Begg Cousland
World Class Filtration Solutions

Mist Elimination Equipment & Droplet Separation from Gas

BEGG COUSLAND ENVIROTEC LTD. :
A PROFILE OF FILTRATION EXPERTS

In the industrial air filtration field, the Begg Cousland name is synonymous with experience and with a high quality of product.
The first Begg Cousland knitted wire demisters were made in the 1950s, and fibre bed type candle filter mist eliminators since the late 1960s. No other company was manufacturing both products until more than a decade later.
A deep knowledge of the materials and a consistent manufacturing process are key factors in providing a genuinely quality product.
We offer that assurance and a full back-up service of experienced technical experts

MIST ELIMINATORS & DROPLET SEPARATION FILTERS

The role of droplet separators, demisters or mist eliminators is to remove a liquid from an air or gas flow using mechanical collection by surface or filaments. The liquid may be a pollutant or, like water, be per se benign, but in either case it is contaminating the air or gas.
The separation of the liquid from the air or gas within a process may :

- ♦ prevent contamination of the process
- ♦ prevent damage to or corrosion of downstream equipment
- ♦ recover a useful product
- ♦ prevent bad atmospheric emissions

The range of filter types.

Liquid is entrained in an air or gas flow following either of 2 basic situations.

- The air or gas meeting mechanically generated spray or generating the spray as it passes through a liquid.
  Such mechanically formed sprays are termed ' droplets ' and are usually always over 5 to 10 microns in size.
  The more coarse droplet filtration is done by impingement in a vane separator, and/ or by knitted wire demister mesh pads.
- The air or gas reacts chemically or physically resulting in a fume or condensation mist formation.
  These particles are mist or aerosols mainly below 3 microns, frequently sub-micron.

Fine droplet and mist filtration is achieved using co-knitted wire/fibre coalescers or, for sub-micron collection, using Candle Filters.

Collection Mechanisms.

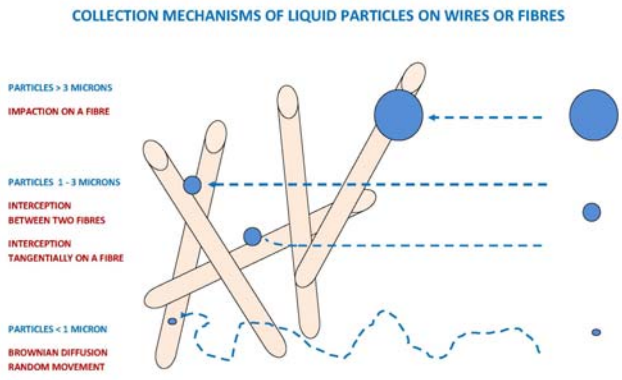


Fig 1

Impaction :
The mechanism whereby a droplet cannot avoid hitting a plate surface or one of the fibres or wires randomly arrayed in the path of the gas, even though the fast flowing gas tries to 'streamline' past. There is a relationship between the blade design and spacing or diameter of wire and the size of droplet collected.
The range of velocities is broad (1 to 10 M/Sec) without affecting efficiency.

Interception :
Collection is achieved by trapping the droplet between two adjacent filaments or fibres. The finer the filaments, the more there can be in a filter with less space between them, which increases the rate of interception of finer mists. At higher velocities interception is a mechanism of coalescence, but at lower velocities it aids collection.
Normal velocity range for Interception is 0.2 to 0.8 M/Sec

Brownian Diffusion :
At low velocities (usually below 0.2 M/Sec., but max. 0.25M/Sec), as the gas passes horizontally through a bed of very fine fibres, the fine mist particles are bombarded by the gas molecules surrounding them, causing the particles to move in various directions, both towards and away from the fibres. The high number of fibres means, however, that the mist is virtually certain to be collected on the fibres. The smaller the fibre diameter, the finer the mist size that can be collected.

HOW TO SELECT THE RIGHT FILTER FOR YOU ?

The filter selection criteria.

Selection is often a compromise of practical issues.

- **By Efficiency :**

  Legislation may demand a specific exit level of contaminant or the operator may need the optimum removal of a contaminant at any stage in a process, or may wish the maximum recovery of a valuable product.

  The operator may not know the size of particles to be removed, but guarantees would favour caution, and the most efficient would be considered. Or the operator may know he has only droplets and so only the lower efficiency types will be considered.

- **By Pressure Loss :**

  The gas flow in a process is generated by a fan or compressor, which generates a vacuum or discharge pressure. The pressure is energy and so is a cost to be carefully considered, how and how much is used. Generally, the lower the pressure loss of a filter the better, except where the operator correctly understands the problems lower efficiency may cause, or where the resultant filter space requirement and filter size and ultimately cost are out of proportion to the benefit of pressure loss saving.

