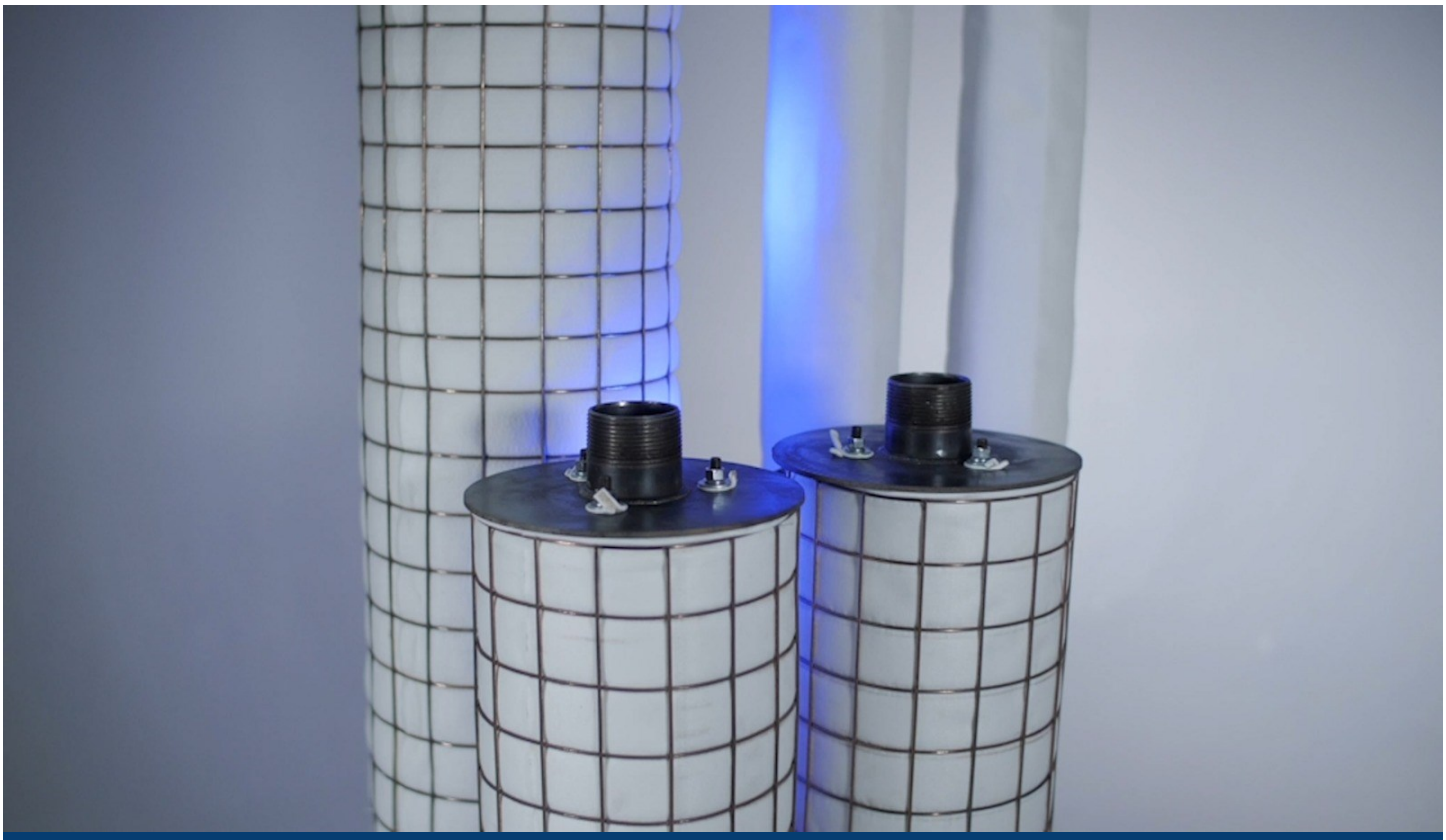
KIMRE™

CLEAN AIR TECHNOLOGY



Fiber Bed Filters Brochure

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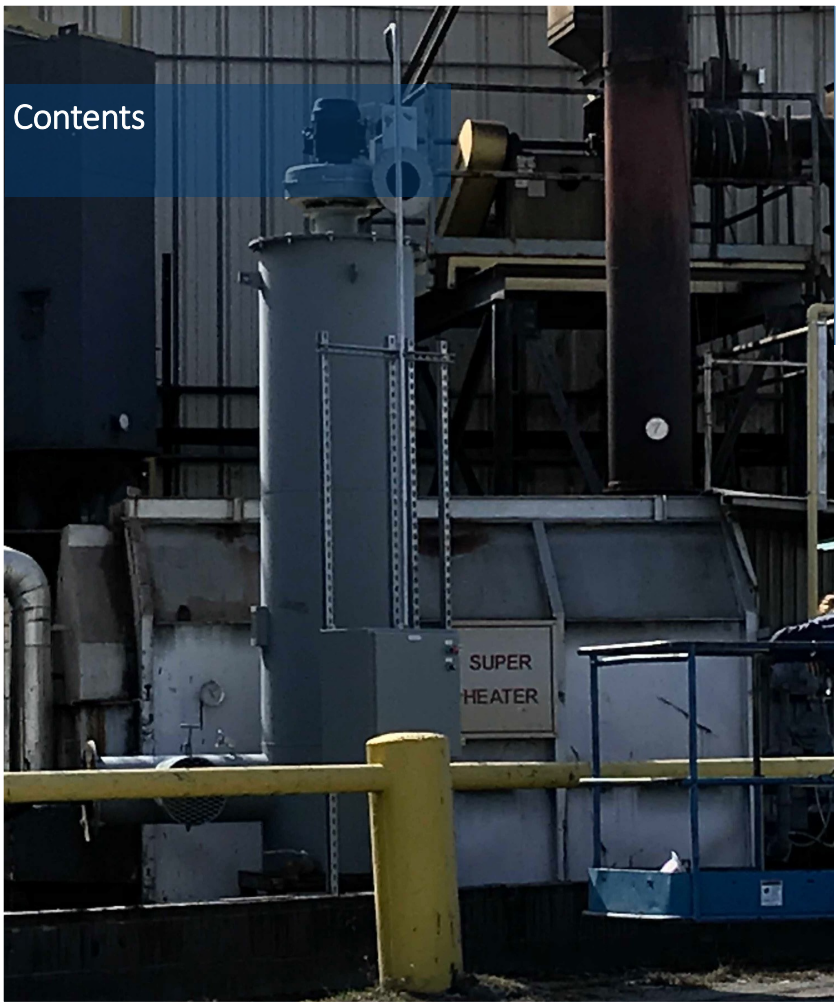

