



EVERSEP

SEPARATOR INTERNALS

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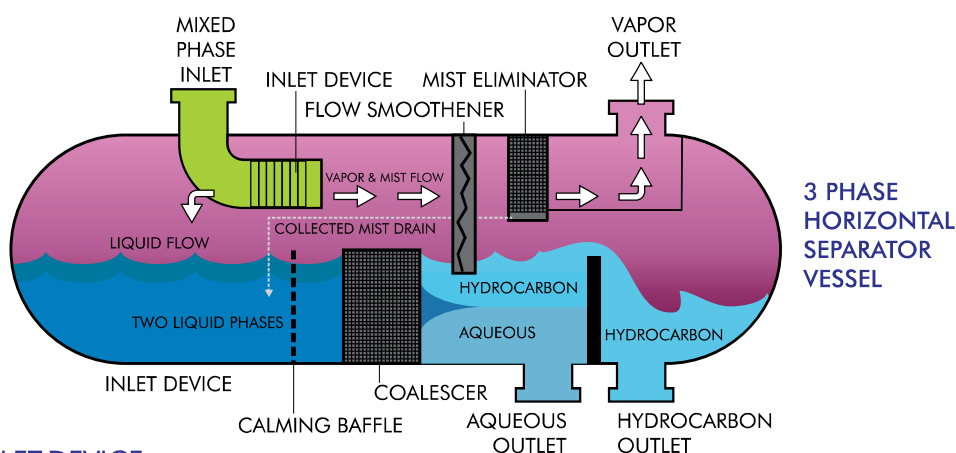
INTRODUCTION

As the oil & gas and chemical processing industry matures, a new class of high efficiency separator internals are required. As a result of its in house design and engineering capabilities, as well as its working relationship with various end users, Evergreen has developed a comprehensive range of high efficiency separator internals.

Separator internals design requires an in-depth knowledge of gas / liquid and liquid/liquid separation technology along with an in depth knowledge of the interplay between these phases when a three phase system (gas/oil/water) is required to be handled.

The size of the separator vessel is important as it has a bearing on the capital costs incurred by the end user. The performance of separator internals will play a critical role in the sizing and final performance of the separator, and a CFD model may be required to optimize the final design.

The separator design takes into consideration the inlet zone, flow development and efficient phase separation at the outlet. A typical separator package consists of:



VANE INLET DEVICE

An inlet device consists of a simple deflector/baffle, a half pipe, a vane inlet device or a cyclone device depending on the inlet momentum of gases. These inlet devices are very useful in reducing entrainment loads and problems due to slugs or flow upsets.

The EVERVANE feed Inlet Device consists of a series of curved vanes arranged in a heavy duty housing, which reduce the inlet momentum while promoting the bulk separation of vapour liquid feeds into a vessel.

The design of the feed inlet device is based on well established and documented parameters relating to inlet momentum, nozzle size, vessel dimensions and configuration. This design offers substantial performance benefits when compared to open nozzles, half open pipes, inlet baffles or simple tangential inlets.

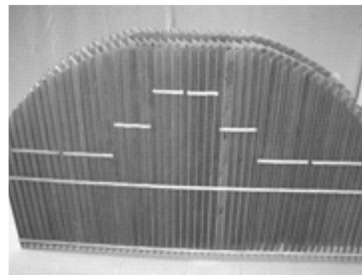
Special designs are available for heavy duty services where slug flow is anticipated, in addition to sectioned constructions for ease of installation through vessel manways.

These devices have no moving parts and hence no maintenance issues, thus making them an optimum choice for new green field and revamp projects.



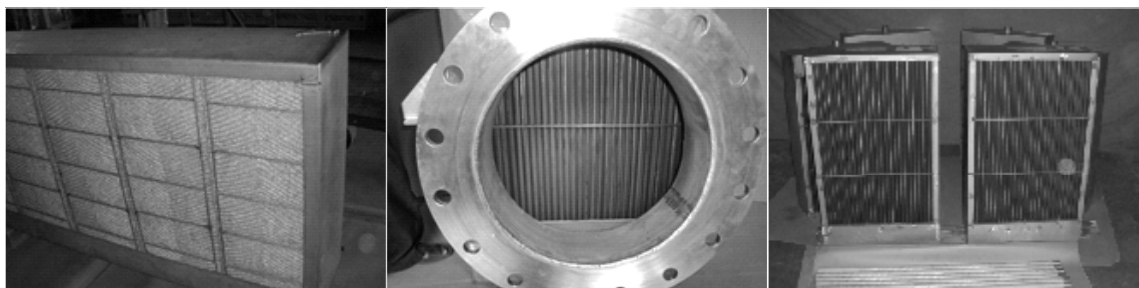
FLOW SMOOTHENER / STRAIGHTENER

A flow smoother (or straightener) is a specially designed vane assembly used to break the foam and/or calm the gas flow and is placed between the inlet device and the mist extractor. It also acts as a primary coarse separation device and helps in reducing the liquid load on the downstream mist extraction device.