  Re-vamp projects usually require a maximum pressure loss to be maintained.

- **By Housing Space :**

  Most filters are fitted in a vessel near the exit or on top of a process tower. Minimising the filter housing height and/or diameter mean cost savings.

  Re-vamp projects may mean space constraints. However, what can physically be fitted into a given space must still allow correct operating velocities to be achieved.

As a general guide we show in Fig. 2 a table of different filter types and their main performance data, from a basic impingement Chevron Vane to a Highest Efficiency Brownian Diffusion Candle Filter. There are of course 'intermediate' filters not shown, and each can be custom designed and fabricated to suit each specific application's needs of size and duty.

Fig 2 Table of Most Common Mist Eliminator Types & Main Performance Indicators

Filter Type	Typical Velocity Range (m/sec)	Typical Pressure Loss Range (mm H_2O)	Typical Particle Size Efficiencies
Chevron Vane	5.0 – 10.0	50 - 150	100% >10μ
Light Duty Demister	> 2.0	10 - 80	100% >10μ
Heavy Duty Demister	> 2.0	20 - 100	100% >5μ
Coalescing Demister	2.0 – 3.0	50 - 120	100% >5μ 95% >2μ
Coalescer + Demister	2.0 – 3.0	100 - 120	100% >5μ 98% >2μ
High Velocity Candle Filter	1.0 – 2.5	100 - 200	100% >3μ 90% >1μ 70% >0.75μ
Medium Velocity Candle Filter	0.3 – 0.5	100 - 200	100% >3μ 95% >1μ 80% >0.5μ
Brownian Diffusion Candle Filter	0.1 – 0.25	150 - 250	100% >3μ 99% <3μ
Highest Efficiency Candle Filter	0.05 – 0.15	150 - 300	100% >1μ >99% <1μ

Design considerations.

Beyond the obvious design factors of gas volume, pressure, pressure loss, operating temperature and housing space, there are a range of other considerations that can be very important, e.g. :

- Gas flow direction / filter installation type
- Process variations / mist formation

Gas flow direction / filter installation type.

In most applications the gas flow to the filter is vertically upwards. This suits demisters and coalescers where the liquid can then drain downwards by gravity. It also suits candle filters as, although the gas will pass horizontally through the fibre bed, the fibre bed is cylindrically formed with an open end and a closed end. An upward flowing gas can pass from the outside of the cylinder to the inside if the candle filter is hanging from a support plate, or the gas can pass from the inside of the cylinder to the outside if the candle filter is standing on a support plate.

We call the hanging arrangement HT1 (see back page) and each candle filter has its own drain and liquid seal pot to prevent by-pass. This design is very stable mechanically and suitable for high efficiency operations. Styles HT3 & HT4 have drain tube only and flanged drain tube, respectively.

In the F series standing arrangements (see back page) the collected liquid flows onto the support plate to drain from there through tubes down into the lower part of the vessel or directly out of the vessel. F3 & F4 types have central bolting circles and F2 type has a flat flange with outside bolting.

The standing type F has some other design advantages. With a hanging design, there is a limit to the amount of gas you can pass through the inner open top area of a filter without exceeding the relevant **Re-entrainment Velocity.** This applies as the collected liquid flows through the fibre and down the exit face of the cylinder. Too high a velocity caused by the gas volume, and some liquid will re-entrain. The F type can then be made longer than the HT type as the gas is passing from the restricted volume / area of the inside of the cylinder to the more open volume / area around the outside of the filters.

The F type is therefore the only practical design for the higher velocity type fibres and care is always taken to ensure that the actual velocity used is compatible with the liquid loading and achievable drainage rate from the fibre. In some filters there is a lower density material on the exit side to enhance drainage or to collect re-entrainment.

Candle filter development started with the most efficient type developed first, and then development took place to find higher velocity fibres and designs to minimise space. This work still bears fruit sometimes, but with a limited application. More filtration area within a given filter housing volume is theoretically possible with more smaller cylinders or with concentric standing cylinders (see Xtra-Flow designs on back page) with the gas passing from the gap between the cylinders through the inner or outer cylinder, but increased pressure loss and mechanical stress as high volumes of gas enter the inlet orifice of such designs means that the gas volume per filter must be limited, limiting in turn the filter's height. As a general guide, an additional 30% can be gained with an Xtra-Flow type compared to a single bed candle filter.

