



Elessent™
MECS® TECHNOLOGIES

**BRINK® MIST ELIMINATORS
FOR SULFURIC ACID PLANTS**



**WORLD-CLASS TECHNOLOGY.
WORLD-CLASS SERVICE.
AVAILABLE WORLDWIDE.**

Elessent Clean Technologies
MECS® Technologies
MECS.ElessentCT.com

BRINK® FOR SULFURIC ACID FIBER BED MIST ELIMINATORS

WHY BRINK®?

- Experience in sulfuric acid plant technology since 1925
- Invented fiber bed technology
- Patented designs for sulfuric acid plant products including AutoDrain® and XP™
- Exclusive supplier of ZeCor-Z® wire mesh pads
- Best technical support in the industry
- Worldwide manufacturing and availability

QUALITY, SERVICE, TECHNOLOGY

Dr. Joseph Brink developed the first fiber bed mist eliminator for chemical and acid plant use in 1958.

MECS®, Inc. (MECS®) continues to be the leader in mist elimination products which utilize the latest technology. MECS® welcomes the opportunity to investigate and recommend solutions to any air pollution or downstream corrosion problem in your sulfuric acid plant. Brink® Mist Eliminator products offer longer service life resulting in lower plant maintenance and operating costs.



FORMATION OF ACID MISTS

Larger acid mist particles are created in sulfuric acid drying and absorbing towers as a result of the splash and shear of liquid acid in the distributor and over the packing. These particles are entrained in the upward gas flow. More difficult to collect small acid particles are formed by the reaction of sulfur trioxide with any water vapor present and by the condensation of acid from the gaseous or vapor phase. These acid particles can corrode blowers, duct work and heat exchangers, damage catalysts and cause atmospheric pollution.



In a sulfuric acid plant, much of the mist is mechanically generated. The frothing action in the trough style distributor along with bubbling in the downcomers generate spray particles. Also, acid drops are stripped off the acid flowing over and through the tower packing.

COLLECTION OF ACID MISTS

A fiber bed mist eliminator for sulfuric acid service is a thick filter consisting of acid-resistant glass fibers packed in a supporting cage. Gases containing the mist particles are directed horizontally through the fiber beds. Particles contract and collect on individual fibers of the bed and then coalesce to form liquid films and droplets that are moved through the bed by gas flow. The collected liquid then drains off the downstream face of the bed by gravity.