Organic asphalt mist eliminator in a tank vent

Contents:

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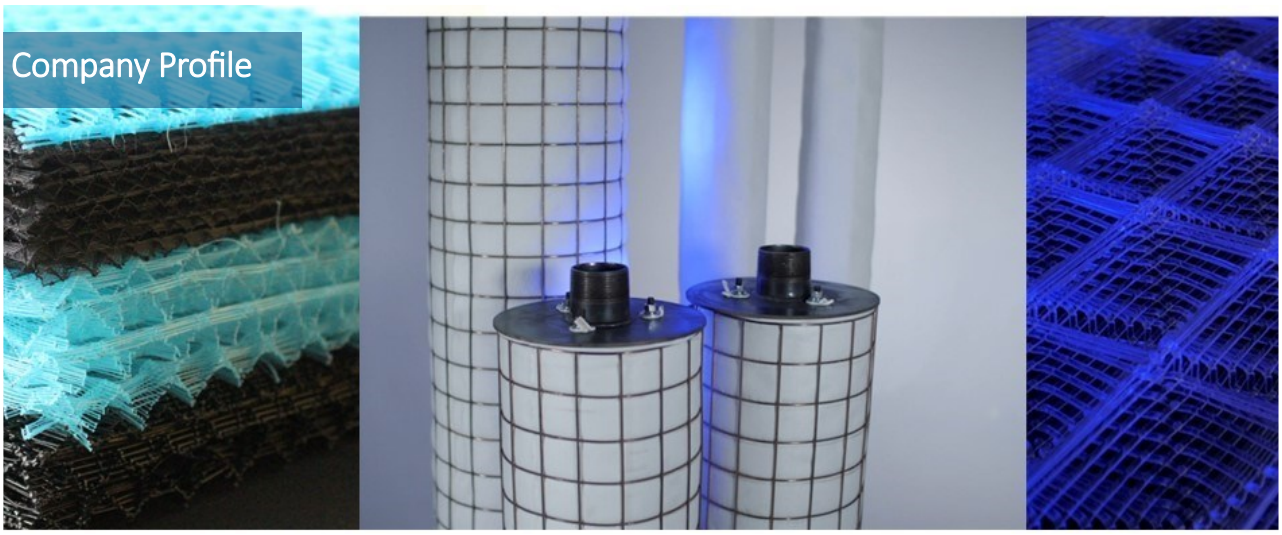