Mostly Xtra-Flow type are used to de-bottleneck a process, not as the initial filter selection.

Sometimes the gas flow is deliberately arranged vertically downward, to enter a candle filter cylinder and flow through the fibre bed to the outside. In such an arrangement , HT 2, there is no need for a drain tube / liquid seal for the filter as the liquid drains from the outside surface to the vessel sump by gravity, while the vessel's gas exit is carefully positioned relatively high up causing the cleaned gas flow to avoid the draining liquid.

The HT2 arrangement is most commonly used in 'organic' applications, e.g. removing oil mist, even directly after a compressor. For the highest possible efficiency 2 sets of Brownian Diffusion type filters can be installed in series. The same effect can be achieved by passing the gas through both of 2 concentrically arranged fibre beds (see Xtra-Pure types on back page).

Process Variations / Extra Mist Formation.

Process variations happen. Planned or otherwise. Plants can be designed to operate at 110% capacity or say 30% at start-up or low season. 110% is usually easier than 30%, as at low velocities Brownian Diffusion can be affected. Lower gas flows usually mean lower liquid loads and lower liquid loads mean less saturation / lower pressure losses and for Brownian Diffusion candle filters less saturation / lower pressure losses mean efficiency may drop. We will recommend a minimum flow % or velocity for high velocity candles. For high efficiency types there is no theoretical minimum, but in practice it is dependant on saturation being maintained.

Higher velocities may not be the result of increased gas flow. They may be localised, resulting from partial solids blockage on the filter, uneven gas distribution before the filters caused by downstream blocking or being unevenly wetted, or uneven gas distribution after the filters caused by a badly positioned gas exit point from the vessel. In general, increased velocity or localized increased velocity can lead to re-entrainment.

Higher loadings of fine mist can happen. Shock cooling of the gas by more / colder liquid spray or incoming gas generates a lot of very fine mist if the rate of cooling is faster than condensable vapour can be removed by mass transfer. Organic contaminants and particulates can act as a nucleus for the formation of fine mists. A gas can react in a saturated fibre bed and ‘fume’ as extra mist. Gas not properly dried may cause the water vapour to reappear later as extra mist.

'BECOIL' DEMISTING UNITS

'Becoil' Demisting Units are impingement type separators consisting of multiple layers of mesh knitted from metal wire or plastic monofilaments, crimped and then assembled in successive layers. Pads fabricated in this way have a very uniform void with an extremely high ratio of filament surface area per unit volume of pad. Collected liquid in the mesh forms discrete droplets on the filaments, which fall off as the force of gravity overcomes the combined forces of the rising gas and surface tension.

The high voidage achieved ensures pressure losses are correspondingly low, while removal efficiencies of droplets larger than 5 microns are essentially 100% provided the demisting unit is correctly designed for the operating conditions. The range is illustrated in Fig 3.

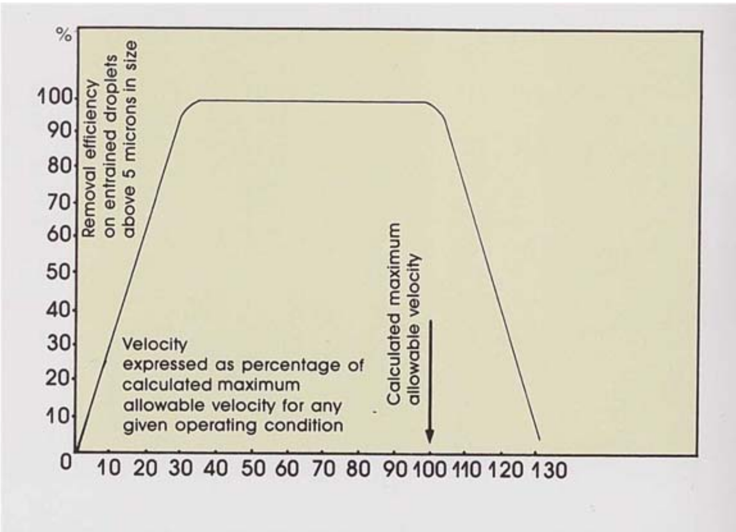


Fig. 3

Pressure losses rarely exceed 50 mm. water gauge but where pressure loss is a critical factor 'Becoil' Demisting Units can be designed to give the highest possible collection efficiency within the operational constraints of any process conditions. Pressure loss graph (Fig 4) demonstrates.

Units, usually with support grids, can be supplied either in one piece or in sections to pass through manways. Standard grids are of the ladder type made from 25 x 3 mm flat bar and 6 mm diameter rod in suitable material.