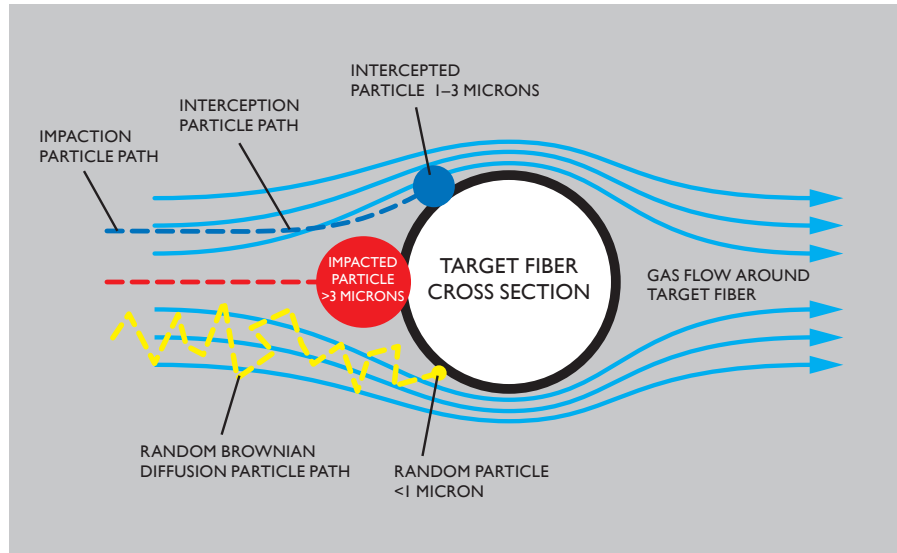


BRINK® FOR SULFURIC ACID

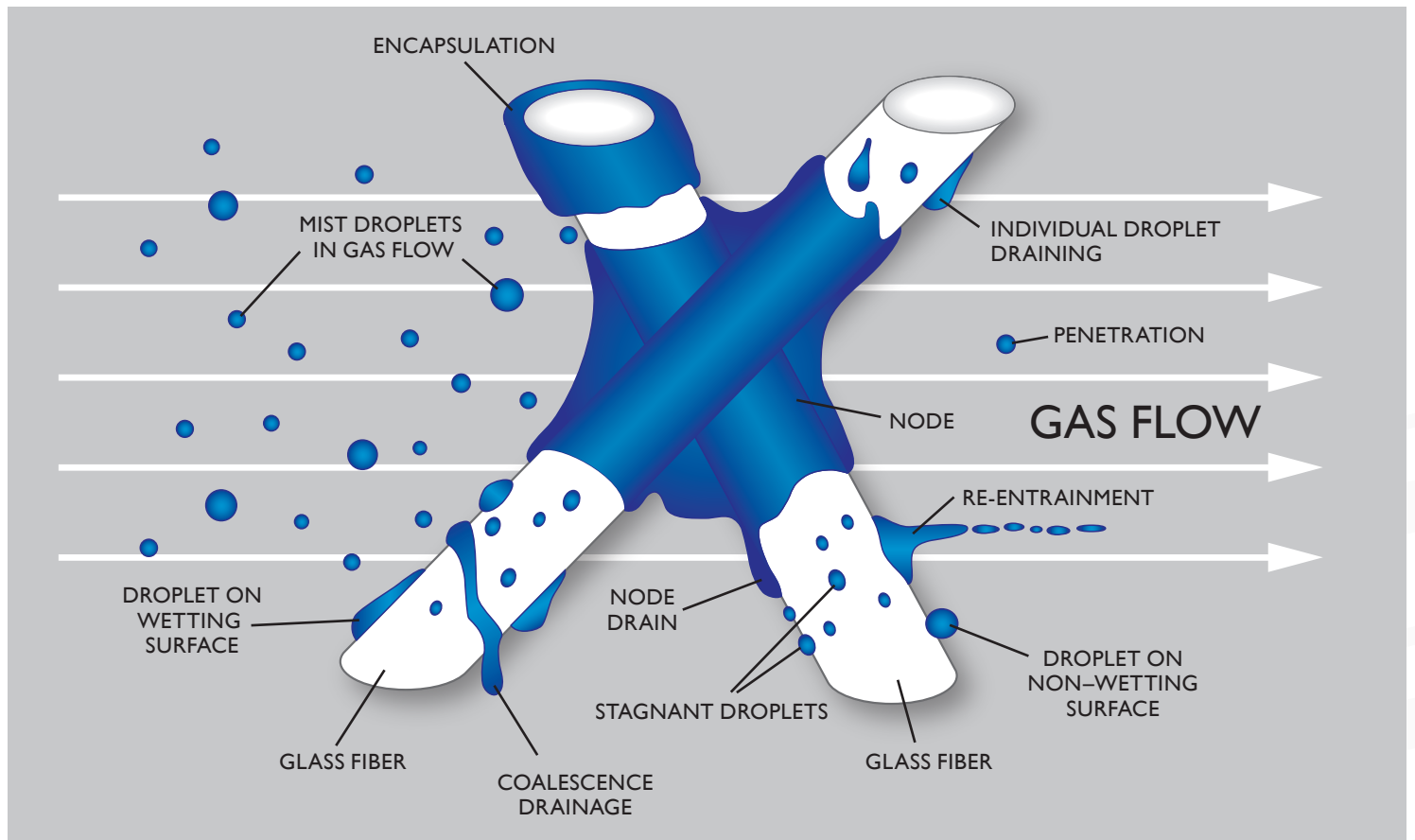
WORLD'S LEADING SOURCE FOR SULFURIC ACID TECHNOLOGIES

PHYSICS

- Particles larger than 3.0 microns are collected when their momentum prevents them from following gas streamlines around fibers. They leave the streamline, strike a fiber and are collected by the fiber.
- Between 1.0 and 3.0 micron-size particles tend to follow the gas streamlines as they flow relatively close to fibers. A 1.0-micron particle, for example, passing within 0.5 micron of a fiber will be collected by the fiber.
- Submicron particles have random side-to-side movement caused by collisions with gas molecules, greatly increasing the probability of collision with a fiber.



