



## **GAS SCRUBBING TECHNOLOGY**

**'BECOFLEX' ROTARY BRUSH GAS SCRUBBER & DE-DUSTING SYSTEM**

**PACKED BED SCRUBBERS**

**VENTURI SCRUBBERS**

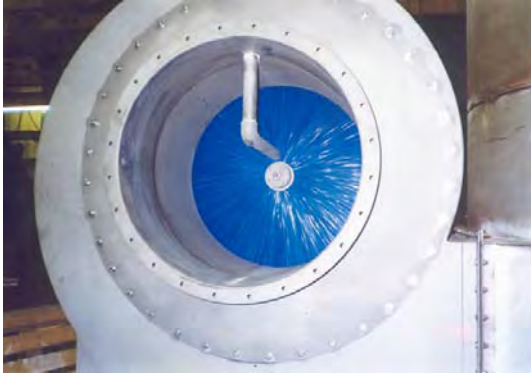
**WET CYCLONE SCRUBBERS**

**CROSS-FLOW SCRUBBERS**

**DUST & FUME SCRUBBERS**

## 'BECOFLEX' Rotary Brush Scrubber

A universal, integrated scrubber system to remove solids (coarse or fine), to abate liquid particles (aerosols or droplets), or to scrub noxious gas, present in any industrial gas flow.



### Technology

The 'BECOFLEX' principle of operation is a wetted fibre brush rotating at high speed in a special volute fan casing, thus creating an extremely dynamic gas contact.

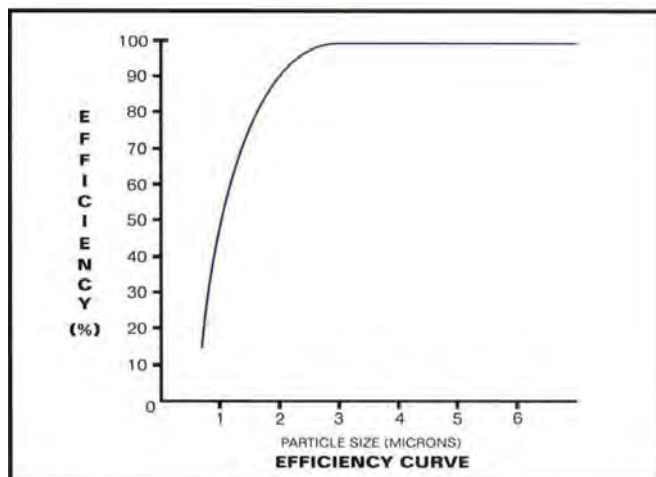
Particles in the dirty exhaust gas stream are drawn into the unit by the suction generated by the rotary brush, and they impact at high speed with the spinning brush fibres and become thoroughly wetted. The next effect is for the particles to be centrifugally washed off, to impact on the wetted inner surface of the volute.

The resulting slurry is then propelled along the bottom of the exit duct to the disengagement vessel, where it falls by gravity to the bottom for removal or recirculation.

The cleaned (wet) gas meanwhile flows upwards from the duct into the disengagement vessel and towards the top gas exit. Usually a 'Becoil' demister is fitted to remove any entrained liquid droplets.

The BECOFLEX system is compact and acts as its own air mover. This usually means there is no need for a separate fan, but in some cases a secondary or main fan is also used, particularly with long upstream processes.

In comparison with the power consumption of a conventional fan, the BECOFLEX will draw up to 60% volume flow for the same power.



Particle Size Efficiency

The BECOFLEX is a **SCRUBBING PROBLEM SOLVER**. The BECOFLEX technology is beautifully simple, which appeals to all engineers - often solving a problem with existing scrubbing systems. Alternative gas scrubbing technologies can have disadvantages, such as :

**Packed Towers** have random or structured packing, which block relatively easily with any solids in the gas.

**Wet Cyclones** have medium efficiency only on smaller particle sizes. Also large liquid volumes are required.

**Venturis** are very efficient, but have high energy requirement, high capital cost and high liquid volume.

However, BECOFLEX's main benefits are :

