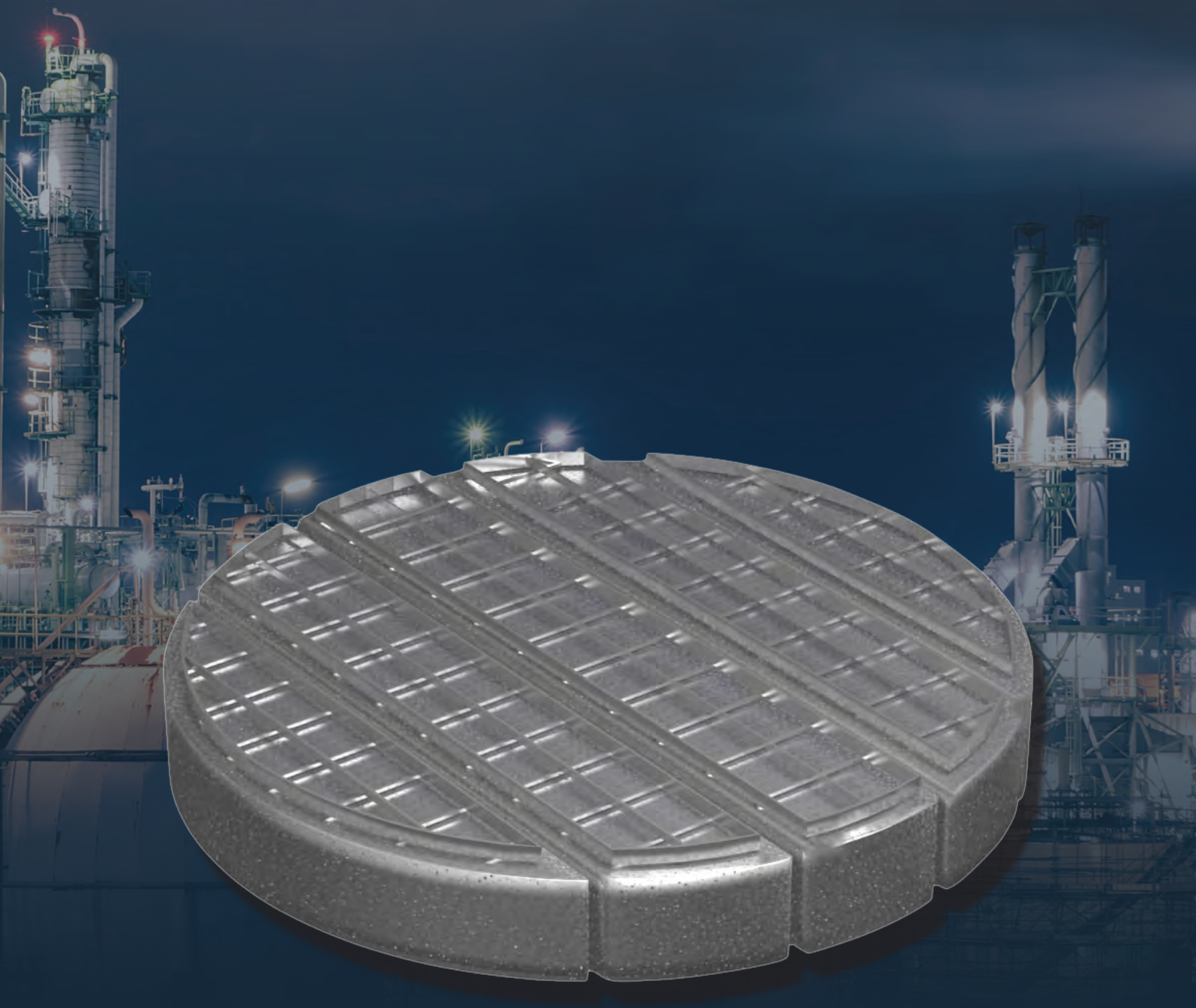
Specialists in the Separation of Liquid Entrainment



KnitMesh® Technologies

Protecting People, Property and our Planet

Mist Eliminators

Since its formation in 1957, KnitMesh Technologies has established a global reputation for the design, manufacture, and supply of equipment that eliminates contaminants and controls pollution by separating entrained liquids from process gas streams.