Company Profile

Kimre's **commitment to the customer** is what sets us apart and allows for our success. For more than 48 years, Kimre engineers and application specialists have been solving process gas stream and emission problems in plants around the world. Our combined experience results in a **superior understanding** of gas and vapor stream separation and mass and heat transfer. From the first inquiry to the final installation, our specialist will meet our commitment to deliver a quality engineered product that will **exceed your expectations**.

Process engineers, environmental engineers and production managers in operations as diverse as fertilizer, sulfuric acid, waste-to-energy and power plants around the world recognize Kimre as a valuable resource.

Visit **www.kimre.com** for more information.

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E-LIMINATOR™ Fiber Bed Candle Filters

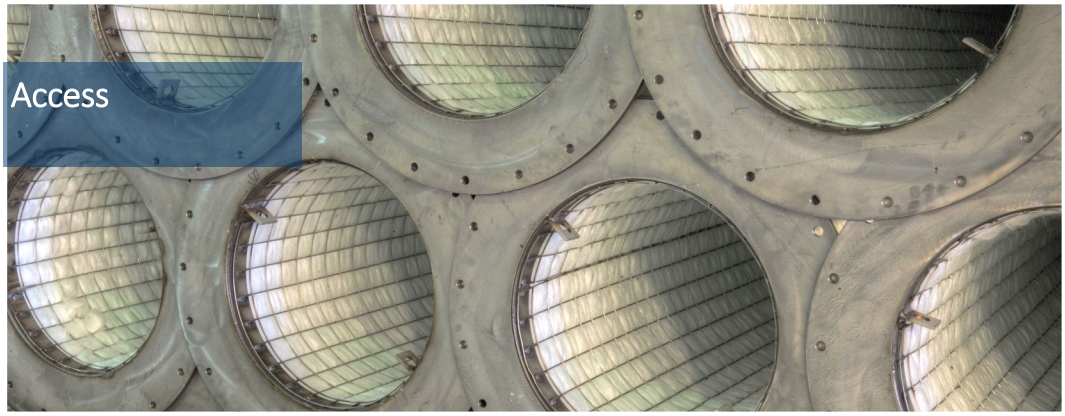
Kimre™ offers a complete line of new and repacked E-LIMINATOR™ Fiber Bed Candle Filters mist collector systems that can meet the most challenging mist elimination needs. Our Fiber Bed Candle Filters are designed to provide the final user with many years of optimal performance and minimal operation or maintenance requirements. We can provide complete Fiber Bed Candle Filters Systems for flow rates from 10 CFM to 250,000 CFM (15 Cubic Meters/Hr to 425,000 Cubic Meters/Hr).

E-LIMINATOR™ Fiber Bed Candle Filters can be designed for new systems to meet the customer's specific efficiency, pressure drop and footprint requirements. The filters can provide removal efficiency greater than 99.9% of sub-micron particles. These systems can use standardized configurations or can be custom designed for your specific installation.

Fiber Bed Filters are highly efficient mist eliminators. They are used to trap, collect and remove liquid mists and soluble particulate matter suspended in a gas stream. They are typically cylindrical elements where the "bed" is composed of fine fibers of media composed of various grades and densities packed between two cylindrical screens. As the particles try to pass through the Fiber Bed Filters, they are trapped and held by the fibers. While larger mist particles are collected by inertial methods of impaction onto or intercepted by a fiber, the high efficiency of the Fiber Bed Filters results from the Brownian motion of the smaller liquid mist aerosol particles and the impact of gas molecules on the smallest, sub-micron particles.