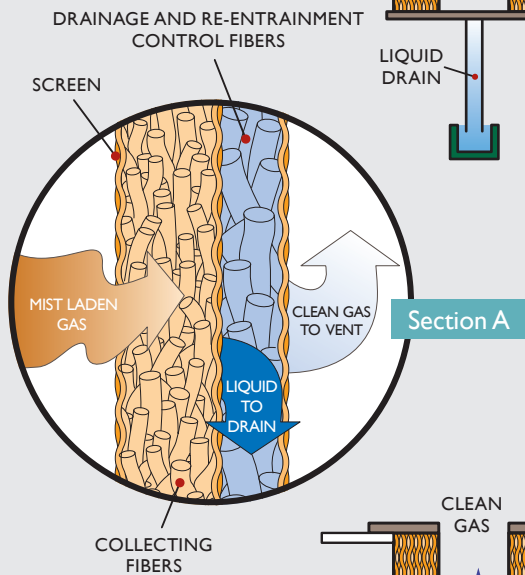
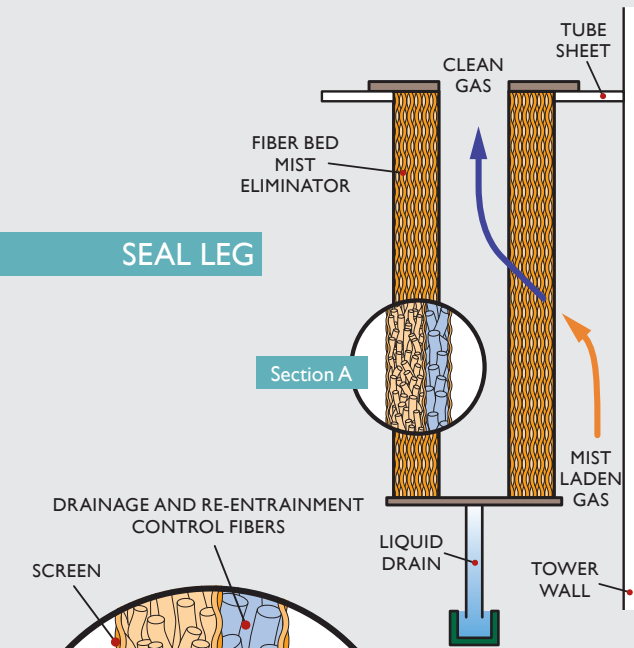
After collection, the acid mist droplets coalesce on the individual fibers in the fiber bed and begin to drain.



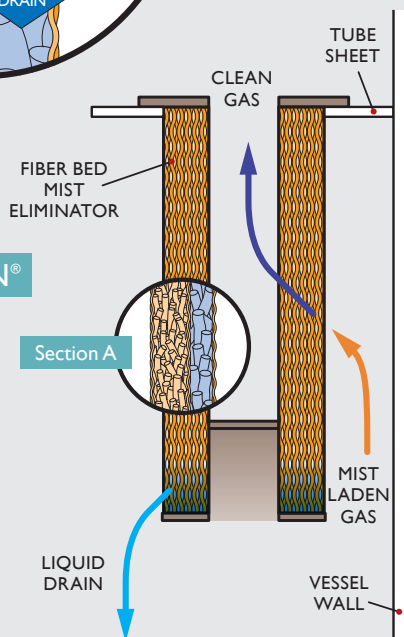
BRINK® FOR SULFURIC ACID DIFFUSION FIBER BED PRODUCTS

BI-COMPONENT HANGING STYLE PRODUCTS

SEAL LEG



AUTODRAIN®



XP™ – EXTRA PERFORMANCE

The eXtra Performance offers the lowest pressure drop available in one to one match-ups when compared to other elements. The pressure drop per XP™ element is 1/3 less than a typical element of the same size and efficiency. As a result, a sulfuric acid plant may use up to one third fewer filter elements at the same Delta P and fewer filter elements means lower life-cycle maintenance costs. New installations can benefit from lower initial capital cost due to smaller vessel size and footprint.

Annual cost increases for purchased electric power are becoming commonplace today. Where new plant construction or tower replacement is necessary or being considered, another design approach should be evaluated. To minimize the effects of escalating energy costs, consider a design where the towers are FULL sized with a FULL complement of eXtra Performance XP™ elements. This design approach will reduce the overall plant pressure drop and reduce the energy required to drive the main compressor. Depending upon the local cost per kilowatt hour of electricity and availability of energy conservation tax credits, payback may be as soon as 6 months.

In addition to new construction and revamps, replacing existing elements with XP™ also results in significant power savings. The resulting power savings allows for the incremental price difference of XP™ elements to be recaptured quickly.

ES – ENERGY SAVER

This product consists of a special wound fiber bed, computer-controlled quality, and a bi-component drainage or re-entrainment control layer of coarse fiber downstream of the finer collecting fiber. Liquid that would re-entrain from the fine fiber bed is drained in the re-entrainment control layer. The ES element has become the product of preference in absorption tower service.

HE – HIGH EFFICIENCY

The original Brink® design consists of fibers that are packed between two concentric cylindrical screens. The HE "Plus" adds a drainage and re-entrainment control layer similar to the ES design.



BRINK® FOR SULFURIC ACID AUTODRAIN™ FIBER BEDS



WITH BRINK® AUTODRAIN™ seal legs, seal cups and complex drain piping are not required for hanging fiber bed mist eliminators.



WITHOUT BRINK® AUTODRAIN™ seal legs, seal cups and complex drain piping are required, adding to the overall cost of operation.