A specialist technical team uses the experience gained from hundreds of successful installations in a broad spectrum of applications to ensure that the best possible product is recommended for each duty.

ISO 9001 accreditation ensures every job is subjected to a strict quality regime that covers everything from technical design through contract review and production to final inspection.

Typical process applications for mist eliminators

In many process operations, gases and liquids contact each other to form a mist, and if the gas is travelling too fast to allow the liquid droplets to settle out under gravity, they become suspended (or entrained) in the gas or vapour. In most cases, the entrainment must be removed to purify the gas and prevent potential process or environmental contamination.

Installation of KnitMesh Technologies mist eliminators is an effective solution to liquid entrainment problems in many process applications throughout industry.

Oil and gas production

- Three phase separators
- Inlet scrubbers
- Compressor systems
- Cold separators
- Glycol dehydration
- Amine absorption columns
- Seawater desalination plant

Power generation

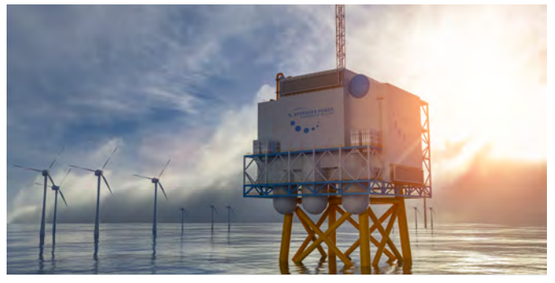
- Steam drums
- Seawater desalination plant
- Flue gas desulphurisation
- Compressor systems

Chemical industry

- Distillation
- Gas absorption and stripping
- Condensation
- Gas compression
- Dehumidification and drying
- Spray removal and desalination
- Seawater desalination plant

Petrochemicals and petroleum refineries

- Olefin and methanol production
- Oxo alcohols and derivatives
- Condensation from and compression of liquefied petroleum gas
- Crude oil distillation
- Catalytic cracking



Green Hydrogen

- Removing water droplets and mist following water electrolysis
- Protecting fuel cells from moisture
- Preventing damage and clogging in pipeline systems, valves, compressors, and other downstream components

Inorganic chemicals industry

- SO_3 absorption and air drying (sulphuric acid manufacture)
- NO_2 absorption and nitric acid concentration (nitric acid manufacture)
- HCl and chlorine absorption (acid manufacture)
- Removing acid gases in air discharges
- Removing urea from gas discharges (prilling towers)
- Fertiliser production
- Gas scrubbing systems (gas treatment to remove sulphur compounds NOx, CO, CO_2)

Separation Mechanisms

Several different types of mist eliminators are designed for the separation of liquid entrainment. To choose the appropriate equipment, the four basic mechanisms used to capture droplets on a wire or filament must be considered.

- Diffusional deposition is only effective in the separation of very finely dispersed aerosols with droplets typically smaller than 1µm, i.e., small enough to be affected by Brownian Motion.
- Direct interception assumes the droplet of a given diameter and negligible mass follows the stream line around the 'target' wire or fibre and is separated as it touches the target or collection fibre.
- Inertial interception considers the droplet mass and predicts how momentum will make it deviate from the gas stream.
- Gravitational deposition works on the principle that large, slow-moving droplets may separate from a gas stream under gravity. This is restricted to large droplet sizes and low superficial gas velocities, making separator dimensions both prohibitively large and uneconomical. Therefore, it can be disregarded as an effective option.

