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# SEPARATION TECHNOLOGIES

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Scrubbers and Separators for Gas/Liquid Separation

# Choose from 2 types of two-phase separators for gas/liquid separation technology

## SCRUBBERS

When liquid loading in gas is < 10 bbls/MMSCF

Protect downstream equipment from damage and failure by removing traces of liquid droplets (> 5 micron) from gas streams.

### Typical applications

- Upstream of gas treating equipment that contains dry desiccants or mechanical equipment, such as compressors
- Downstream of equipment where liquids have condensed from the gas

### How to achieve optimum performance

- Scrubbers are designed to handle light liquid loads and do not take the place of a primary two-phase separator.
- Retrofit with internals that operate efficiently under the new operating conditions – Gas Scrubbers are designed with a gas flow operating envelope between 25-110%.
- Carefully investigate gas and liquid flow behavior to prevent mal-distribution of gas flow in incoming pipework. To avoid maldistribution it is recommended that the inlet & outlet piping has a straight run for at least 5 x the pipe OD.

## SEPARATORS

When liquid loading is >10 bbls/MMSCF and/or liquid slugs are expected

Two-phase Gas Separators use inlet diffusers to deal with slugs of liquids and two-stage mist eliminators to effectively remove high liquid loading in the gas.

Common vapor-liquid separation technologies used throughout the process industries are Impingement Separation Technologies i.e. knitted wire mesh mist eliminators and vane packs.

### 1. Wire Mesh

Wire mesh mist eliminators provide a high separation efficiency at the lowest installation costs.

They are usually made up of multiple compressed layers of thermoplastic or metal wire.

#### Benefits

- Deliver excellent results over a broad range of gas/liquid separation tasks
- Highest separation efficiency
- Lowest installation costs

Our wire mesh mist eliminators are made in any size and shape from a wide range of materials.

When specifying a wire mesh pad, variables to consider include: wire diameter, surface area, mesh thickness, interfacial surface tension between the fiber and the collected liquid.

#### Wire mesh and vane combinations

Combine wire mesh mist eliminators with vane types to optimize the benefits of individual types of equipment and improve overall performance.

In this case, the mesh serves as a preconditioner (1st stage) to the fine mist droplets in the gas, forming larger droplets (coalescence) for the 2nd stage vane type mist elimination process.





## 2. Standard Pocket and Double Pocket Vane Mist Eliminators

One of the most versatile technologies for mist elimination is the vane separator. Vane packs are a good choice for retrofit upgrades and new construction alike.

Vane packs use the changes in direction and the inertia of heavier contaminant in a lighter process gas to achieve separation. While gas makes turns back and forth, the liquid is captured on the walls of the vane mist eliminator and allowed to drain out of the gas stream. Higher efficiency vanes utilize dedicated drainage channels to improve the contaminant capacity and avoid reentrainment.

### Benefits

- Handles higher throughputs than mesh technology with a more robust construction.
- Handles viscous liquids
- Operates well in fouling service
- If contaminants deposit on the vane blades, we can install the vanes with spray nozzles to clean the blades during operation

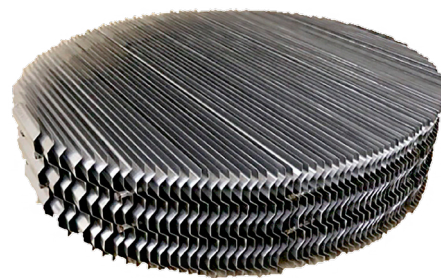
### Standard vs Double Pocket Vanes

The double pocket (DP) vane pack is now one of the most utilized technologies for separation in every industry around the world.

The unique features of DP vanes are:

- High gas flow capacity (nearly 3x that of a mesh mist eliminator)
- High efficiency of 99.9% of 8 micron like a mesh pad

DP vanes are used for retrofitting old scrubbers and separators and in new projects to allow us to design smaller scrubbers and separators, therefore reducing capital cost.



## 3. Cyclonic Tube Separators

Some natural gas applications have high liquid contaminant rates and also contain solids that plug typical mesh or vane separators. Larger single body cyclonics typically do not have the efficiencies needed to protect critical downstream equipment. In cyclone spin tube separators, centrifugal forces can act on an aerosol at a force many times greater than gravity.

### Benefits

- In-line and multicyclone separators provides protection down to the 3-5 $\mu$ m range of liquids and associated solids
- Overall removal efficiency of 99.9% of normal pipeline contamination
- Robust construction can operate in conditions where normal separators cannot, and where momentary flow rates above design conditions need to be tolerated without replacing filters continually.

### Typical applications for the cyclonic tube separator are:

- Pipeline cleanup and liquid recovery
- Removal and recovery of lubricants in fuel gas streams
- Removal and recovery of amines and glycols from gas streams
- Dessicant bed protection
- Liquid hydrocarbon and water recovery from high-pressure wellhead streams