The E-LIMINATOR Fiber Bed Filter is not a one size fits all. Kimre engineers will select the proper filter candle size, material and filtration media that best suits the application. Virtually all existing Fiber Bed Filters from any manufacturer can be replaced with Kimre E-LIMINATOR™ Fiber Bed Filters to provide improved performance and/or filter life. Kimre's sales and technical staff have extensive experience with existing installations allowing them to provide the exact solution you need.

Kimre E-LIMINATOR™ Fiber Bed Filters are manufactured in our facility in Homestead, Florida. Our technical team consist of over 20 people who have extensive experience in manufacturing Fiber Bed Filers. We have our engineers on site to oversee all of the production aspects.



Easy access and maintenance:

Fiber Bed Filters can be configured to sit on top of the tube sheet, so that the filter can be accessed from the clean air side of the housing

Smaller single filter systems can be provided with a vessel or skid mounted fan and be quickly installed and commissioned.

For intermediate ranges of flows, skid mounted systems can be provided or separate vessels, fans, prefilters and exhaust stacks can be supplied as site conditions warrant.

Larger systems require field erection work which will be witnessed by Kimre project engineering to provide advice for a successful installation.

Single Fiber Bed Filter Vessel

Collection Principles

Candles can reach up to 20’ in length and rang from 4” OD to 32” OD

These are typical fiber bed filter applications:

Organic type applications include oil mists, plasticizer mists and food processing fumes.

Chemical processing applications include acid mists, fumes from soldering and electronics manufacturing processes, platinum and precious metals recovery and processing, hazardous/toxic chemicals incineration emissions and fumes from polymerization processes in plastics manufacturing.

Organic: Asphalt roofing products - Compressed Air & Gasses - Food Processing (Vegetable Oil & Lard Frying) Metal Matching - Oil Mist Plasticizer - Rotating Equipment - Lube Oil Reservoir Urethane

Chemical Processing: Sulfuric Acid - Chlorine and Hydrogen (Chlor-Alkali) - Pulp and Paper - Semi Conductor Acid Storage and Vent Tanks - Platinum Recovery - Polymerization - Styrene & Urethane

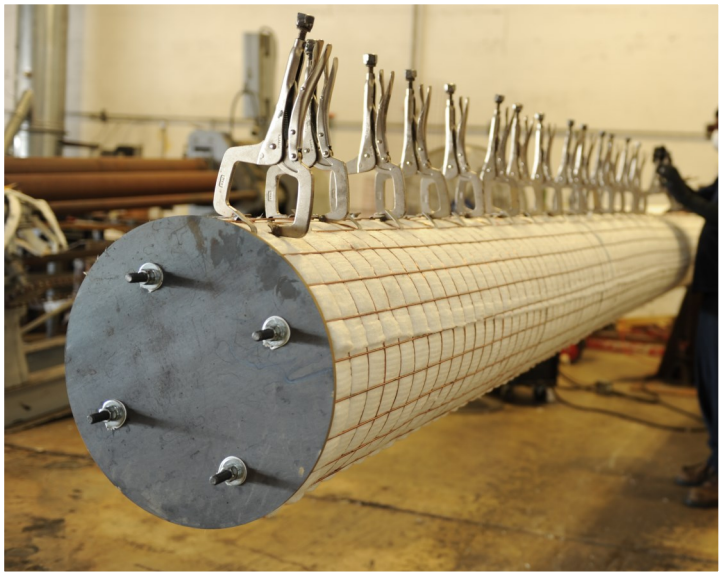
Kimre™ E-LIMINATOR™ Fiber Bed Candle Filters work under (3) three basic particle collection principles:

Impaction: Large size particles (> 3 microns) flowing in the same direction of the fluid that contains them. The fluid will travel around any obstacle in its path; however the large size particles inertia will make them continue to follow the fluid’s original path which will impact them to the filters fibers where they are collected.

Interception: Medium size particles (>1 micron particle size<3 microns) have much lower inertia which will let them travel around the filter fibers but will get caught when they graze them.

Brownian Diffusion: Very small particles (< 1 micron) travel randomly within the fluids travelling path as they are constantly being displaced by larger particles. The smaller their size, the greater will be their direction oscillation. Although these small particles can easily escape the filter fibers their erratic motion often times is perpendicular to the flow direction bring them in contact with the filter fiber surface where they are trapped and collected. The collected particles coalesce into larger droplets and drain from the filter assembly to a collecting tube-sheet or bottom drain plate. Brownian diffusion turndown is unlimited; efficiencies up to 99.9% particle collection can be achieved within an average pressure drop of 2” to 20” of water column.