AD – AUTODRAIN™

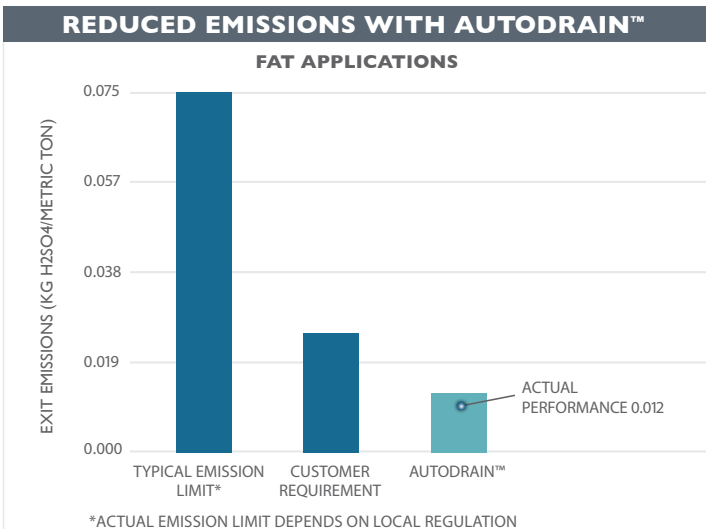
AutoDrain™ effectively drains acid and virtually eliminates re-entrainment from Brink® Mist Eliminators without the use of expensive and complex seal leg piping systems.

NEW INSTALLATIONS

With Brink® AutoDrain™, seal legs, seal cups and complex drain piping are not required for hanging fiber bed mist eliminators. Significant initial cost reduction and life cycle maintenance cost reductions will result AND the project schedule can be shortened. Additional value can be realized, eliminating the hanging mist eliminator seal system design: deletion of stainless steel piping, reduced field labor for installation, enhanced safety and no need for future seal system inspection or maintenance repairs.

EXISTING PLANTS

All of the “NEW INSTALLATION” benefits discussed above can be realized when adding AutoDrain™ to an existing installation. When adding the AutoDrain™ to existing elements, the option also exists to convert the elements to XP™. In most cases this will keep the length of the new element with AutoDrain™ the same as the length of the element without AutoDrain™. Converting the elements to XP™ also typically results in plant de-bottlenecking, lower pressure drop and/or increased plant rates. As with ES elements, XP™ elements with AutoDrain™ will allow for fast-track turnarounds as less field work will be required to install drain piping.



SEAL LEG SYSTEM VS AUTODRAIN™*		
COST COMPARISON — TIME AND MONEY		
	SEAL LEG SYSTEM	AUTODRAIN™
MATERIALS	\$100K	\$ 0
LABOR	\$100K	\$ 0
(PIPE, FITTINGS, DESIGN AND FIELD INSTALLATION)		
SCHEDULE	+2 DAYS	SAVES 2 DAYS
INSPECTION	@ MAJOR TURNAROUNDS	NOT REQUIRED
*FOR A 3000 TPD PLANT – 50 ELEMENT FAT		



BRINK® FOR SULFURIC ACID ACID PLANT DE-BOTTLENECKING

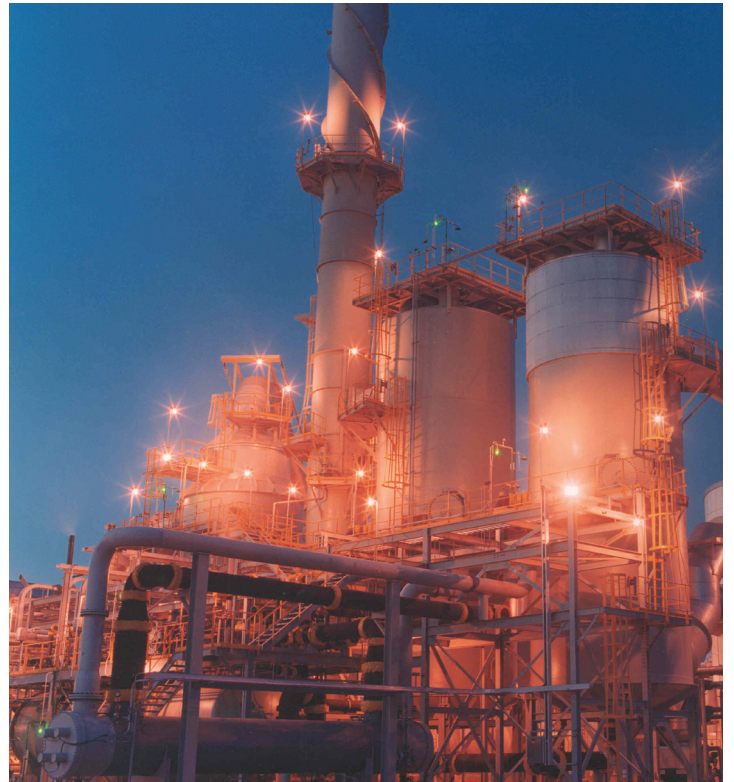
THE ULTIMATE DE-BOTTLENECKING TOOL

EXTRA PERFORMANCE XP™

The Brink® XP™ is the next-generation fiber bed mist eliminator technology for de-bottlenecking sulfuric acid plants from MECS. The XP™ is designed specifically to increase production potential without requiring plant modifications and is a desirable alternative to new construction.