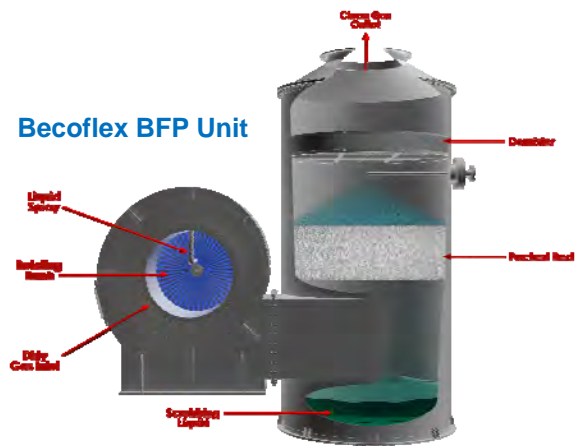
- ✓ It is a self-cleaning wet gas scrubber, where the gas or air impacts on the spinning brush, which is sprayed with low volume liquid. This dynamic action gives excellent gas/liquid contact and means the unit can be very compact.
- ✓ It can handle solids removal with less liquid in & effluent than conventional towers or wet cyclones.
- ✓ It can use water or any chemical solution for gas absorption or odour control.
- ✓ It can be fitted with packings or other 2<sup>nd</sup> stage equipment for more complex gas absorption duty ( the 1<sup>st</sup> stage brush having removed any solids blockage risk ).
- ✓ It acts as its own air moving fan as the brush creates more than just the suction to overcome its own pressure loss, so not only is no separate fan required, it also means it is usually easy to retrofit it to existing process lines.
- ✓ It can act as a solids removal pre-filter in front of, and protecting mist eliminators.



### BECOFLEX Rotary Brush Scrubber Materials

The BECOFLEX brush fibres are made of Polypropylene or PVDF so there is a 100°C temperature limit at the inlet. Spray cooling before the volute may be suitable in some cases. A metal brush can be supplied for BF33 and BF40

The standard materials for the volute and vessel are Carbon Steel, Stainless Steel, Polypropylene / GRP



## BECOFLEX Design Options

There are 5 main Design options for the BECOFLEX Technology. A Standard design BF, combinations with sprays and different types of contact bed BFA / BFC / BFP, and a combination with mist eliminators BFCF.

## BECOFLEX BF Units Flow / Suction Options

The Table below shows the Flow rate options for each BECOFLEX BF and BFA Unit, at 3 different Fan Static Pressure (Suction) values.

**Note 1 :** For flows larger than 25,000 m<sup>3</sup>/hr we combine fan volute units in parallel, feeding into a common exit vessel.

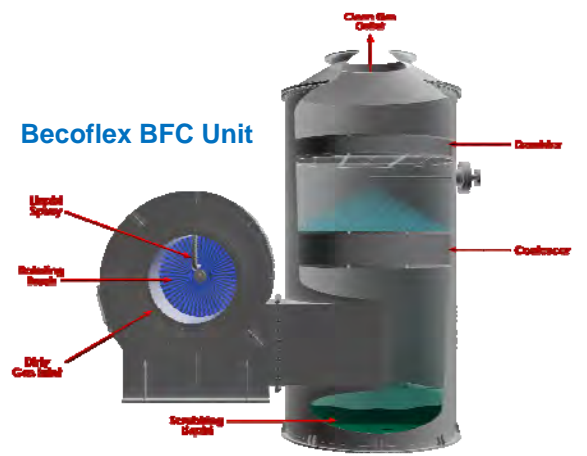
**Note 2 :** For BFC, BFP and BFCF Units, the Flow rate will be lower than shown in the table, due to the extra resistance caused by the filter / packing.



## BECOFLEX BF Unit Size and Other Data

The Physical Size, Motor Size and Liquid Spray Rate data for each BECOFLEX BF Unit is shown in the table below.

BF MODEL	Gas Volume m <sup>3</sup> /hr			Unit Data		
	@ 50mm H <sub>2</sub> O Fan Static Pressure	@ 80mm H <sub>2</sub> O Fan Static Pressure	@ 110mm H <sub>2</sub> O Fan Static Pressure	Approximate Dimensions L x W x H (mm)	Motor Size (Kw)	Brush Spray (Litres / minute) @ 50mm H <sub>2</sub> O F.S.P. Gas Volume
BF33	1,000	600	200	1100 x 900 x 1350	1.5	5.0
BF40	2,000	1,400	800	1350 x 1000 x 1600	3.0	10.0
BF49	3,000	2,100	1,200	1550 x 1000 x 1750	4.0	15.0
BF57	4,000	3,000	1,900	1750 x 1150 x 2000	5.5	20.0
BF65	5,500	4,000	2,500	2000 x 1250 x 2200	7.5	27.5
BF73	7,000	5,000	3,300	2200 x 1450 x 2400	11.0	35.0
BF81	8,500	6,400	4,200	2400 x 1500 x 2600	11.0	42.5
BF89	10,500	7,800	5,100	2600 x 1550 x 2800	15.0	52.5
BF98	12,000	9,400	6,200	2800 x 1700 x 3000	18.5	60.0
BF114	17,000	12,900	8,700	3300 x 1800 x 3400	22.0	85.0
BF130	25,000	16,800	11,500	3600 x 1950 x 3650	30.0	125.0