Our Fiber Bed Filter Products



The design of the E-LIMINATOR™ Fiber Bed Candle Filter System starts with selection of the Fiber Bed Filters elements. The filter units rest on or are suspended from a tube sheet inside a closed tank. Gas flow can be from inside the filter face to the outside (forward flow) or outside the filter face to the inside (reverse flow). Concentric filters combine reverse flow and forward flow into parallel beds combined into a single filter, optimizing efficiency and pressure drop.

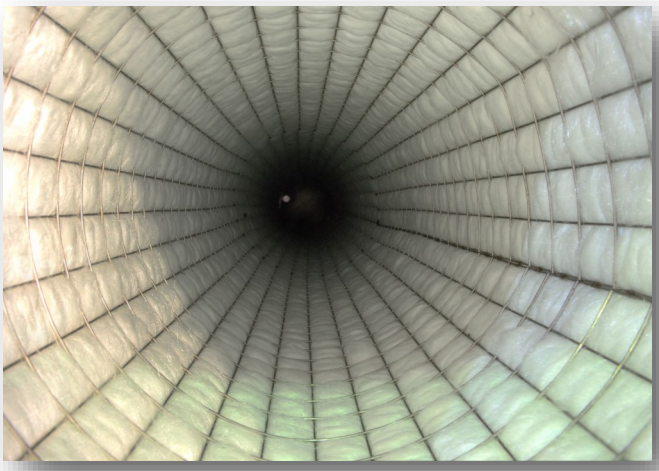
Integral prefilters can be provided to improve performance and life of the Fiber Bed Filters in the system. For additional protection, Kimre™ B-GON® Mist Eliminators, panel filters or pocket filters can be used at the inlet to the system. Various replacement options are available to facilitate replacement of the prefilters.

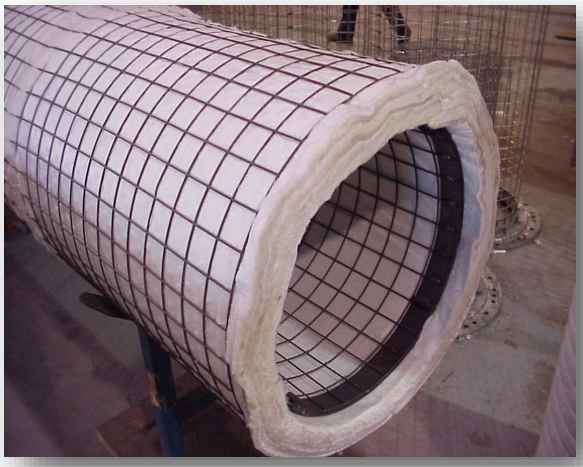
High Quality Materials of construction:

Structural Inner Cage, Outer Cage and End Plate Materials: Carbon Steel, Alloys, FRP, Plastic

