Begg Cousland

World Class Filtration Solutions

Equipment and Technology to Control Atmospheric Emissions from the PVC Coating Industry

Begg Cousland Envirotec Filter Technology

The Begg Cousland Envirotec team have been active in the field of Industrial Air Pollution Control for more than 30 years. We make both knitted wire meshpad demisters and candle filter mist eliminators, we have a unique length and depth of experience in the collection of liquid particles from air / gas streams.

In addition to the base technology of filtration, we have an ongoing development programme for package systems for the PVC Coating Industry. This builds on our experience of over 100 installations, many of which have been supplied on a turnkey basis, as end-of-pipe pollution control systems comprising filters, vessels, heat exchangers, pumps, instrumentation and fan, plus chimney if required.

Typical Applications

- vinyl coated and linoleum flooring
- vinyl coated wallpaper
- synthetic leather (car upholstery, bags, shoes etc.)
- laminated sheets (special films, belts, tarpaulins)
- foam products

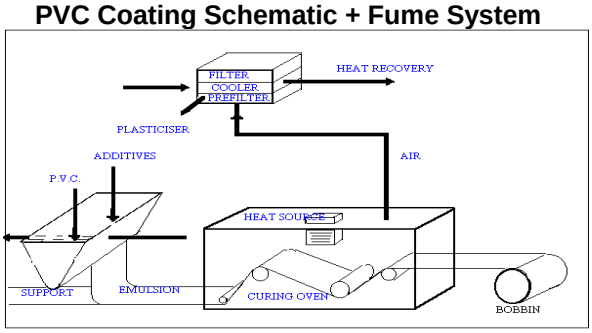
Our method for the removal of these fumes is not only highly efficient (meeting the lowest emission level requirement in Europe), but often gives the added advantage to recover valuable liquids for re-use.

Polyvinyl-chloride (PVC) is a thermoplastic, mixed with additives to improve its properties and enable it to be processed more easily
The most common major additives are:

- plasticizers to provide elasticity, e.g. DOP (Dioctyl Phthalate)
- stabilizers to prevent degradation e.g. PB salts
- lubricants (solvents) to prevent plugging on cylinders of the coating machine
- charges i.e. silicium
- pigments i.e. anthraquinones

The emulsion (polymer + additives) is spread coated and heat cured or calenderized in ovens. PVC emulsion is fed to the ovens with successive steps of curing / calendering and cooling sections. Gas is extracted from curing / calendering sections and cooling sections.

PVC Coating Schematic + Fume System



FUME FILTRATION APPLICATION

Exit gas from curing ovens (180°-150°C) which has been directly or indirectly heated.

Mist Formation/Nature/Load
Depending upon formulation, 500 to 5,000 mg/m³ of plasticizers are present in the exhaust gas. Solvents and other products are also entrained.

Problems to Solve
Air pollution. Most regulations specify a maximum emission of 20 mg/m³ of plasticisers (= invisible), or 50 mg/m³ total carbon, or an odour related limit.
Recovered plasticizer and solvent could be re-used.

A. FILTRATION TECHNOLOGY – FILTERS

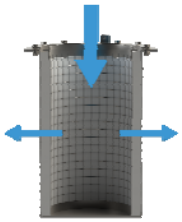
Begg Cousland srl supply high quality, high efficiency knitted meshpad prefilters, bag liners, and candle filter mist eliminators which can also be made hanging or standing to suit others' package systems.

Design Solutions :

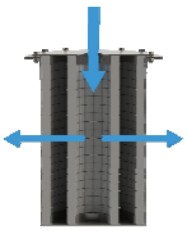
Our BCE filter design preferences are :

Prefilter knitted meshpads in durable, washable, easy to handle sections

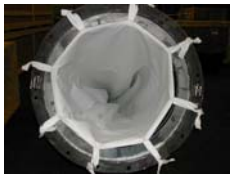
High Efficiency Brownian Diffusion type Candle Filters hanging type HT2, with TGW15 glass fibre in Carbon Steel structures.



