FIBER-WIND Mist Eliminators
Fiber Wind Mist Eliminator

Air Water Soil Corporation offers a full range of air pollution control technologies, waste and primary water treatments and industrial fluids purification systems.

The “fluids purification system division” is specialized in the design of mist eliminators, liquid-liquid separators, coalescers, solid-liquid separators, static mixers.

FIBER-WIND type mist eliminators of AWS are specifically made to remove mainly submicron liquid or soluble solid particles from an air or gas stream. They are similar to mesh pad mist eliminators except that the filaments are extremely fine fibers, randomly but very closely spaced.

FIBER-WIND mist eliminators of AWS are constructed in a cylindrical form (candle filters) between two concentric open mesh bed formers into which special fibers of various materials are either densely packed or wound or wrapped.

The FIBER-WIND mist eliminators are installed vertically on a tube sheet either in hanging or standing configuration. Because of the vertical disposition, liquid accumulating on the fibers is moved horizontally through the fiber bed by the drag of the gases and drains by gravity down the downstream side to the bottom of the fiber bed where it is collected and either returned to the process or removed as a waste.

Definitions: Mist and Spray

Aerosol applies to suspended particulate, either solid or liquid, which is slow to settle by gravity and to particles from the submicrometer range up to 10 to 20 μm.

Mists are fine suspended liquid dispersions usually resulting from condensation and ranging upward in particle size from around 0,1 μm.

Spray refers to entrained liquid droplets. The droplets may be entrained from atomizing process (i.e. absorption towers). Size will range from the finest 10 μm up to a particle whose terminal settling velocity is equal to the entraining gas velocity (if some settling volume is provided).

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Particles between 1 and 3 micron are collected by direct interception. They are light enough to follow the deflected gas streamline but, when they pass close enough to a fiber, they are also light enough to be attracted to it by weak interactive forces and are once again collected. A particle of diameter 1.0 micron, for instance, is collected if it passes at a distance less than 0.5 micron from a fiber.

Collection mechanism of FIBER-WIND

The initial object of any device for separating entrained mist from a process gas stream is to make the individual particles coalesce into a continuous liquid film on a solid surface from which it can drain away.

There are several mechanisms by which, alone or in combination, according to the nature of mist involved, this can take place. They include inertial impaction, direct interception, Brownian movement and electrostatic attraction.

Particles larger than 3 micron are relatively massive, and advantage can be taken of their momentum to collect them by inertial impaction. When the gas stream encounters an obstruction such as a fiber, its path or "streamline" is deflected round the obstruction, but the momentum of the 3+ micron particles carries them onwards so that they collide with the fiber and are collected.

Extremely fine liquid or solid particles (less than 1.0 micron in diameter) are small enough to exhibit random Brownian movement caused by collision with gas molecules. This random movement causes the particles to be displaced in any direction while following the gas flow thus increasing the probability to collide and be captured by the fiber. Brownian movement increases as the particle size decreases: thus a 0.1 micron particle will have about five times the Brownian movement of a 1.0 micron particle, greatly increasing the probability of collision with a fiber monofilament and of being captured.
Guaranteed collection efficiency of FIBER-WIND mist eliminators

**FIBER-WIND type BM (Brownian Movement)**

This type of mist eliminator works at fiber bed velocities of about 0.10-0.15 m/sec depending on specific processes. The collection efficiency will be essentially 100% for all particles 3 micron and larger and 99.5% or more, for all particles smaller than 3 micron. FIBER-WIND type BM have no turndown problems: thus the lower the fiberbed velocity, the higher the collection efficiency, especially for submicron particles.

**Pressure drop of FIBER-WIND type BM**

The pressure drop of this mist eliminator type is directly proportional to the fiber bed velocity. Typically it is in the range of 50-300 mm of water column when elements are saturated with collected liquid but free of undissolved solids.

**FIBER-WIND type IM (Impaction Movement)**

This type of mist eliminator works at fiber bed velocities of about 1.0-1.5 m/sec depending on specific processes. The collection efficiency will be essentially 100% for all particles 3 micron and larger and 90-97% for all particles 1.0 micron and larger.

**Pressure drop of FIBER-WIND type IM**

The pressure drop of this mist eliminator type is in the range of 100-250 mm of water column when elements are saturated with collected liquid but free of undissolved solids.
Material of construction of FIBER-WIND mist eliminators

The elements cage is usually made of:

- Carbon steel
- Stainless steel
- Special alloy steel
- PVDF (polyvinylidenfluoride)
- Polypropylene
- FRP (fiber reinforced plastic)

Typical FIBER-WIND applications

- Sulphuric acid plants
- Fertilizer plants
- Chlorine plants
- Ammonium nitrate plants
- Nitric acid plants
- Detergents plants
- Plastic manufacturing
- Phosphoric acid plants
- Compressed air and gas
- Lubricating oil vent systems
- Ammonia scrubbers
- Asphalt units
- PVC wall coverings
- Artificial leather production
- Pulp and paper ammonia based sulfite recovery

Mist separation principle
Main office

AWS Corp. srl
Vicolo Scuri, 123
24059 Urgnano (BG) - ITALY
Phone +39 035 4819906 / +39 035 6014844
Fax +39 035 19967687

info@awscorp.it - www.awscorp.it