



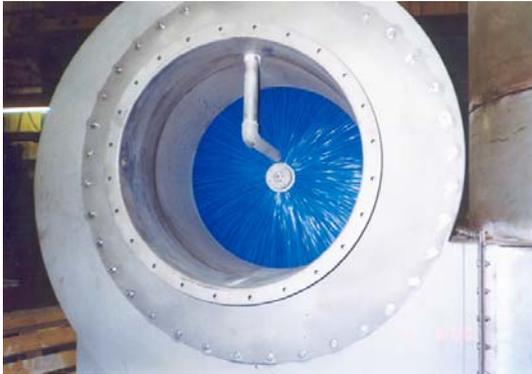
Begg Cousland

World Class Solutions -Filtration & Pollution Control

Becoflex Rotary Brush Scrubber

'BECOFLEX' Rotary Brush Scrubber

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



Basic Principles

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.

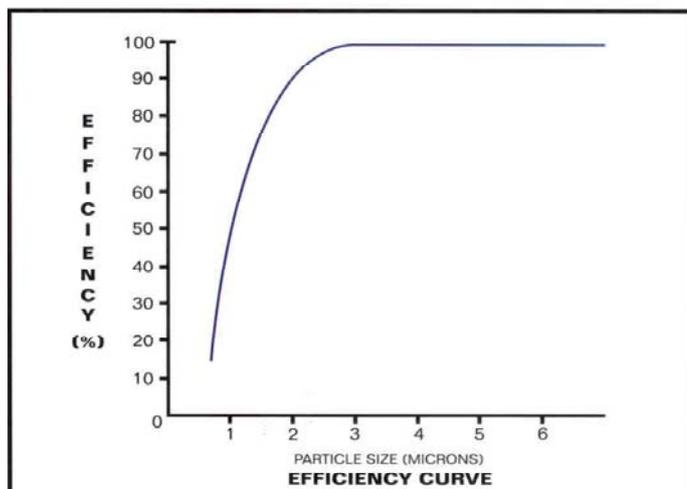
Particles in the dirty exhaust gas stream are drawn into the unit by the suction generated by the rotary brush, and they impact at high speed with the spinning brush fibres and become thoroughly wetted. The next effect is for the particles to be centrifugally washed off, to impact on the wetted inner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



The BECOFLEX was invented by I.C.I. in the UK, and Begg, Cousland became a licensee at the end of the 1980s. Begg, Cousland now owns the technology.

The technology is beautifully simple, which appeals to all engineers. Often when it is presented engineers can usually imagine at least one application where it could solve a problem. That is many times the key benefit of BECOFLEX - it is a **SCRUBBING PROBLEM SOLVER**.

Alternative gas scrubbing technologies' disadvantages :

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.

Dry Cyclones have medium efficiency only on solids, and poor efficiency on smaller particle sizes.

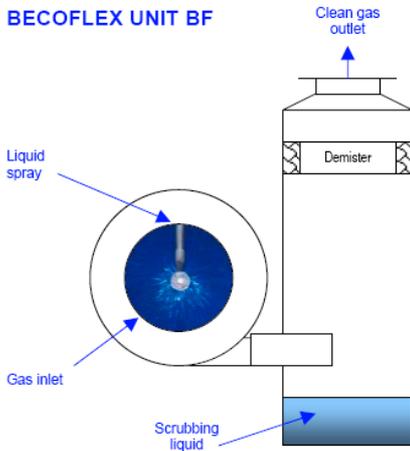
Venturis are very efficient, but have high energy requirement, high capital cost and high liquid volume.



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 2nd stage equipment for more complex gas absorption duty (the 1st 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 UNIT BF



Standard 'BECOFLEX' Unit

Primarily used for scrubbing out particulates, this is a single stage scrubber system, with the discharge vessel fitted with a 'Becoil' knitted mesh demister for droplet removal.

This system has a low liquid usage, recirculated if suitable, and no pressure loss.

The degree of suction generated depends on gas volume and other in-line restrictions.