Filter Media : Fiberglass, Polyester, Polypropylene

All materials are verified and inspected for quality





Our Fiber Bed Filter Products

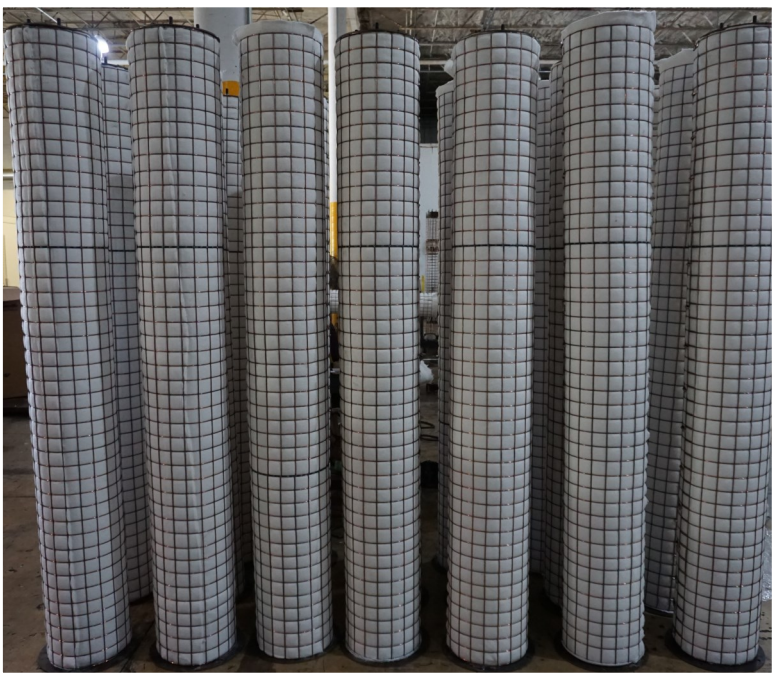
Effective Pre-Filtration is the key to prolonging Main Brownian Diffusion Fiber Bed Filters, Most Fiber Bed manufacturers offer a Pre-Filtration that is not effective in capturing of solids. Further, the pre-filters quickly deteriorate and fall apart once they become saturated which leads to premature Main Fiber Bed Filter failure. Kimre™ offers a Washable B-GON® Pre-filter media that is proven to be effective in capturing and collecting soluble and insoluble particulate before entering into the main fiber bed filter elements and greatly extending main fiber bed filter life. The thermoplastic media consisting of various densities that yields low pressure drop of < 2" w.c. In addition Kimre offers integral prefilters with the Main Fiber Bed filters to extend filter life.

Fiber bed filter constructed with fiber glass reinforced plastic (FRP)inner and outer cages and end plates. This design is often used for controlling fumes from toxic chemicals waste incineration applications, or other corrosive environments.

Kimre manufactures standing impaction filters for any pressure vessel. Material can be constructed of Alloy 20 and Alloy 20 co-knit.

All fiber bed filters are designed to meet the specific process requirement of the clients. The filters will be designed with the proper cage assembly and the media configuration will determine the collection efficiency and the performance as well as the pressure drop. Below is a Kimre Fiber Bed Filter designed by Kimre Engineers Our filters are manufactured and tested at Kimre Homestead (Miami) Florida location.

Sulfuric Acid



Standing 88" long candle filters

Sulfuric Acid:

Absorption Towers

Kimre™ provides both high efficiency Brownian Diffusion Fiber Bed Filters and high velocity impaction Fiber Bed Filters for Sulfuric Acid Absorption Towers. Using composite bed designs, Kimre filters are designed to meet your specific efficiency and pressure drop requirements. Kimre E-LIMINATOR™ Fiber Bed Filters provide excellent performance and long life in Absorption Tower applications for Sulfur Burning, Regeneration and Metallurgical Sulfuric Acid plants.

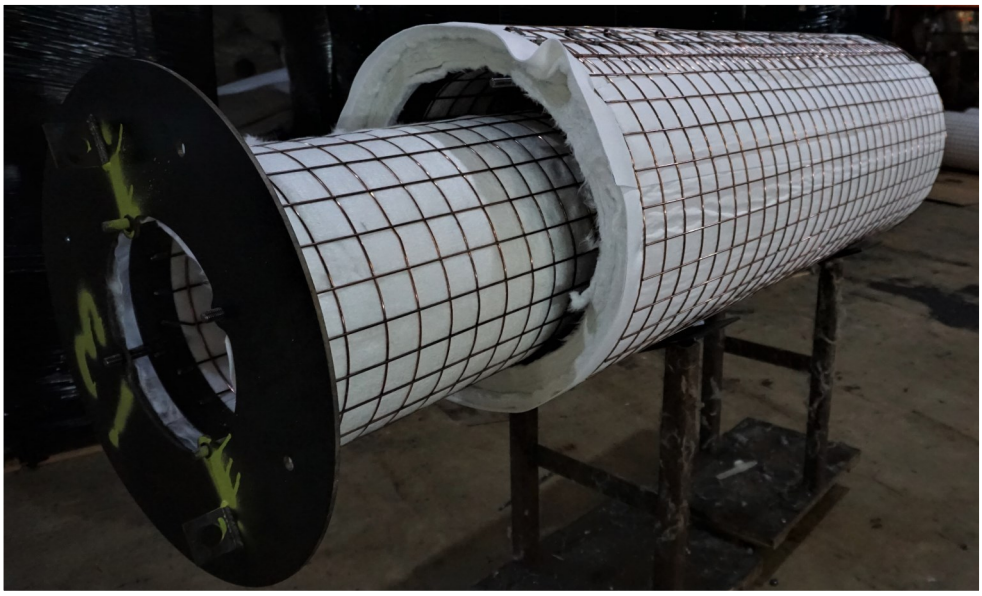
Drying Towers

Kimre™ offers a more comprehensive range of mist eliminators for drying towers than any other company in the world. From our B-GON® Mist Eliminators providing higher efficiency, longer life and lower pressure drop than competing products to high velocity candle filters using co-knit metal mesh, Kimre can meet any drying tower requirements.