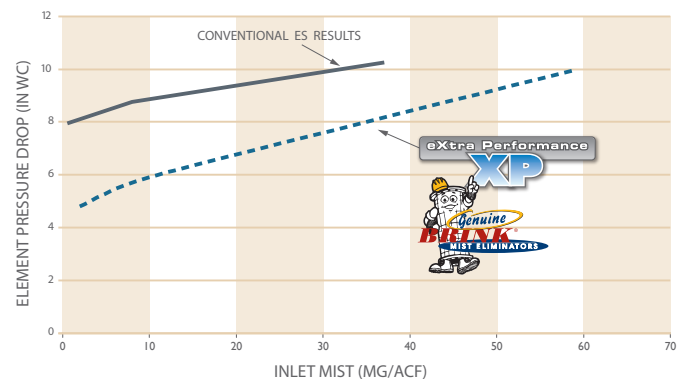
The Brink® XP™ is a unique and patented fiber bed design that is ideal for de-bottlenecking and enhancing plant production potential. It allows the lowest pressure drop while guaranteeing 99% acid mist removal at design inlet loading for most de-bottlenecking applications. As a result, you may enhance your profit potential from incremental rate improvement without the need for major equipment modification or new plant construction.

De-bottlenecking with Brink® XP™ is a cost-effective, revenue producing project for plants that are rate limited due to pressure drop within the tower(s) containing fiber bed mist eliminators. In today's production-oriented economy, plants are pushed to the limit of production. The Brink® XP™ offers the best method to reduce pressure drop in existing towers while allowing your plant to increase production rate.



BRINK® XP™ – MORE PRODUCTION POTENTIAL

ELEMENT PRESSURE DROP VS. MIST LOADING



CONCENTRIC ELEMENTS

Concentric elements increase the fiber bed surface area without requiring tubesheet modifications. Lower pressure drop or increased flow capacity is achievable, and they are available in all element types. The extra cost of a flared tower or added tower height can be avoided by using Brink® concentric fiber beds.



BRINK® FOR SULFURIC ACID REPACKS, REPAIRS, UPGRADES AND CONVERSIONS

REPACKING TO XP™ DESIGN – MECS® BRINK® AP™

MECS® offers a unique approach to repacking fouled fiber beds – the Brink® AP™. These new AP™ repacks consist of Brink® XP™ technology blended with existing ES or ES-style cages. Brink® AP™ repacks offer approximately 20% reduction in pressure drop and improved efficiency over repacking your existing fiber bed cages with their original design diffusion fiber collection media. While repacking with XP™ media does not offer the full advantage of new XP™ elements, the 20% Delta P and efficiency improvement offers a significant advantage over conventional repacks.

MECS® BRINK® AUTODRAIN™ CONVERSION REPACKS

Modification to element screen cages and the addition of proprietary embedded drainage devices will be installed to incorporate the Brink® AutoDrain™ design during an element repack. The converted elements will operate like new Brink® AutoDrain™ mist eliminators without the need for filling seal cups, materials and labor for seal cups and/or drain piping. The extra height available can allow for longer functional process length on the repacked fiber bed – equipped with AutoDrain™ elements, resulting in de-bottlenecking opportunities. Lower pressure drop and/or increased plant rates will be realized. Fast-track turnarounds can be achieved due to less field work required.

STANDARD REPACKS

MECS® can repack any brand fiber bed to meet or improve the original equipment manufacturer's specifications.

MECS® REPACKS PROVIDE AND/OR IMPROVE:

- Better efficiency
- Longer service life
- Optimized pressure drop
- Expedited service available



BEFORE REPAIR AND PREPACK - Mishandling of this fiber bed has caused serious damage to the cage and flange of this stripped element.



AFTER REPAIR, UPGRADE AND REPACK – MECS® can repack any brand fiber bed to meet or exceed OEM specifications.

REPAIR AND UPGRADES

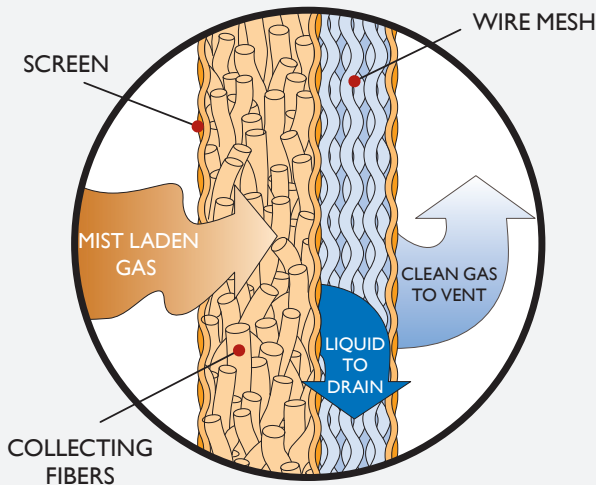
To achieve fast turnaround and expedited delivery, MECS® inventories flanges, screens, end plates, gaskets, fasteners, roving, mat and bulk fiber engineered for sulfuric acid service.