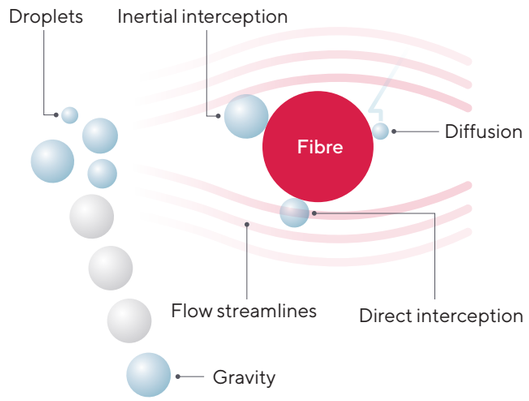
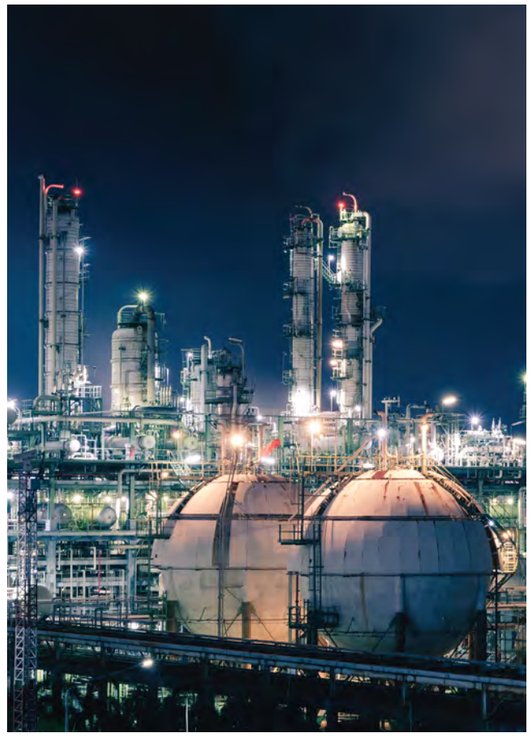


Figure 1:
Droplet collection mechanisms.



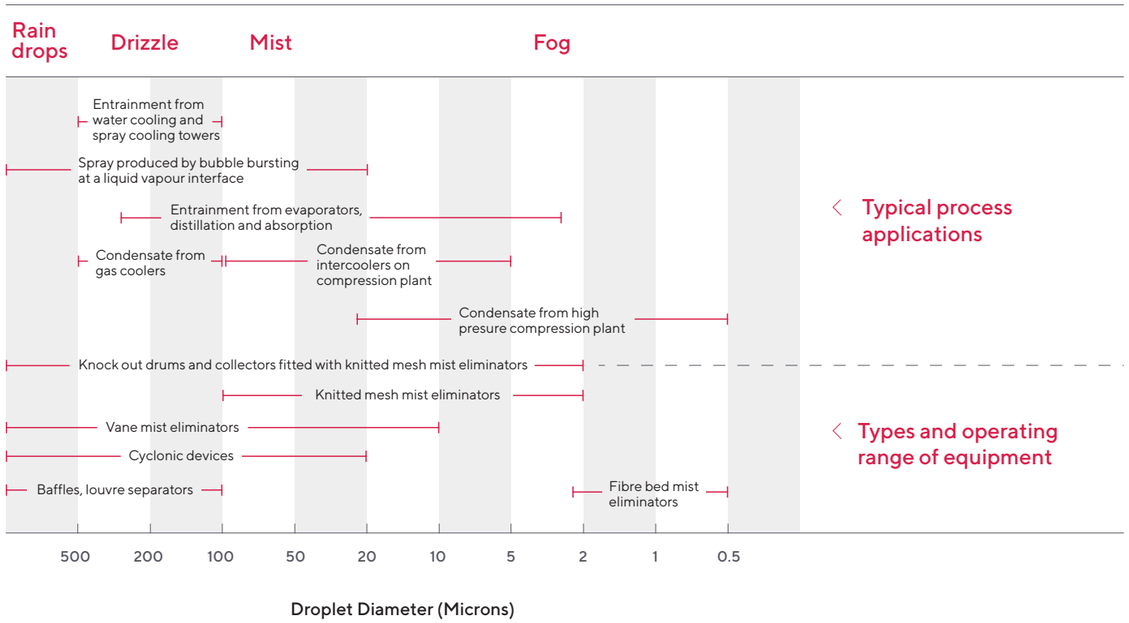


Figure 2:
Typical entrainment characteristics and corresponding separation equipment.