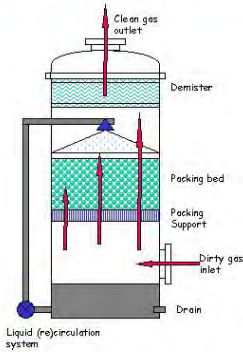


## 'BEGG COUSLAND' Gas Scrubbers

Begg Cousland can design and supply all types of gas scrubbing equipment, either as 'end-of-pipe' pollution control or as a gas cleaning stage within a process.

Gas scrubbers are all designed to ensure a good contact and mixing between gas and liquid, usually for Absorption Odour control or Particulate removal. Desorption and Distillation are also mass transfers done in columns. Below are the most common designs we supply.

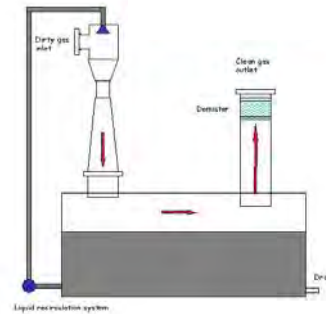
### Option 1. Conventional Packed Bed Scrubber



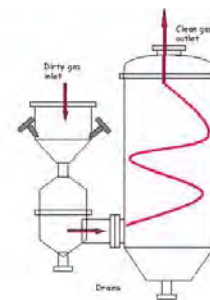
This design removes gas by absorption or by chemical reaction. Suitable for odour control also.

High energy / high efficiency Venturis use a cyclone stage afterwards, and can remove 0.1 micron dust. It is not prone to blockage. Eductor Venturis are used where 'sticky' solids are present or where the high liquid flow can condense.

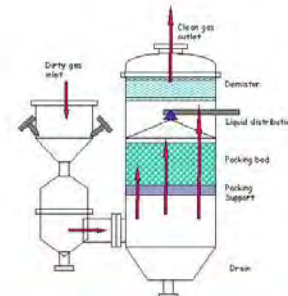
### Option 4. Eductor Venturi Scrubber



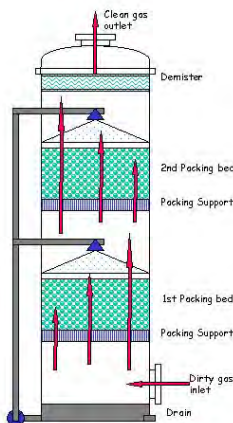
### Option 5. Venturi Scrubber + Cyclone



### Option 6. Combination Venturi + Packed Bed



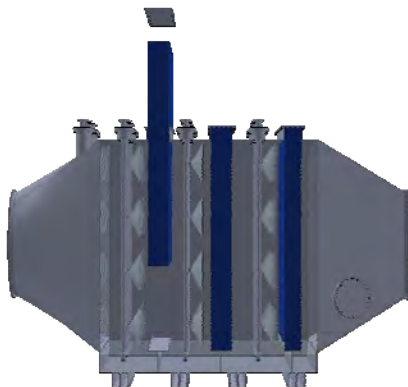
### Option 2. 2 Stage Packed Bed Scrubber



This design removes 2 different gases by absorption or by chemical reaction with different liquors with a dividing tray. Suitable for 1<sup>st</sup> stage 'stripping' and 2<sup>nd</sup> stage scrubbing.

Packed bed scrubbers are designed to give excellent gas / liquid contact and residence time for the reactions, but can be blocked by solid particulates. Where solids are present it is best to use a different design or have a solids removal stage first, to prevent the fouling of the packings. Begg Cousland offer the BECOFLEX technology for wet removal of solids and cross-flow scrubbers equipped with BLUEFIL® structured mesh packing stages.

### Option 3. 4 Stage Cross-Flow Scrubber



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