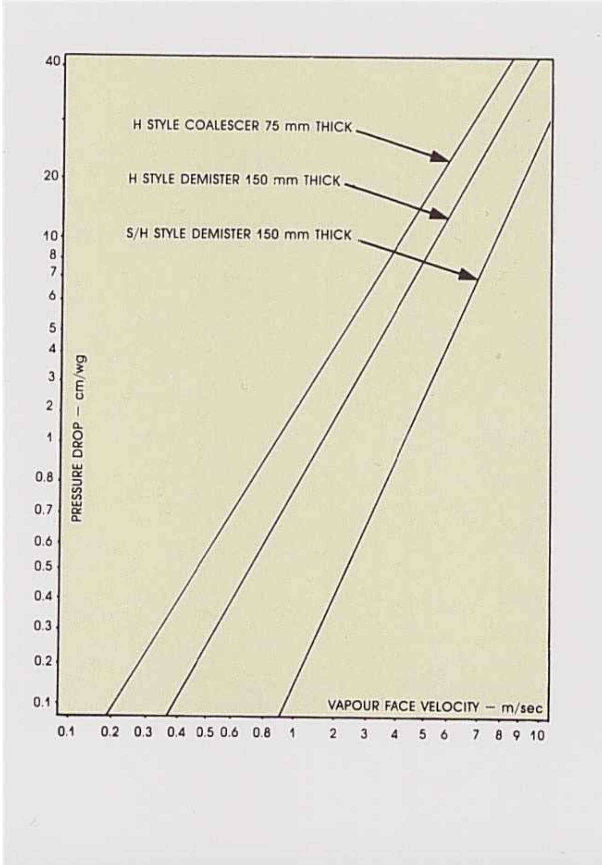


Fig. 4

Design Data

The primary design consideration is the velocity of the gas through the demisting unit, and the Saunders-Brown expression is a convenient means for expressing the equation for calculation of allowable vapour velocity based on liquid and gas densities.
The basic equation is:

$$V\ max = K\sqrt{\frac{\sigma L - \sigma G}{\sigma G}}$$

Where :

V Max = Maximum allowable velocity
σ L = Liquid density
σ G = Gas density
(Expressed in similar units)
K = Constant dependent upon liquid and gas densities, viscosity and surface tensions of the entrained liquid.

For most applications the value K can be taken as 0.105 to express V in metres/second.
It is usual to design working velocities at 75% of the calculated V Max.

Fig. 5 Table of Most Common Demister Mesh Styles and Characteristics

WIRE MATERIAL	BEGG COUSLAND MESH STYLE	WIRE DIAMETER (mm)	DENSITY (Kg/m^3)	FREE VOLUME %	SURFACE AREA (m^2/m^3)
Stainless Steel	H	0.28	192	97.5	360
	SH	0.28	136	98.0	256
	L	0.28	112	98.5	210
	UL	0.28	80	99.0	151
	H237	0.152	135	98.3	430
	UL238	0.152	54	99.3	194
	H1241	0.112	430	94.6	1936
Polypropylene	H	0.50	69	92.4	606
	HL	0.35	65	92.9	807
	HUL	0.25	21	97.7	369
	SH	0.50	50	94.5	439
	SHL	0.35	50	94.6	621
Hostaflon ETFE	H	0.50	127	92.4	606
	HSH2	0.27 / 0.50	93	94.5	505
	HSH3	0.27 / 0.50	59	96.5	390

'BECONE' COALESCERS

As already stated the 'Becoil' Demisting Unit is a high efficiency, low pressure loss device for removing liquid particles > 5 microns. To help the collection efficiency below 5 microns we have developed the 'Becone' Coalescer.

This unit is a pad made from composite / co-knitted monofilaments and staple fibre yarn exhibiting along its length the ends of the staple fibres which compose it. These fibres are much smaller in diameter than either the yarn into which they are spun or the monofilaments, consequently forming a more efficient filter. The multitude of fibrous ends presented to the gas flow reduces the streamline effect, trapping the fine droplets within the coalescer, and any coarse droplets so formed are re-entrained in the gas stream leaving the coalescer. They are then removed by a 'Becoil' Demister.

