



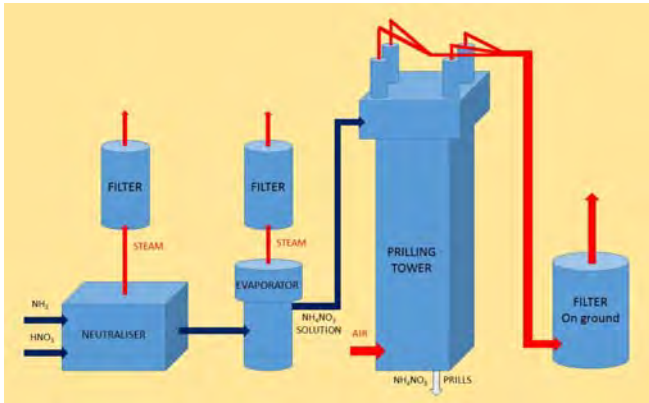
**Equipment and Technology to
Control Atmospheric Emissions
from the Nitrogen Fertiliser
& A.N. Explosives Industries**

Begg Cousland's Filtration Technology

Begg Cousland has been active in the field of Industrial Air Pollution Control for more than 60 years. We have a unique product knowledge and depth of experience in the collection of liquid particles from air / gas streams.

In addition to the base technology of gas / liquid filtration, we have design know-how for complete gas cleaning packages, comprising vessel, irrigated scrubber sections and associated equipment.

Application 1. Ammonium Nitrate Evaporator and Ammonium Nitrate Neutraliser



Mist Formation/Nature/Load

The NH_4NO_3 is entrained by steam.
Particle size usually > 3 microns
Load can be up to $15,000\text{mg}/\text{m}^3$

Problems to Solve

Air pollution.
Product loss.

Design Solution

T80.35 PTFE fibre mist eliminators with 304SS structures
Our specially developed T80.35 PTFE mat fibre allows filters also to be made cylindrically (as well as rectangular panels) and this gives better efficiency & life.

Application 2. Ammonium Nitrate Prilling

Increasingly A.N. Prilling tower emissions are required to reduce to levels, which require the use of high efficiency Candle Filters. We have a range of fibre bed designs, to give the best balance of efficiency and pressure loss.

We can offer also alternative technologies using only irrigated mesh pad demisters, which can achieve quite high efficiencies + good free ammonia absorption as well.

Mist Formation/Nature/Load

Decomposed NH_3 and HNO_3 from NH_4NO_3 is entrained by the air rising through the Prilling Tower. Also some NH_4NO_3 prills can be entrained.
Particle size usually averages 1 micron
Average load can be up to $150\text{mg}/\text{m}^3$. The heaviest load is found in the air drawn around the prill head sprayer.

Problems to Solve

Air pollution.
Product loss.



Falling AN Prills

Design Solution A

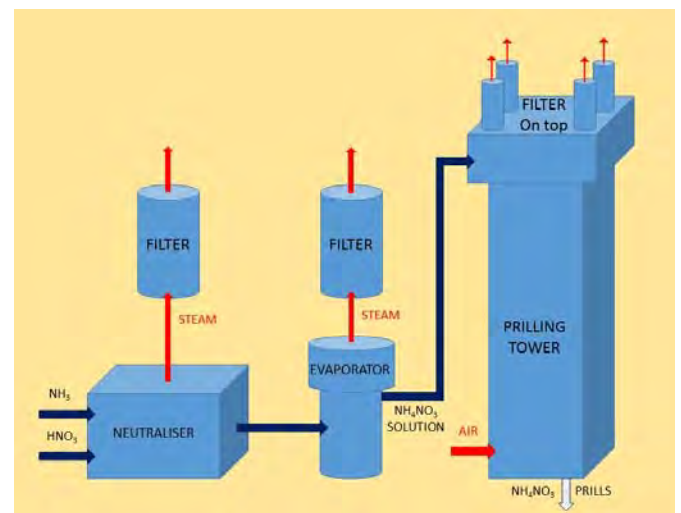
B14 / B14W / TGW15 glass fibre mist eliminators with a 304SS standing type structure.
Filter lengths from 1.83 to 6.1 metres.
Install a first stage mesh pad demister with nitric acid solution spray for NH_3 abatement.



