

AMISTCO® Candle FILTERS



Submicron *Mist Eliminators*



AMISTCO®
Separation
Products, Inc.

AMISTCO® Separation Products offers superior performing candle filters and turnkey submicron mist eliminator packaged solutions for Sulfuric Acid production, other processes involving acids and a wide range of pollution control applications. As the Western Hemisphere licensee for Begg Cousland we manufacture a proven unique candle filter technology to complement our comprehensive line of mesh pad and vane type mist eliminators.

The Begg Cousland candle filter was originally developed in the laboratories of I.C.I.. After 30 years of proof in the field,

these unique candle filter materials and construction have increased separating efficiency, lowered pressure drop or in some cases both in numerous separation applications replacing other candle filter technologies.

With the addition of candle filters, AMISTCO® provides customers with superior new or retrofit separations technologies to handle everything from submicron mists to large droplets. Our engineering expertise and fabricating capabilities go one step further to offer customers packaged pollution control and product recovery systems assemblies.

TGW 15	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 < 20MG/NMS	Corrosion Protection
Design Criteria	100% Removal > 1 Micron 98% Removal < 1 Micron	150-250 MM H2O Pressure loss	Less Than 0.2 M/SEC Bed Velocity

Candle Filter Applications

- *Sulfuric Acid Mists*
- *Phosphoric Acid Mists*
- *Hydrochloric Acid Mists*
- *Wet Chlorine Gas (Brine mist removal)*
- *Dry Chlorine gas (H₂SO₄ removal)*
- *Plasticizer Mist*
- *Compressed air and refrigerant gas (oil mist removal)*
- *Fertilizer Prill Towers*
- *Ammonium Chloride mists*

Candle Filter Construction

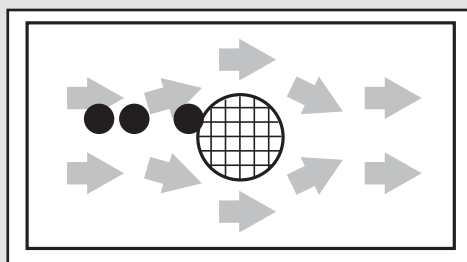
Each candle filter is composed of millions of fibers. These fibers are carefully packed in dense form into a 2-inch annular space between two concentric cages. These candles are installed vertically and grouped together in multiples or as a single candle. Gases travel horizontally through the filter. Particles are collected on the fibers by various means, coalesce and drain down through the filter bed. Depending upon the application gas flow can be directed inside/out or outside/in the candles.



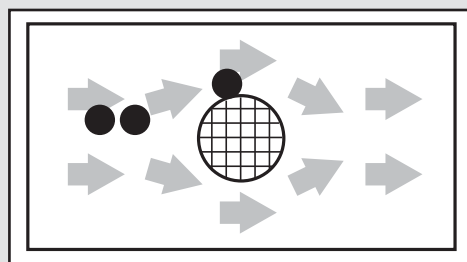
Candle Filter Separations

Candle filters remove liquid particulates by means of impaction for particles greater than 3 microns, interception for particles greater than 1-2 microns and Brownian diffusion for submicron droplets. As mist laden gas passes through the filter bed, surrounding gas molecules surround the fine mist

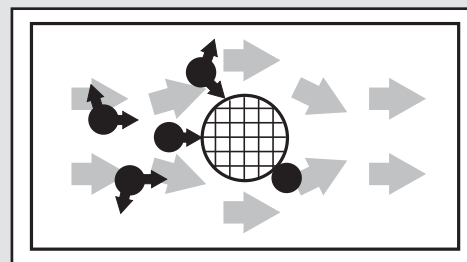
particles causing random side to side (Brownian) movement while traveling through the mesh of fiber. This Brownian movement causes the submicron droplets to eventually collide with a fiber. Low velocities are required for the diffusion velocities associated with Brownian movement.



Impaction
Particles 3 microns larger



Interception
Particles 1 to 3 microns



Brownian Diffusion
1 micron and less

— Sulfuric —

Candle Filters for Sulfuric Acid Applications

AMISTCO® Candle Filter Mist Eliminators are used in Sulfuric Acid processes to prevent corrosion and damage to expensive downstream equipment and to control pollution.

Water, shock cooling and oleum based mists result from the various sulfuric acid processes. The exact mist eliminator equipment recommended for a H₂SO₄ plant depends upon several factors.

1. Sulfur/SO₂ source
2. Single absorption or double absorption
3. Location (drying tower, IPAT, FAT)
4. Equipment requiring protection
5. Type of acid produced
6. Pressure Loss
7. Local pollution control requirements

Sulfuric Acid Processes

Sulfur Burning Plant (dark and bright sulfur)-

Sulfur is burned and the SO₂ gas is converted to SO₃ through catalytic contact. SO₃ gasses are absorbed by recirculating H₂SO₄ solution in an absorbing tower.