BECOFLEX Design Options

Here we show the main 5 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

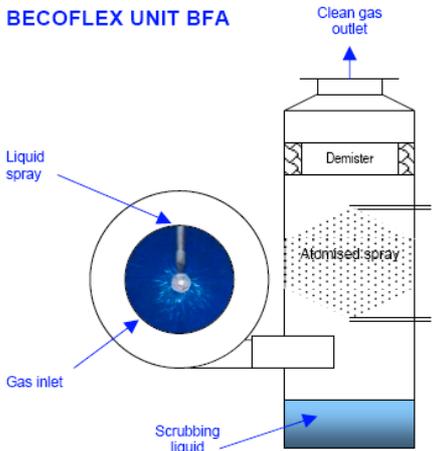
The Table below shows the Flow rate options for each BECOFLEX BF Unit, at 3 different Fan Static Pressure (Suction) values.

BECOFLEX BF Unit Size and Other Data

The Physical Size data, Motor Size and Liquid Spray Rate data for each BECOFLEX BF Unit is shown in the table on page 4.

BECOFLEX MODEL	Gas Volume m ³ /hr		
	@ 50mm H ₂ O Fan Static Pressure	@ 80mm H ₂ O Fan Static Pressure	@ 110mm H ₂ O Fan Static Pressure
BF33	1,000	600	-
BF40	2,000	1,400	800
BF49	3,000	2,100	1,200
BF57	4,000	3,000	1,900
BF65	5,500	4,000	2,500
BF73	7,000	5,000	3,300
BF81	8,500	6,400	4,200
BF89	10,500	7,800	5,100
BF98	12,000	9,400	6,200
BF114	17,000	12,900	8,700
BF130	25,000	16,800	11,500

BECOFLEX UNIT BFA

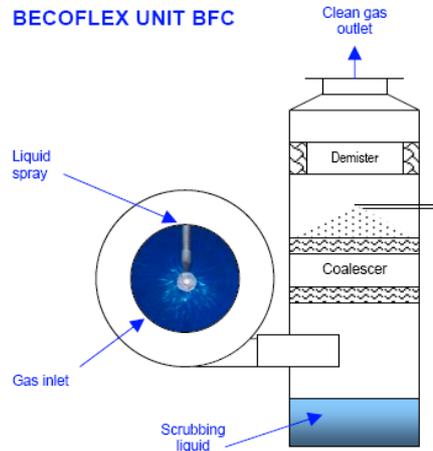


Combined 'BECOFLEX' Unit and atomising spray section

In addition to scrubbing out particulates, this double stage scrubber system increases the residence contact time, without the risk of solids blockage of a packed bed scrubber. The discharge vessel is fitted with atomising sprays which will generate the optimum droplet size for gas absorption. Alternatively a Coalescer mesh pad stage can be installed between the sprays. (BECOFLEX UNIT BFC)

This system is ideal where odour control is key, and where toxic gas is a problem.

BECOFLEX UNIT BFC



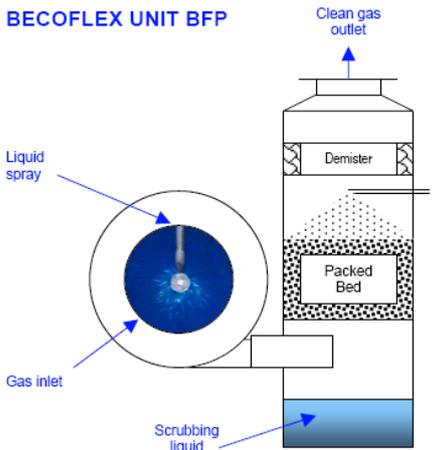
Combined 'BECOFLEX' Unit + sprayed Coalescer section

In addition to scrubbing out particulates, this double stage scrubber system increases the residence contact time in a knitted mesh & fibre bed.

The discharge vessel is fitted with a spray system above a Coalescer mesh pad stage, which is installed below the sprays to increase mass transfer.

The Coalescer has a high surface area per unit volume, which makes a highly effective gas / liquid contact bed, while keeping a relatively open structure for gas flow.

BECOFLEX UNIT BFP



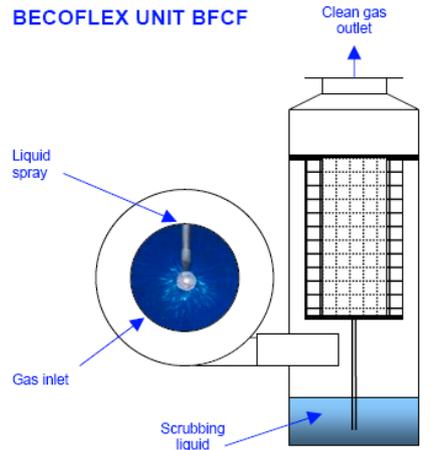
Combined 'BECOFLEX' Unit and random packed bed

This design is a combination of co-current and counter-current scrubber systems.