The combined 'Becone' and 'Becoil' installation increases collection efficiency to > 98% in the 2-5 micron range, and fibre materials are Glass, P.T.F.E. and Polypropylene

Typical performance figures for a 2-stage installation of a 'Becoil' Demister + 'Becone' Coalescer are:
Efficiency 5 microns and larger = 100%
2 microns and larger = 98 - 99%
Total Pressure Loss Approx. = 120 mm H2O

Knitted Wire Demisters

Co-Knitted Wire + Glass Fibre Coalescer

'BECONE' COALESCERS SINGLE STAGE

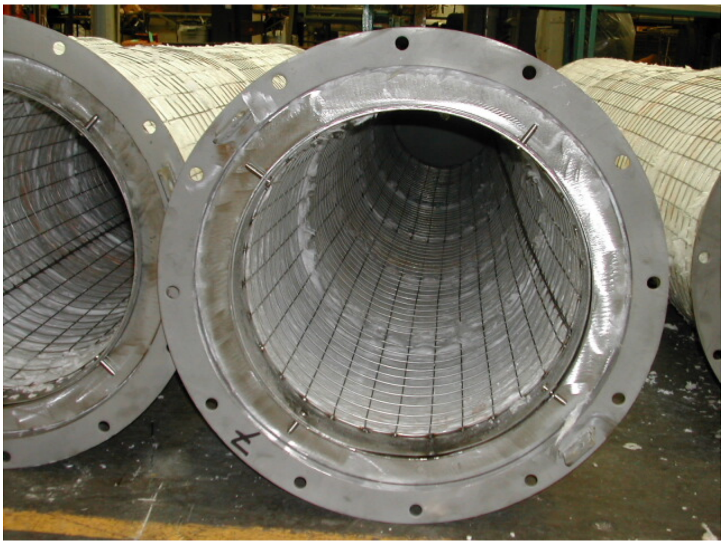
A single stage, combination Coalescer + Demister is available in flat or coned form, depending on vessel design.This single stage can reach efficiencies almost identical to the 2 stage system, but care must be taken when liquid load is expected to be high, as the whole of the single stage can flood, with no capacity then to remove entrained droplets downstream.

'BECOVANE' DROPLET SEPARATORS

Chevron type droplet separators are made using multiple parallel blade profiles assembled into a pack, which allows the gas to pass vertically or horizontally between the blades. The blades are relatively widely spaced, meaning that the Chevron pack has a high volume throughput capacity, with relatively low pressure loss. Efficient for droplet sizes of > 10 microns in size, they are also highly resistant to plugging.

'BECOFIL' NON-WETTABLE FIBRE FILTERS

'Becofil' Mist Eliminators - often referred to as Candle Filters or Fibre Bed Filters - originally developed in the research laboratories of I.C.I. are intended for the complete removal of very fine mist particles less than 2 microns diameter. The mechanism of fibre filters is well known and is basically a combination of impingement for particles greater than 1-2 microns in diameter and diffusion for the finer particles where Brownian motion becomes increasingly predominant. As the gas passes through the filter bed the small mist particles are bombarded by the gas molecules surrounding them, causing them to move in various directions, towards and away from the surface of the fibres of the filter. Each filter is composed of millions of fibres and although the efficiency of each individual fibre is low the cumulative effect is very high. Low approach velocities are necessary in order not to mask the diffusion velocities associated with Brownian movement.



Begg Cousland has always used a technology of preformed elements packed into a 5 centimetre annular space between two concentric cylinders fabricated from corrosion resistant mesh.
The candles are installed vertically and gases pass horizontally through the filter wall, the trapped particles coalescing and draining down through the filter bed.

Gas flow through candles can be either inside/outside or outside/inside depending upon the siting of the installation and the method of securing the candles in place. See page 10

‘BECOFIL’ MIST ELIMINATORS

There is a wide range of our pre-formed fibres, (glass or other materials) shown on pages 7 to 9. In addition we have a series of wound rope types in our Brownian Diffusion range – see Type B14W on page 7.

These B14W mist eliminators can be made in 3 be depths – 50, 63 or 75mm – and can be supplied with or without an exit surface drainage mat layer This means we can adapt our beds to meet the demands of different high mist load duties. We can also repack the structures of other suppliers.

Emergency Repack On Site
Due to the unique construction of the preformed fibre elements, those filter media can usually be replaced on site without the need to return the filters to the factory for repacking or re-wrapping with new fibre material.
This facility does depend on the structure / cages being in good condition.

General Repacking
We are always looking for ways to assist our customers technically or commercially, and one way we can offer good savings, is to repack old filter structures with new fibre beds, to regenerate them for re-use.
In case the cages are not able to be re-used (due to corrosion, or deformation in handling), then we can take back the flange and end plates only, and add new cages as well as the new fibre bed. This often saves site cost emptying the old fibre.