KnitMesh Technologies Wire Mesh Mist Eliminators

KnitMesh Technologies wire mesh mist eliminators have an excellent track record as a low-cost, highly versatile, and efficient method of removing liquid entrainment from gas streams.

They are produced as a bed of knitted mesh, which presents a tortuous path and a large surface area to the droplets entrained in the gas stream.

Separation is achieved by impingement on and capture by the filaments of the mesh, where the droplets coalesce and drain. Installation can be made in a variety of ways, but gas flow is usually either vertically upwards, with the liquid draining counter-current to the gas flow, or horizontally, with the liquid draining in a direction normal to the gas flow.

KnitMesh Technologies offers standard designs that are ideal for routine applications, providing excellent separation efficiency down to droplet sizes as small as 2 microns and with a pressure drop typically less than 2.5mbar.

Each mist eliminator is manufactured to suit the dimensions of the vessel or housing into which it will be installed. Most KnitMesh Technologies wire mesh mist eliminators are supplied complete with rigid support grids, which allow direct installation onto appropriate supports such as beams and rings within the vessel. The sectional installation allows ease of handling and access through vessel manways. Accessories such as tie wire, bolting, clamps, and support beams can be supplied where necessary.

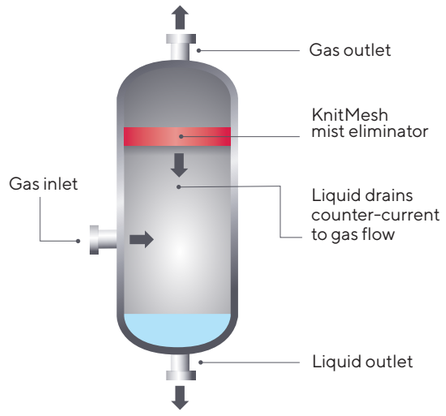


Figure 3:
Typical vertical vessel arrangement.

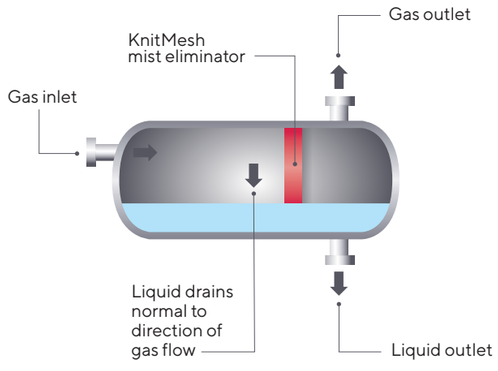


Figure 4:
Typical horizontal vessel arrangement.

Special modelling techniques for optimised designs

For more demanding applications, KnitMesh Technologies has developed sophisticated modelling techniques that move mist eliminator design away from conventional industry 'rules of thumb' and provide:

- Optimised structure
- Tailored features, e.g., fibre material, free volume, and mesh pattern, for specific process requirements
- A more precise method of performance prediction over a range of possible inlet conditions
- Ability to consider the effects of changing drop size distribution and liquid hold-up