Gas Cleaning

Kimre™ can provide highly effective gas cleaning equipment using our B-GON® Mist Eliminators and KON-TANE® Tower Packing. The benefits of Kimre's unique interlocking design are ideal for removing contaminants such as Mercury from Metallurgical and Regen plants.

Asphalt



Typical concentric element maximizing surface area

Asphalt:

Coaters/Saturators

The manufacture of asphalt roofing products requires the application of hot asphalt to the underlying substrate. This results in the lighter fractions of the asphalt being vaporized which then condenses to form a blue haze in the exhaust from the ventilation system. Fiber Bed Filters have been accepted as meeting the Generally Available Control Technology (GACT) requirements of 40 CFR 63.11559 of sub-part AAAAAAA (NESHAP for Area Sources: Asphalt Processing and Asphalt Roofing Manufacturing).

In some areas, more stringent emission controls are required, such as thermal oxidation or carbon ad-sorption of the VOC emissions from the roofing manufacture. For these systems, Kimre™ B-GON® Mist Eliminators and Kimre E-LIMINATOR™ Fiber Bed Candle Filters have proven to be ideal pre-filters to reduce the loading and fouling of the VOC control device by removing the condensable materials.

Storage Tanks

Kimre™ offers complete solutions incorporating both B-GON® Mist Eliminators and E-LIMINATOR™ Fiber Bed Candle Filters into systems to handle emissions from asphalt storage tank vents. We can ac-commodate a variety of flow rates from 50 CFM up to 1500 CFM in small, self-contained packages. These systems include prefiltration with B-GON® Mist Eliminators to provide long life and minimize maintenance. Optional air blower and instrumentation can be provided to complete the system and meet the customer requirements.

CASE STUDY #65

Fiber Bed Filters in Asphalt Fume Emission Control

A roofing shingle manufacturer in Ohio needed to improve ventilation in their manufacturing operations and replace an older system that was at the end of its useful life. They installed two (2) systems, one for 5300 cubic meters per hour and one for 14,700 cubic meters per hour. Kimre was able to provide the two systems, including prefiltration and fans, and successfully treat the emissions from the shingle manufacturing plant.

Asphalt roofing manufacture generates an aerosol of “light ends” (lower boiling hydrocarbon compounds) as the hot asphalt is spread on the shingle substrate. Various solids are often mixed in with the hydrocarbon aerosol.

Fiberbed filters remove solid and liquid particulate from air (or gas) streams through inertial and Brownian diffusion collection mechanisms. The filters are constructed by placing fine fibers of fiberglass, polyethylene terephthalate, poly-propylene or other materials between two concentric screens. The contaminated air flows either from the center of the filter to the outside (forward flow) or from the outside to the inside (reverse flow).

The efficiency for fiberbed filter elements is 99.99% for particles larger than 3 microns and 99.8% for particles smaller than 3 microns. This unique efficiency is due to the inertial collection for particles larger than 1 micron and Brownian diffusion collection of sub-micron particles.

Only particles are collected by the fiberbed filters. Any vapors that enter the filter will pass through and be exhausted with the air. That is why the efficiency is given for particle collection. In addition, the Brownian diffusion collection is achieved through the design of a specific bed depth. This “deep bed” filtration makes it important to limit the amount of insoluble solids that enter the filter. Insoluble solids will collect permanently in the filter, while liquid particulate, such as condensed asphalt light ends will coalesce and drain from the filter.

Both systems used Kimre Mist Collector Filters for collecting the aerosols in the incoming air. Inlet temperature was approximately 50°C. Pressure drop across the units started at 125 mm WC when clean. Each system had a prefilter section combining Kimre B-GON® media with Galvanized Steel Mesh panel filters to minimize solids loading on the main Mist Collector Filters. The prefilter section is able to extend the life of the main filters from 6 months up to 18 months.