New Design — Co-knit Coalescer Style

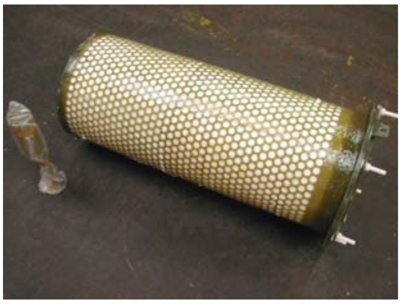
In some plants / processes where high velocity candle filter mist eliminators are installed, blockage with solids can be a problem. Coalescer material can be wound onto the candle filter cage, and can directly replace the fibre-only bed with lower pressure loss. They are then easier to clean and extend operating cycles. See Fibre Type G35K on Page 8.

Mist Eliminator Structure Materials

The structure of the mist eliminator comprises an inner and an outer support cage, made of metallic wire mesh, or perforated synthetic sheet materials, and usually some fixing flange and end plate (see page 10 for common types).

The general material options are as follows, but others can be used – please discuss with us.

316L Stainless Steel	Carbon Steel
304 Stainless Steel	Titanium
SX	Hastelloy
Alloy 20	904L



GRP / FRP (+Resin e.g. Derakane or Atlac)

P.V.D.F.	E.C.T.F.E.

Polypropylene

'BECOFIL' CANDLE FILTER SERIES
GLASS FIBRE OPTIONS / SELECTION GUIDE

Brownian Diffusion Mist Eliminators

TGW15	Glass Fibre	Smallest Fibre Dia. Possible	Hanging or Standing Type
COLLECTION MECHANISMS	Brownian Diffusion	Interception	Impaction
SELECTION CRITERIA	Very High Efficiency Mist Removal	Invisible stack emission <20mg/m^3	Optimum Outlet Protection
DESIGN CRITERIA	100% removal >1µ >98% removal <1µ	150-250mm H_2O Pressure Loss	< 0.2 m/sec Bed Velocity

TGW16	Glass Fibre	Smallest Fibre Dia. Possible	Hanging or Standing Type
COLLECTION MECHANISMS	Brownian Diffusion	Interception	Impaction
SELECTION CRITERIA	Highest Efficiency Mist Removal	Invisible stack emission 10mg/m^3	Extreme Outlet Protection
DESIGN CRITERIA	100% removal >1µ >99% removal <1µ	250-300mm H_2O Pressure Loss	< 0.12 m/sec Bed Velocity

B14W	Wound Rope Glass Fibre	Small Fibre Dia.	Hanging or Standing Type
COLLECTION MECHANISMS	Brownian Diffusion	Interception	Impaction
SELECTION CRITERIA	Very High Efficiency Mist Removal	Range of Bed Thicknesses (50/63/75)	Optimum Outlet Protection
DESIGN CRITERIA	100% removal >1µ or >3µ 99% removal <1µ or <3µ	150-250mm H_2O Pressure Loss	< 0.25 m/sec Bed Velocity

B14	Glass Fibre	Small Fibre Dia.	Hanging or Standing Type
COLLECTION MECHANISMS	Brownian Diffusion	Interception	Impaction
SELECTION CRITERIA	High Efficiency Mist Removal	Limited Pressure Loss	Limit of Installation Space
DESIGN CRITERIA	100% removal >3µ 99% removal <3µ	150-250mm H_2O Pressure Loss	< 0.25 m/sec Bed Velocity

Medium Velocity Mist Eliminators

B12	Glass Fibre	Small Fibre Dia.	Standing Type or HT2 Type Only
COLLECTION MECHANISMS	Coalescence	Interception	Impaction
SELECTION CRITERIA	Low Fine Mist Content in Gas	Limited Pressure Loss	Limited Installation Space
DESIGN CRITERIA	100% removal >3µ 95% removal 1-3µ 80% removal <1µ	150-250mm H_2O Pressure Loss	< 0.25 m/sec Bed Velocity

'BECOFIL' CANDLE FILTER SERIES
GLASS FIBRE OPTIONS / SELECTION GUIDE

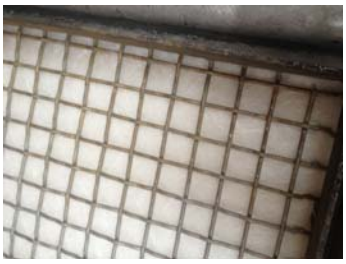
High Velocity Mist Eliminators

G25	Glass Fibre	Medium Fibre Dia.	Standing Type Only
COLLECTION MECHANISMS	Coalescence	Interception	Impaction
SELECTION CRITERIA	High Gas Volume per Filter	Mainly Droplet Removal Needed	Very Limited Installation Space
DESIGN CRITERIA	100% removal >3µ 90% removal 1-3µ 70% removal <1µ	100-200mm H_2O Pressure Loss	0.8 - 2.5 m/sec Bed Velocity