MIST EXTRACTOR / ELIMINATOR

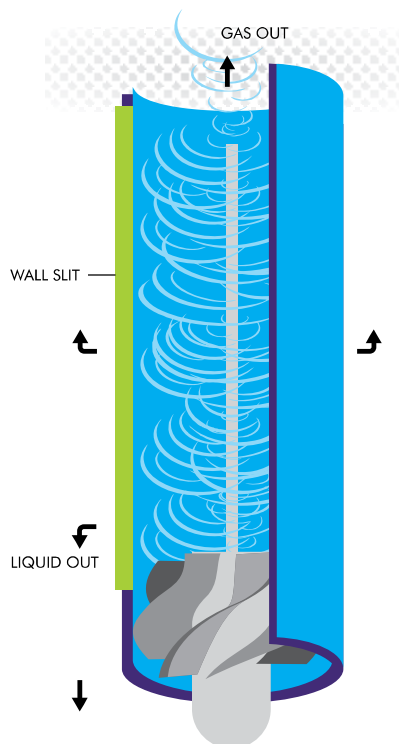
The gas phase in the separator is finally led to a mist eliminator/mist extractor to remove any residual liquid entrainment before it exits the separator vessel. This mist eliminator may be a mesh pad or a vane type mist eliminator. The vane packs may be supplemented with an upstream mesh pad coalescer/agglomerator or a downstream perforated plate to ensure uniform gas distribution across the vane assembly cross-section.



EVERSPIN AXIAL FLOW CYCLONE

EVERGREEN also offers an axial cyclone mist eliminator (EVERSPIN) for high pressure applications (where wiremesh and vane mist eliminator performance is adversely affected).

The EVERSPIN mist eliminator consists of multiple standard cyclone tube elements mounted into a tubesheet. An intense centrifugal spinning motion is created by the gas entering the cyclonic pipes which throws the liquid outward onto the pipe wall. This liquid coalesces into a liquid film at the pipe's inner wall and is purged out of the pipe through slits in the wall. The collected liquid drains to the vessel sump via down pipes. For high capacity separation applications, an EVERSPIN is coupled with an EVERMESH or an EVERON vane mist eliminator which acts as a coalescer/agglomerator for forming large droplets which are in turn removed with various combinations of EVERSPIN/EVERMESH/EVERON devices to achieve substantially higher capacity (up to double) in an existing vessel. Such capacity enhancement revamps are easier to implement in a vertical separator configuration (compared to the conventional horizontal separator version) when there is a large amount of vapour to be separated from a small amount of liquid phase ($< 10\%$).

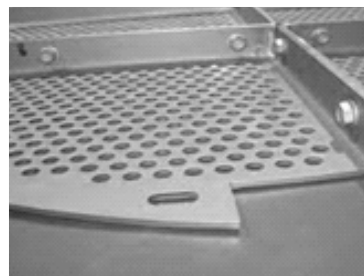


EVERSPIN (AXIAL FLOW CYCLONE)



CALMING PLATE / BAFFLE

A calming plate/baffle is a well designed perforated plate assembly placed in the liquid phase, upstream of the coalescer media and it is used to prevent chaotic fluid distribution. A single or two stage calming baffle is normally recommended to provide a near uniform laminar flow type regime into the coalescing media.



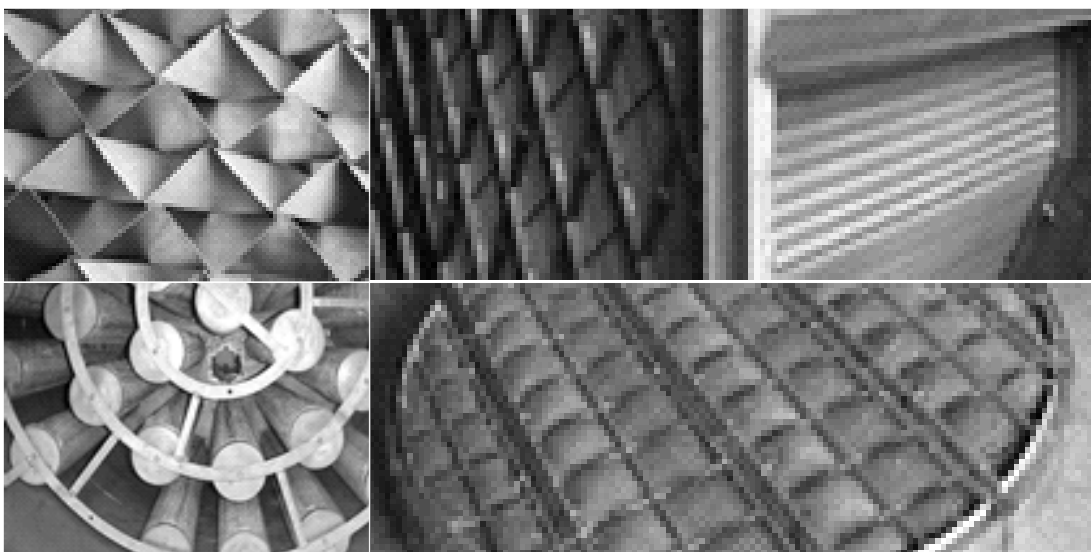
LIQUID- LIQUID COALESCER

Coalescers are used to enhance the separation of two immiscible liquids. They perform very effectively in two phase Liquid – Liquid separations or in three phase separations provided the feed to the separator does not contain a stable liquid emulsion .The principle type of coalescers offered are:

EVERPACK PP parallel plate separator which consists of a series of plates arranged parallel to the direction of flow but normally angled or fitted to assist the drainage of the collected liquid. The parallel plates form narrow flow channels which considerably reduce the required distance for vertically dispersed liquid flow, before the droplets are coalesced and collected on the individual plate surface.

EVERPACK CP corrugated plate or honey comb style coalescers (modified structured packing modules). Depending on overall vessel design and fluid properties, both these EVERPACK plate separators are capable of effective bulk removal of dispersed droplets in the range of 50-1000 microns.

EVERSEP coknit wire meshpad and cartridge element coalescers. These are installed to increase the size of liquid droplets, and so reduce settling times (these are effective for dispersions as small as 10-20 microns).



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