Brink® quality, craftsmanship and experience ensures high performance and a clean stack for your sulfuric acid plant.

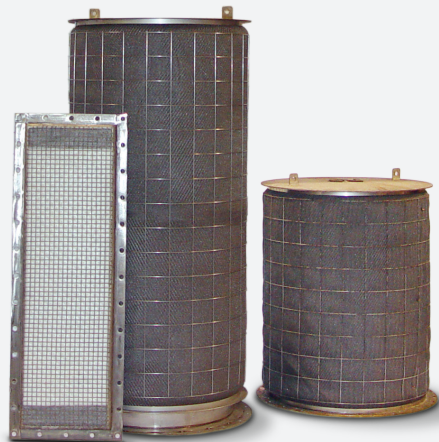
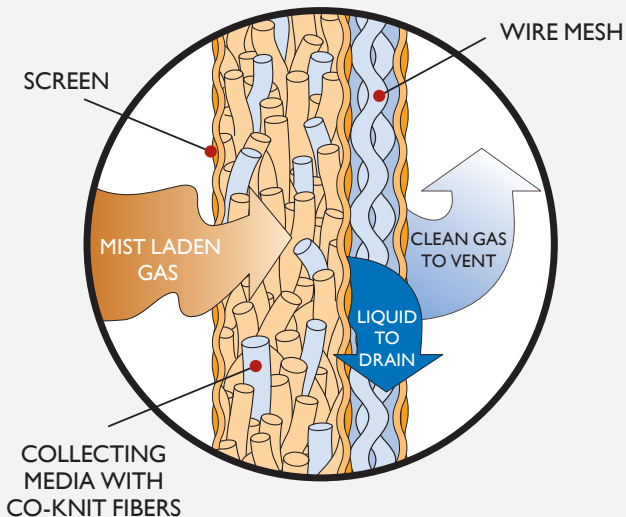


BRINK® FOR SULFURIC ACID IMPACTION FIBER BED PRODUCTS

CS MODELS



CK MODELS



CK – CO-KNIT

A new innovation to increase the operating time between washings of drying tower elements and extend the plant operating time between turnarounds. Co-knit uses Alloy 20 wire mesh with acid resistant glass fiber knitted into the mesh, creating a more open packing structure while providing the same efficiency as a CS element. A metal alloy mesh re-entrainment control layer is included on the downstream side (outside).



CS – COST SAVER

Packed with a glass fiber mat collecting layer and a metal alloy mesh re-entrainment control layer on the downstream side (outside). One advantage of CS products is their ease of maintenance and removal compared to conventional mesh pads.

CS-IP

Used in the drying towers of sulfur burning and spent acid plants where the outer metal mesh layer is typically Alloy 20. CS-IP elements in the drying tower usually need to be washed about once per year due to the build up of sulfates in the filter. While this maintenance results in plant downtime, removing the acid mist and solids with the CS helps protect downstream equipment such as a suction blower and the first-pass catalyst.

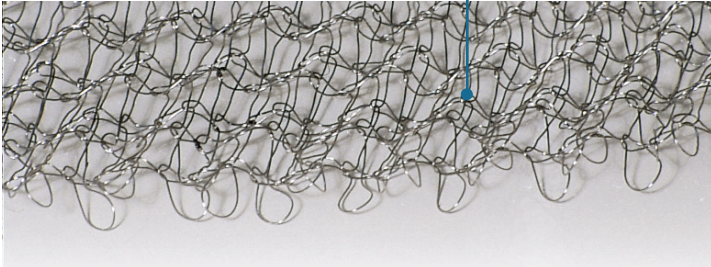
CS-IIP

Can be used in any absorbing tower. Like the CS-IP, the CS-IIP uses a glass mat to collect the particles and includes a metal mesh re-entrainment layer, which greatly reduces re-entrainment.