G35	Glass Fibre	Coarse Fibre Dias.	Standing Type Only
COLLECTION MECHANISMS	Coalescence	Interception	Impaction
SELECTION CRITERIA	High Gas Volume per Filter	Mainly Droplet Removal Needed	Blockage Risk by Solids
DESIGN CRITERIA	100% removal >3µ 80% removal 1-3µ	100-200mm H_2O Pressure Loss	1.0 - 2.5 m/sec Bed Velocity

G35K	Glass Fibre	Co-knitted wire 316L / 310 / Alloy 20	Standing Type Only
COLLECTION MECHANISMS	Coalescence	Interception	Impaction
SELECTION CRITERIA	High Gas Volume per Filter	Re-entrainment risk at high load	Frequent Solids Blockage
DESIGN CRITERIA	100% removal >3µ 75% removal 1-3µ	100-180mm H_2O Pressure Loss	1.0 - 2.5 m/sec Bed Velocity

HTP	Glass Fibre	Co-knitted wire 316L / 310 / Alloy 20	Polygon Bolted Panel Filters
COLLECTION MECHANISMS	Coalescence	Interception	Impaction
SELECTION CRITERIA	High Gas Volume per Panel	Mainly Droplet Removal Needed	Blockage Risk by Solids
DESIGN CRITERIA	Select G35 Efficiencies (above) or Select G35K Efficiencies (above)	100-200mm H_2O Pressure Loss	1.0 - 2.5 m/sec Bed Velocity



HTP PANEL FILTERS

'BECOFIL' CANDLE FILTER SERIES
OTHER FIBRE MATERIAL OPTIONS / SELECTION GUIDE

Polypropylene Fibre Mist Eliminators

PP13.5	Polypropylene Fibre	Small Fibre Dias.	Hanging or Standing Type
COLLECTION MECHANISMS	Brownian Diffusion	Interception	Impaction
SELECTION CRITERIA	High Efficiency Mist Removal	Alkaline Process Conditions	Fluorine (HF) Present
DESIGN CRITERIA	100% removal >3µ 95% removal 1 - 3µ 90% removal <1µ	150-250mm H_2O Pressure Loss	< 0.20 m/sec Bed Velocity

Polyester Fibre Mist Eliminators

PT12	Polyester (Terylene) Fibre	Small Fibre Dias.	Hanging or Standing Type
COLLECTION MECHANISMS	Brownian Diffusion	Interception	Impaction
SELECTION CRITERIA	High Efficiency Mist Removal	Wet Chlorine / Alkaline Process	Fluorine (HF) Present
DESIGN CRITERIA	100% removal >3µ 95% removal 1 - 3µ 90% removal <1µ	150-250mm H_2O Pressure Loss	< 0.20 m/sec Bed Velocity

P.T.F.E. Fibre Mist Eliminators

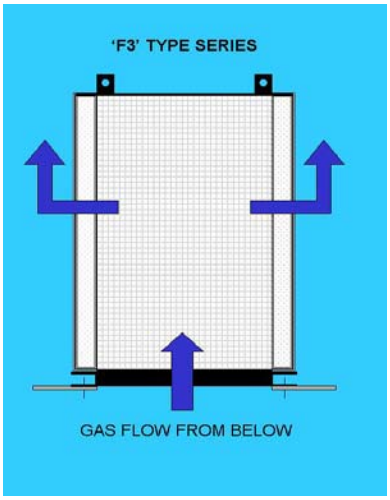
T80.35	P.T.F.E. Fibre	Small Fibre Dia.	Standing Type
COLLECTION MECHANISMS	Limited Brownian Diffusion	Interception	Impaction
SELECTION CRITERIA	High Efficiency Mist Removal	Hot Alkaline Process	Fluorine (HF) Present
DESIGN CRITERIA	100% removal >3µ 95% removal 1 - 3µ 80% removal <1µ	120-250mm H_2O Pressure Loss	0.3 – 0.5 m/sec Bed Velocity

