Air Separation<br>38 Polyester Film<br>39 Aerospace Assembly | **A Coarse Filter**<br>i) Spectra Net<br>ii) Spectra Pre (Pleated)<br>iii) Spectra Pocket AP, FP, FPS<br>**B Fine Filter**<br>iv) Spectra Fine (Pleated)<br>v) Spectra Pocket AP, FP, FPS, SMF<br>vi) Optipleat<br>vii) Geopleat<br>viii) Spectra Cell V<br>ix) Spectra Cell<br>x) Sub HEPA<br>xi) Spectra Cell Compact<br>**C HEPA Filter**<br>xii) Spectra Guard HEPA<br>(Lite, Standard, Hi-Flow, Super Flow)<br>xiii) Spectra Minipleat HEPA (Standard, Hi-Flow)<br>**D Filter Housing**<br>xiv) Universal Holding Frame<br>xv) Bag in Bag Out<br>xvi) Spectra Seal V Bank<br>**F Specialty Filter**<br>xvii) Spectra HT ASHRAE Filter<br>xviii) Spectra HT HEPA Filter<br>xix) Spectra Roll Filter |

For detailed product brochure /
performance data sheet, please contact us.

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