BRINK® FOR SULFURIC ACID IMPACTION MESH PAD PRODUCTS

CRIMPED WIRE



CO-KNIT WIRE/FIBERGLASS



BENEFITS:

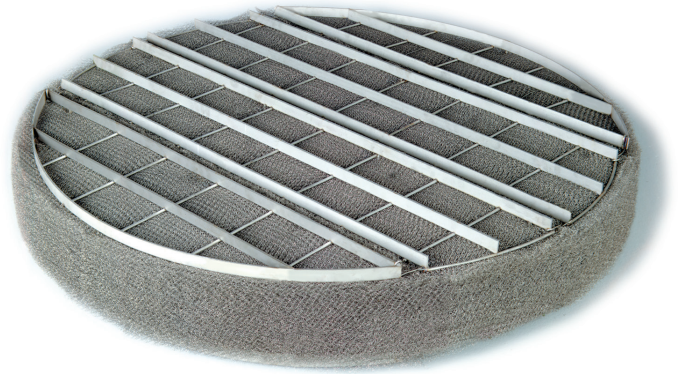
- ZeCor®-Z increases service life 3 to 5 times vs. Alloy 20
- Increases service life of duct work, blowers and catalyst
- Guards against unexpected temperature upsets or surges

FEATURES:

- Uses multi-layer mesh in ZeCor®-Z, Alloy 20, 316L SS and co-knit for all services
- Exclusively incorporates the best materials available
- Co-knit glass or Teflon® fibers provide increased efficiency and reduced pressure drop without sacrificing capacity

TOWERGARD™ – HIGH-PERFORMANCE MESH PADS

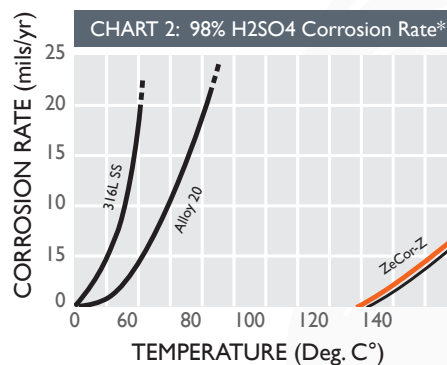
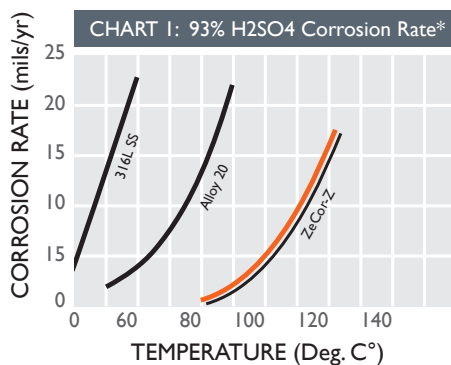
Captures, collects and returns acid mist to the tower with 99.9% collection efficiency on particles greater than 2.0 microns with 2 inch w.c. pressure drop. TowerGARD™ systems made with co-knit glass or Teflon® fibers are capable of 50% turndown due to increased targets for slower/smaller droplets.



ZECOR®-Z CORROSION RESISTANT MATERIALS

Sulfuric acid plant drying or absorbing tower mesh pads utilizing stainless steel or Alloy 20 materials require replacement every one to three years as a result of corrosion. Resultant sulfate buildup reduces collection efficiency and increases pressure drop. Plant upsets can overheat Teflon® mesh pads and cause them to melt. TowerGARD™ mesh pads are available exclusively with the best corrosion-resistant materials currently available: ZeCor®-Z can be used for 92 – 98% sulfuric acid.

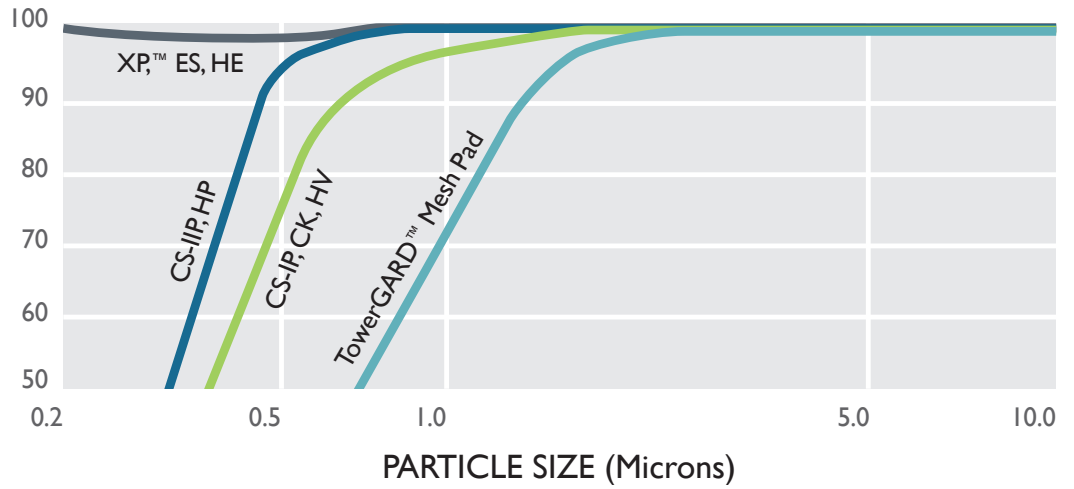
Compared to Alloy 20 and 316L stainless steel, corrosion rates are dramatically reduced for ZeCor®-Z within normal operating temperatures for drying towers (50° – 80°C) and 92 – 98% sulfuric acid (see charts 1 and 2). ZeCor®-Z has much greater corrosion resistance and will withstand temporary plant excursions better than either Alloy 20 or 316L stainless steel.