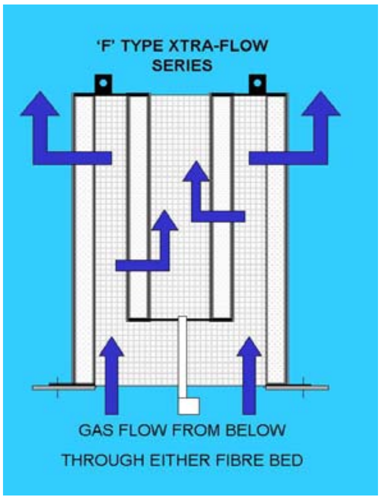
Carbon Fibre Mist Eliminators

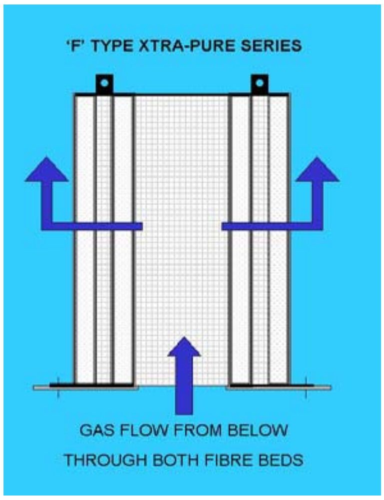
C14	Carbon Fibre	Smallest Fibre Dia. Mat	Hanging or Standing Type
COLLECTION MECHANISMS	Brownian Diffusion	Interception	Impaction
SELECTION CRITERIA	Very High Efficiency Mist Removal	Invisible stack emission <20mg/m^3	Fluorine (HF) Present
DESIGN CRITERIA	100% removal >3µ >99% removal <3µ	120-250mm H_2O Pressure Loss	< 0.2 m/sec Bed Velocity

Standard Single Bed Types | **Capacity Increase Double Bed Types** | **Efficiency Increase Double Bed Types**

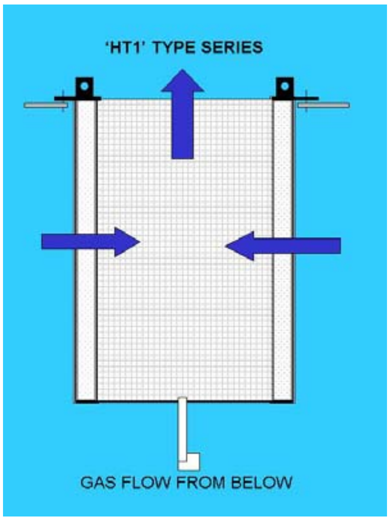
STANDING

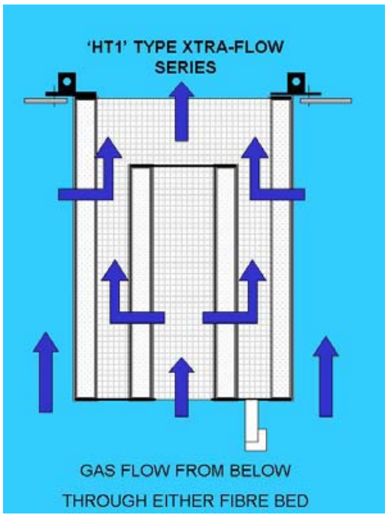


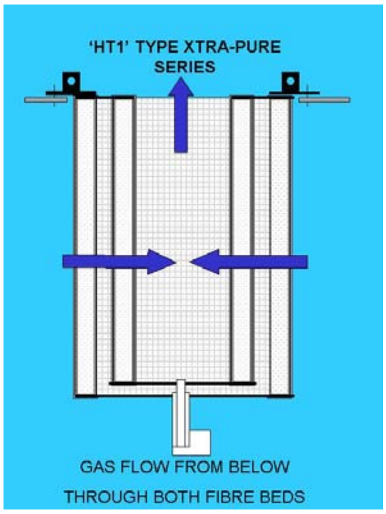




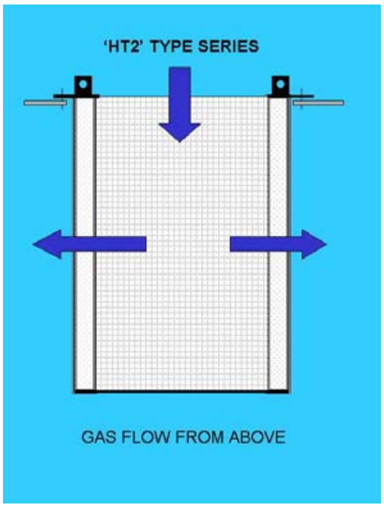
HANGING







HANGING



Begg Cousland Envirotec Ltd.
205 White Studios,
62 Templeton St.
Glasgow G40 1DA
United Kingdom

Tel + 44 141 556 2289
Fax + 44 141 550 1653

E-mail : info@bcenvirotec.com

Web : www.beggcousland.com