Metallurgical Plant-

Ore (pyrite) is roasted. The exit gas is purified, dried and fed into a catalytic converter. SO₃ is absorbed on a H₂SO₄ solution.

Spent Acid plants-

By-products of the organic monomer industry (caprolactam, acrylonitrile) is burned. Exit SO₂ is purified, dried, converted and absorbed in H₂SO₄.

Wet Process (decomposer process)-

The hydrogen sulphite is burned. Exit gas is fed into the converter without being dried.

Sulfuric Acid Candle Filter Applications

- Drying towers
- Interpass Absorbing Towers
- Final Absorbing Towers (FAT)
- CrossFlow Stripper
- Product Stripper
- Acid Concentrator
- Oleum Tank Vents
- SO₂ Tail Gas Scrubbers (NH₃)

— Nitrogen —

Mist Eliminators for the Nitrogen Industry

The nitrogen industry has numerous processes where AMISTCO® Candle Filters and Knitted Mesh Mist Eliminators provide separation solutions. They prevent corrosion, protect downstream equipment, prevent pollution and recover valuable product.

Nitrogen Processes

Ammonia Nitrate-Ammonia Nitrate and nitric acid are fed to the neutralizer. The highly exothermic reaction produces NH₄NO₃ and steam. The neutralizer can be under pressure, vacuum or atmospheric. Ammonia Nitrate solution is fed to an evaporator and concentrated solution is prilled.

Urea Fertilizer-There are once through, partial recycle and total recycle processes. In brief, liquid NH₃ is mixed with CO₂ gas under high pressure with recycled recarbamate. Conversion to urea is 60%. Pressure is reduced with each pass through the first and second decomposers to drive off all of the NH₃ and CO₂. The urea solution is further concentrated in a vacuum evaporator and pumped through spray heads in the prilling tower.

Nitric Acid-NH₃ is oxidized with air on PR/RM catalyst to form NO at high temperature. N₂ and unreacted O₂ are fed to atmosphere with NO and NO₂.

Nitrogen Candle Filter Applications

- Evaporator towers (prevent product loss)
- Prilling Towers (pollution prevention)
- Catalyst (minimize loss of precious metals)
- Post Absorbing Tower (product recovery and protection of downstream equipment)
- Neutralizer and evaporator (prevent water and air pollution)



— Chlorine —

Candle Filters for Chlorine Plants

Whether your plant has diaphragm or mercury cells, or chlorine, stream producing wet chlorine and after the drying tower, dry chlorine, an NaOH stream, or hydrogen stream, AMISTCO® has separation technology to optimize your plant operations. Contact your AMISTCO® separations specialist for your particular application requirements.

Chlorine Candle Filter Applications

- **Pre-drying tower** with chlorine to prevent plugging and reduce sulfuric acid consumption
- **Post-drying tower** before the liquid seal compressor in dry chlorine applications to collect sulfuric acid mists which impact product purity or freeze on tube affecting heat exchanger operation
- **Pre NaOH Streams** before jet system to collect NaOH mists which contaminate water
- **Hydrogen Streams** installed after the cell to collect NaOH and Hg mists which impact purity, corrode the compressor and decrease the charcoal system to remove mercury vapor (mercury vapor cell)



23147 Hwy. 6 Alvin, TX 77511
Ph: (281) 331-5956 Fax: (281) 585-1780
e-mail: amistco@amistco.com
www.amistco.com

— Blue Haze —

Candle Filter and Turnkey Systems for Blue Haze Applications

For pollution and odor control, candle filters are particularly effective in removing plasticizer, low/medium volatile solvents, oil and other fine mists or fumes which result from a variety of processes in numerous industries. AMISTCO manufactures replacement filters as well as turnkey systems, which may involve a prefilter, cooler, fan, pumping and instrumentation etc. Separation systems can be built to customer specification or performance requirement. For more details contact one of our separations specialists.

Blue Haze Candle Filter Applications

- **Plasticizer Solvent Fume Removal**
Through an absorptive recovery system, the exhaust from ovens curing vinyl coated flooring or wallpaper can be separated to eliminate invisible plumes and recover valuable process liquids.
- **Lube Oil Haze From Rotating Equipment** in compressors, turbines and other large rotating equipment mists or blue haze generated from recirculating lube oils creating blue haze.
- **Metal Working Operations**
Fumes resulting from metalworking lubricants used in milling, drilling and other metal shaping operations which create a blue smoke or haze.
- **Plastics Processing**
For injection molding, film making, and extrusion of plastics AMISTCO® Separation Products manufactures systems to remove submicron particles causing blue haze.
- **Other Applications Include**
Asphalt Production Storage and Loading, Fabric treating and coating.

AMISTCO® is a licensee of Begg Cousland candle technology