BRINK® FOR SULFURIC ACID MIST PARTICLE SIZE IN SULFURIC ACID TOWERS

BRINK® AND TOWERGARD™

COLLECTION EFFICIENCY VS. PARTICLE SIZE

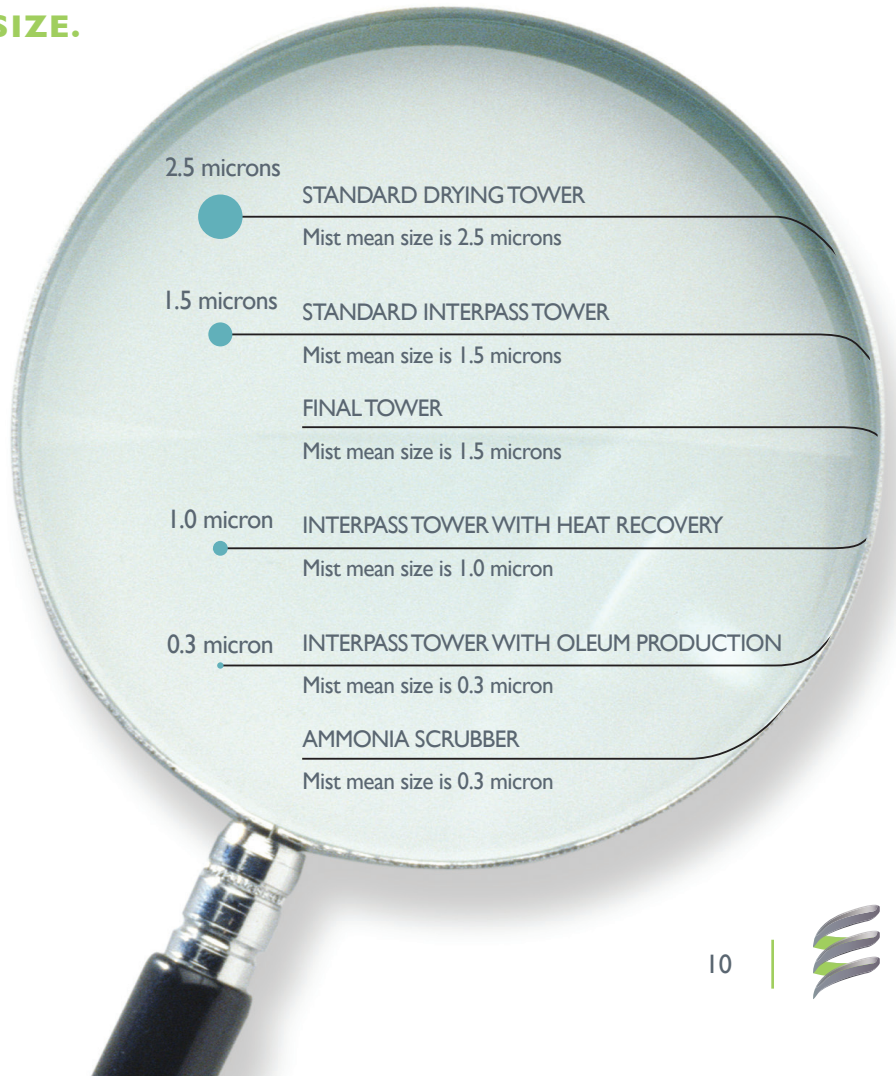


IF A HUMAN HAIR WAS THIS SIZE ...

A human hair has a diameter of approximately 100 microns.

1 micron =
0.000039 inch
(0.001 mm)

... THEN ACID MIST WOULD BE THIS SIZE.



BRINK® FOR SULFURIC ACID INNOVATIVE ENGINEERING

BRINK MIST ELIMINATORS

Brink® fiber beds are designed to remove virtually any type of mist from any gas stream, and they excel at collecting the most difficult to capture aerosol mists – submicron sized. MECS® welcomes the opportunity to investigate and recommend solutions to any mist related air pollution or in-process gas handling problem that you may have in your sulfuric acid plant.



		DIFFUSION	IMPACTION
MIST ELIMINATOR SELECTION GUIDE			
DRYING TOWER	SULFUR BURNING		X
	SPENT ACID	X	X
	METALLURGICAL		X
INTERPASS TOWER	NO OLEUM	X	X
	WITH OLEUM	X	
HRS (Heat Recovery Tower)		X	
FINAL TOWER	STRINGENT REGULATIONS	X	
	OPERATING RATE VARIES	X	
	STANDARD DESIGN	X	X
CAUSTIC/AMMONIA SCRUBBER		X	
OLEUM STORAGE AND LOADING		X	



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