Option of concentric bed Xtra-Pure HT2 design



Bag Liners to fit inside Hanging type HT2 or Standing type F Candles



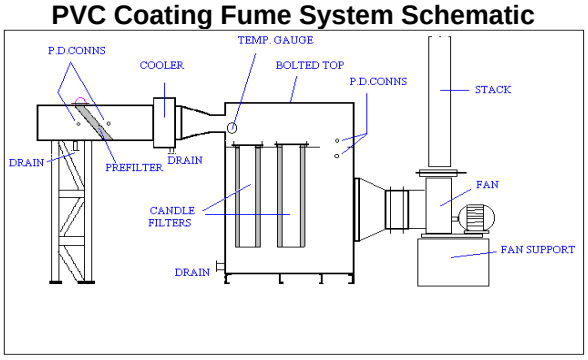
B. FILTRATION TECHNOLOGY – PACKAGE SYSTEMS

Option 1. Basic BCE System for Indirect Heated Ovens, with no lacquer or chlorinated parafins

This system design has 4 main feature components :

- ✓ An efficient, washable prefilter collects large particles and insolubles, to give maximum protection to the downstream parts & to minimise maintenance.
- ✓ A water fed fin & tube heat exchanger cools down the gas to 35°C to ensure all plasticizers and the less volatile solvents are in liquid phase.
- ✓ High efficiency filters Type HT(2) TGW15 are used, giving the ultimate in sub-micron fume collection.
- ✓ Bag liners (washable) are fitted inside each candle filter to give final added protection to the fibre

PVC Coating Fume System Schematic



Additional BCE design benefits are :

- ✓ Pre-filter fitted via a drawer system, for easy access.
- ✓ Candle Filters are fitted via removable flat roof sections for easy access to the Candle Filters and Bag Liners.
- ✓ Hot water heat recovery from the Heat Exchanger can be used in the plant.

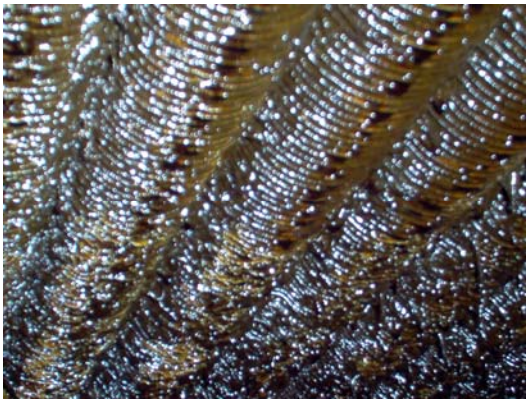
Option 2. BCE System with 'Scrubber' Pre-filter for Direct Heated Ovens, or Fumes with Lacquer or chlorinated parafins, or Low volatile solvent removal

In response to the special problems presented by the very dirty fume which is usually generated by direct fired ovens, we developed a simple solution to avoid (or at least minimise) the blockage by hydrocarbons, 'cracked' hydrocarbon compounds and other solid / viscous materials, including chlorinated parafins such as Cereclor (which forms a waxy film on the Candle Filters when cool) and lacquers (which form a hard coating on the Candle Filters when cool).

We have used a pre-filter scrubbing section, which can be a first stage add-on in any emission treatment line. Such pre-filter scrubbers are working perfectly at various PVC Coating sites in Europe.

Multi-stage irrigated pre-filter sections

A low pressure loss demister pad is irrigated with recirculated DOP or other suitable plasticiser which is used in the customer's process. This creates an efficient, high voidage contact bed to knock out particulates and viscous materials, before they pass to the main Candle Filter vessel. This is done in a downward flow, vertical arrangement and washes solid or coated materials out of the pre-filter and the cooler below.



Unsprayed cooler tubes and fins - blocked

The BECOPHASE System of Liquid/Liquid Separation removes water from recovered Plasticiser or Plasticiser from effluent water. See our BECOPHASE brochure.

Separate water from recovered plasticiser for re-use

Option 3. BECOSOLVE System with Chilled Liquid 'Scrubber' for low volatile solvent removal

By chilling the sprayed liquid (plasticizer or other liquid) and lowering the scrubber section temperature, more VOC components condense and absorb into the liquid.

Option 4. Basic BCE or BECOSOLVE System with Concentric Double Bed Candle Filters for highest ever aerosol fume removal

Where certain components are classed as noxious or as a health hazard, efficiencies below 10mg/Nm^3 can be imposed and can be achieved. This will also reduce the odour levels.

2 BECOSOLVE Systems on a platform

State of the Art BECOSOLVE systems use Xtra-Pure HT2 type candle filters, to filter the sub-micron fume particles to a level between 3 and 10mg/Nm^3

With such a low content of liquid phase impurities in the exit air, the overall Carbon content limit is easier to meet.

Drawer-type Heat Exchanger Cooler below Pre-Filter Irrigation Spray Bar Connections

Xtra-Pure Inner Bed Candle Filter being lifted through removable roof plates

Recovery of Clean Valuable Plasticiser for Re-use = Short Payback Period

HT2 Candle Filter being lifted for inspection

For further information, please contact us at

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