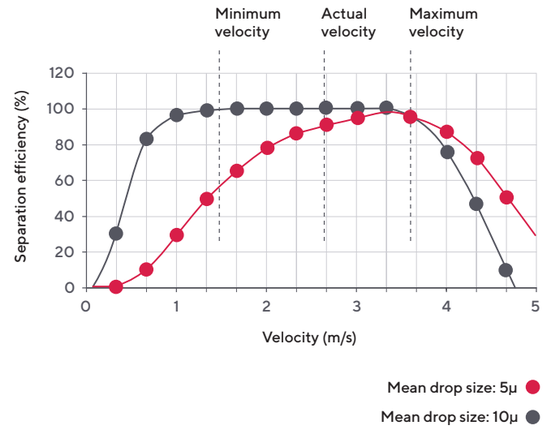


Figure 5:
Typical separation efficiency curve for KnitMesh Technologies Type 9030 mist eliminator.

Typical Features of KnitMesh TechnologiesMist Eliminators

Feature	Metal	Plastic
Pad Density (kg/m^3)	40 to 250	32 to 100
Wire Diameter (mm)	0.10 to 0.5	0.2 to 0.5
Free Volume (%)	97.6 to 99.1	89 to 97
Specific Surface Area (m^2/m^3)	140 to 1000	360 to 2000

Materials of Construction

Metal	Plastic	Multifilament High Performance Fibres
Stainless Steel 316(L), 304(L), 321, 316Ti	Polypropylene	PTFE Fibre
Monel*	Hostaflon ET (ETFE)	Glass Fibre
Hastelloy*	Teflon† FEP	
Incoloy* 825 & Incoloy* DS	PVDF	
Nickel		
Titanium		
Alloy 20		
Aluminium		

Specialist Solutions

to mist elimination problems

Mist eliminator design

- Problem definition
- Sizing and specification of an appropriate KnitMesh mist eliminator
- Analysis of inlet configuration and vessel layout
- Detailed design of internals and supports
- Designs available for installation in either vertical or horizontal orientation

Manufacture

- KnitMesh Technologies mist eliminators tailor-made to suit specific vessel dimensions and configurations
- Construction in a wide variety of materials to suit even the most corrosive process environments
- Mesh mist eliminators supplied as pads only or complete with top and bottom supporting grids ready for direct installation in the vessel
- Sectional construction for ease of handling and access through manways
- Complete packages of equipment including vessel and internals, can be provided where necessary

Delivery

- KnitMesh Technologies can arrange delivery to your premises, wherever you are in the world, with delivery duty paid where requested.

Site supervision

- For complex projects, our technical team can provide site supervision during installation

Representation

- KnitMesh Technologies has an extensive network of agents and distributors covering over 50 countries. Full details of your local representative can be found on our website

Website

- For more information on our mist eliminator range and other products and services, visit our website at:

www.knitmesh.co.uk

Design Advice

Comprehensive performance information is available on a wide range of standard designs, enabling KnitMesh Technologies engineering staff to tailor the mist eliminator design to suit most applications.

For best performance, it is important to achieve uniform gas flow distribution and maximum effective area, and advice can be given on the most appropriate positioning in terms of disengagement distances from the vessel inlet, outlet, and other vessel internals.

Sizing:

For equipment based on direct and/or inertial interception, gas stream velocity affects all three principles involved in separation (impingement, coalescence, and drainage). Flooding, or re-entrainment of liquid, can occur if the flow of gas prevents drainage, and the effective area of the mist eliminator is therefore established by determining an appropriate superficial velocity for the equipment. The overall performance of the mist eliminator is then a balance between efficiency and pressure drop.

V = maximum superficial gas velocity (m/s)

rl = liquid density (kg/m3)

rv = gas density (kg/m3)

K = a constant that is specific to the separation equipment and is a function of process parameters such as:

- Liquid loading
- Gas and liquid viscosity
- Gas pressure
- Surface tension

Derating factors are often applied to allow a safety margin for exceptional conditions such as liquid slugs and gas surges. For example, mesh mist eliminators should generally be designed with a velocity of 75% of V to allow for surges and with a minimum velocity of 30% of V.

For more information on any of our products, please don't hesitate to contact us.

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