The choice of random packing can be saddles, rings or new generation low pressure loss types, but due to the first stage BECOFLEX action, there is an in-built protection against solids blockage.

This system offers longer residence times for more complex gas scrubbing duty, while providing gas suction as an integral part of the system.

BECOFLEX UNIT BFCF



Combined 'BECOFLEX' Unit and Candle Filter

Mostly used for vent gas scrubbing, this is a two stage scrubber + mist filter system, with the discharge vessel fitted with a 'Becoil' high efficiency fibre bed for mist removal.

This system is usually designed with enough suction generated to overcome the system's own pressure loss only.

Single or multiple candle filters according to the gas volume being treated, the system collects mist, solids and even odours.



BECOFLEX BF UNIT



BECOFLEX BFCF UNIT

BECOFLEX MODEL	Unit Data		
	Appx. Dimensions L x W x H (mm)	Motor Size (KW)	Brush Spray @ 50mm H₂O F.S.P. Gas Flow (l/min)
BF33	1100 x 900 x 1350	1.5	5.0
BF40	1350 x 1000 x 1600	3.0	10.0
BF49	1550 x 1000 x 1750	4.0	15.0
BF57	1750 x 1150 x 2000	5.5	20.0
BF65	2000 x 1250 x 2200	7.5	27.5
BF73	2200 x 1450 x 2400	11.0	35.0
BF81	2400 x 1500 x 2600	11.0	42.5
BF89	2600 x 1550 x 2800	15.0	52.5
BF98	2800 x 1700 x 3000	18.5	60.0
BF114	3300 x 1800 x 3400	22.0	85.0
BF130	3600 x 1950 x 3650	30.0	125.0



BECOFLEX BFC UNITS



BECOFLEX BRUSH

Odour Control ; Vent Gas Treatment ; Product Bagging / Loading

Odours can arise in 2 ways. Some substances have an inherent aroma, e.g. H₂S, Mercaptans. However, on normally innocuous substances such as water, the action of bacteria can generate odour. The wet scrubbing treatment of odours can be achieved in different ways:

- **Masking** : The scrubbing liquor will contain a sweet smelling compound which is stronger than the nuisance odour. There is no chemical reaction, but simply a masking of the smell.
- **Reaction** : The sprayed solution will contain an agent which will chemically bind with the odour molecule and the subsequent reaction is to break the molecule down into non aromatic fractions.

In any such odour scrubbing, it is important to achieve optimum gas or air contact with the scrubbing liquor.

Begg, Cousland's BECOFLEX system however has proven to be ideal for the removal of odours and particulate, without the disadvantages of packing or size. This greatly simplifies even retrofit vent gas treatment as there is no addition to the pressure loss - in fact, with pneumatically fed hoppers, the BECOFLEX air movement helps the silo's vacuum effect.

Some Application Examples

The BECOFLEX has proven success in emission control from **soda ash** bagging station silos and controlling terephthalic acid (**PTA**) silo dust & odours with 5% NaOH. Fugitive dust emissions from wagon loading operations on **phosphates** are stopped. The vent vapours from **asphalt** tanks are pre-scrubbed before a sub-micron mist eliminator.



Phosphate Wagon Loading Becoflex BF

Oleum tanks vent SO₃ gas which is treated by the BFCF design system, and combinations with mist eliminators are also used for (cooled) **incinerator** exit gas, and tail gas from processes emitting **SO₂ & SO₃**.



Oleum Wagon Loading Becoflex BFCF

The most recent new applications are **granulator dryer** & **prilling tower** emissions in nitrogen fertiliser plants.



A.N. Granulator Dryer Becoflex Units

BECOFLEX Rotary Brush Technology

Currently the brush fibres are made of synthetic materials, Polypropylene and PVDF, which means there is a temperature limit at the inlet to the BECOFLEX. Spray cooling before the volute may be suitable. Development continues on a high temperature brush.



Combined Becoflex BFCF

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

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