Ground level Candle Filter Vessel after Prilling Tower

Design Solution B

For CAN and older towers a top-of-tower scrubber unit of 1 or 2 stage irrigated mesh pads (demisters / co-knit fibre coalescers / BlueFil®) with 304SS or FRP grids.
Install a nitric acid solution spray on a first stage mesh pad, for optimum NH_3 abatement.



Top of AN / CAN Prilling Tower fitted with irrigated mesh pad system before each fan + chimney exits

Application 3. Ammonium Nitrate Granulation

AN can be produced as a Granulated product. The Granulators, and Dryers, have product and some free NH_3 to be cleaned before going to atmosphere. We offer our special Becoflex Rotary Brush Scrubber technology and/or BlueFil® meshpad scrubbing systems.



BECOFLEX Rotary Brush Scrubber

Mist Formation/Nature/Load

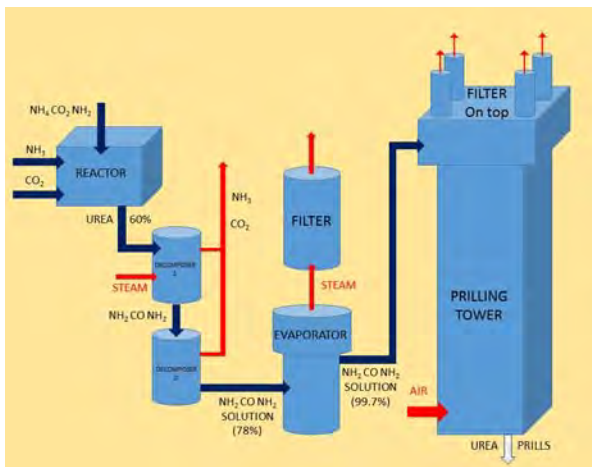
AN particles are entrained by fans, often via cyclones. Particle size usually 2 - 3 microns. Load can be up to 2,500mg/m³

Problems to Solve

Air pollution.
Product loss.

Design Solution

Application 4. Urea Evaporator



Mist Formation/Nature/Load

The Urea is entrained by steam. Particle size usually 2 - 3 microns. Load can be up to 7,000mg/m³

Problems to Solve

Air pollution.
Product loss.

Design Solution

T80.35 PTFE fibre mist eliminators with 304SS structures. Our specially developed T80.35 PTFE mat fibre allows filters to be made cylindrically or as rectangular panels.

Application 5. Urea Prilling

For Urea Prilling we offer a range of designs, including BlueFil®, knitted wiremesh pads and combinations with our Becoflex Rotary Brush Scrubber for this duty. The loads are usually lower than from AN prilling.

Mist Formation/Nature/Load

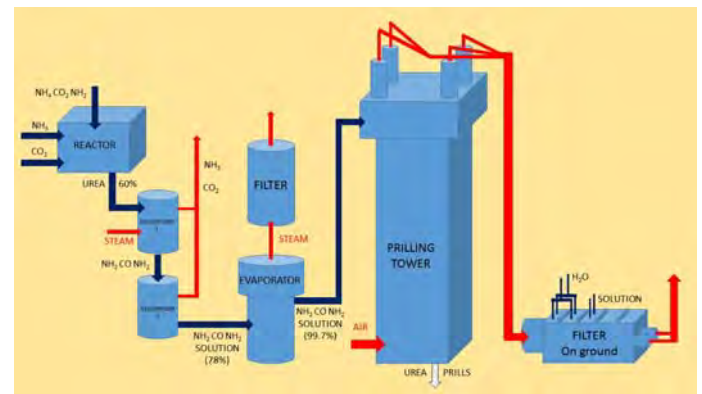
Decomposed NH_3 and microprills are entrained by the air rising through the Prilling Tower. Particle size usually averages 1 micron. Average load can be up to 800mg/m³.

Problems to Solve

Air pollution.
Product loss.

Design Solution A (Top of Tower)

2 or 3 stage irrigated vanes / mesh pads (demisters / co-knit fibre coalescers) with 304SS grids. Install demineralised water wash sprays for 2nd stage. Install a nitric acid solution spray on a first stage mesh pad, for NH_3 .