Kimre Mist Collector Filters are easily replaced using V-Band clamps to hold the filters in place on mounting flanges in the vessel. Filters can normally be handled by two maintenance technicians. The clean filters weigh approximately 27 Kg; dirty filters weigh less than 40 Kg.

The two Kimre systems have been operating successfully at the roofing manufacture plant for several years.

CASE STUDY #66

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Controlling Asphalt Plumes from Coating of Pipes

In some applications, pipe that is coated with asphalt is used for corrosion protection. The process of applying the asphalt to the pipe requires hot, freely flowing asphalt to cover the pipe completely. This operation leads to emissions of asphalt fumes that contain hydrocarbon compounds that will condense at ambient temperature and form a "blue haze" plume. Kimre can provide mist elimination equipment to removed the condensed liquids and eliminate the plume. In addition, the compounds in asphalt have a very low odor threshold. The removal of the mist from the coating line exhaust steam will reduce, but not eliminate the asphalt odors from the operation.

Kimre has provided both B-GON® and fiber bed filter mist eliminators for removal of asphalt pipe coating emissions. An asphalt pipe coating line was using a multi-stage filtration system to control the asphalt emissions. The multi-stage filtration system was providing poor performance and required maintenance twice per month. Kimre evaluated the media used in various stages and performed design analysis of how to improve the performance of the system. Kimre recommended to the customer that they replace 3 stages of the 5 stage system with B-GON® Mist Eliminators designed specifically for micron size mist control and long operating life. The customer implemented a stage-wise replacement of a single stage of the original system with the B-GON® Mist Eliminator replacements. After replacing the first stage, the customer was able to see an improvement in operation. When all three stages were replaced, the customer experienced a 600% improvement in operation between maintenance.

Other Kimre systems use a two stage system consisting of a pre-filtration stage followed by fiber bed filters. The provides the highest efficiency removal of condensed sub-micron asphalt droplets available, over 99% of sub-micron particles are removed, along with virtually 100% of particles larger than 1 micron. Kimre offers a variety of fiber bed filter designs to accommodate customer needs, whether for low pressure drop, ease of maintenance or extended operating life. Kimre can provide fiber bed filter elements that weigh approximately 35 kg for handling by two maintenance operators. If operating life is more important, Kimre can build filters that will operate 2 years or longer between change-outs.

With the flexibility in design provided by Kimre's fiber bed filters and B-GON® Mist Eliminators, Kimre can provide an asphalt emission control system exactly tailored to your requirements.

Asphalt Plants

Equipment Type:	Asphalt Plant
Features:	Fiber bed mist eliminators with Kimre B-Gon®
Capacity:	30,000 ACFM
End User Location:	US

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Oil Mist Plasticizer

Fiber bed Candle re-pack

Oil Mist Plasticizer:

Machining/Metalworking

In metalworking operations coolants and lubricants are used to cool the tools and dies used to form metal parts. Often these emissions cause “blue haze” or hydrocarbon smog to form inside the manufacturing plant as well as a build up of oil film on equipment, walls and floors. Kimre™ B-GON® Mist Eliminators and E-LIMINATOR™ Fiber Bed Filters are an ideal way to ensure indoor air quality and to minimize hazardous conditions for workers. The Kimre equipment can be supplied for point source control as well as combined “house” ventilation systems.

Food Frying

When foods are fried, the oils that are used will evolve droplets into the air. Kimre B-GON® Mist Elimiantors and Fiber Bed Filters provide an effective control solution to eliminate stack opacity and oil drop out on rooftops and surrounding areas.

Plasticizers

Many additives are used in making plastic products to impart specific properties to the polymer being used. The plasticizer additives often have properties that make them difficult to control. They vaporize during plastic processing, but will condense out as the air cools in the ventilation system. Depending on the materials and temperatures, the condensed droplets will often be in the sub-micron range, making them perfect for control with Kimre Fiber Bed Filters.

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CLEAN AIR TECHNOLOGY

This Brochure is for informational purposes only. The graphs and information found in this brochure are believed to be accurate and reliable, but is/are not to be construed as implying any guarantee of performance or warranty. Contact Kimre for specific performances based upon your operating conditions.

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