Design Solution B (Top of Tower or on Ground Level)

Horizontal vessel with vertically oriented 2 or 3 stage irrigated BlueFil® mesh pads with FRP grids. No wash sprays for 3rd or 4th (demisting) stage. Install a nitric acid solution spray on first stages for NH_3 .



Irrigated BlueFil® meshpad system

Design Solution C (Ground Level)

1st stage BECOFLEX Rotary Brush Scrubber, followed by only a 2 or 3 stage BlueFil® meshpad scrubber, vertical or horizontal.

The dynamic air / liquid contact achieved in the volute due to the rotating brush optimises the liquid volume required, and the brush action adds to the air extraction effect, rather than adding pressure loss restriction. All >2 micron dust removed before 1st BlueFil® meshpad.

Application 6. Urea Granulation

There are many different technologies for Urea Granulation, including fluidised bed, which can produce different emissions



Mist Formation/Nature/Load

The Urea is entrained by exiting air from a granulator / cooler
Particle size usually 2 - 3 microns
Load can be up to 2500mg/m³

Problems to Solve

Air pollution.
Product loss.

Design Solution

Horizontal vessel with vertically oriented 2 or 3 stage irrigated BlueFil® mesh pads with FRP grids.
No wash sprays for 3rd or 4th (demisting) stage
Install a nitric acid solution spray for NH₃.

Application 7. Nitric Acid Plant Catalyst Recovery

In the Nitric Acid process catalytic oxidation takes place on precious metal catalysts, and valuable Platinum and/or Palladium metal can be lost, especially in high pressure plant. As an option a parallel filter system can be used.

Mist Formation/Nature/Load

PT dust from catalyst reactor or Degussa gauze PD dust.

Problems to Solve

Precious metal loss / quick recovery

Design Solution

2 vessels in parallel, with a horizontal TGW15 glass fibre filter in a 304SS or 321SS structure. 1 on line & 1 on standby.

Application 8. Nitric Acid Plant Absorber Emissions

After the Absorption stage, when, with water, NO₂ reacts to HNO₃, some HNO₃ can be emitted to atmosphere.

Mist Formation/Nature/Load

HNO₃ particles
Larger size droplets
Load typically 1,300mg/m³

Problems to Solve

Pollution control
Product loss

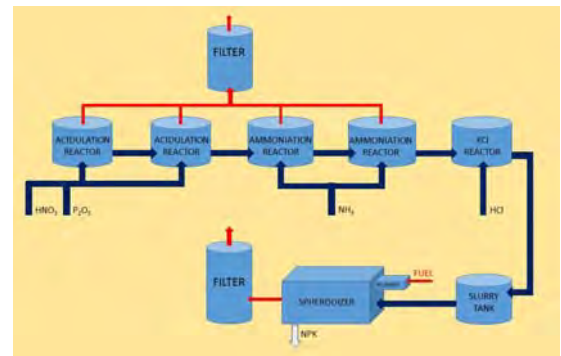
Design Solution

G25 Glass fibre candle filter with 304LSS structure

Application 9. NPK Plant Emissions

An NPK fertiliser has Nitrogen, Phosphate & Potash contained in the same granule. There are a variety of methods of manufacture of NPK fertiliser, including acidification, wet & dry granulation. The granulator off gas has different contaminants to treat, e.g. acid droplets & fume, fluorine & ammonia gases together with dust from the granulation process. For the different applications Begg Cousland specify custom designed optimised equipment.

An example of NPK plant filters are on Acidulation and Ammoniation duty, treating the exit gas from the decomposition of Phosphate rock by HNO₃ and P₂O₅, then the NH₃ stage & the KCl stage reactions. After the pelletising Sphero-dizer a separate filter cleans those specific off gas contaminants.



Mist Formation/Nature/Load

HNO₃ + P₂O₅ and some NH₄NO₃ particles
Load typically 10,000mg/m³

Problems to Solve

Pollution control

Design Solution

1ST stage irrigated meshpad with PH control + 2nd stage TGW15 glass fibre candle filter with 316LSS structure

For further information, please contact us at

Begg Cousland Envirotec Ltd.

205 White Studios, 62 Templeton Street,

Glasgow G40 1DA

United Kingdom



Tel + 44 141 556 2289

Fax + 44 141 550 1653

E-mail : info@bcenvirotec.com

www.beggcousland.com