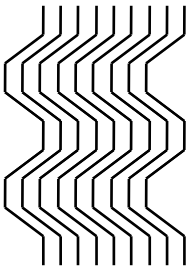
K-Sep® Separator Internals

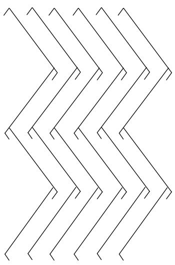
KVME Vane Mist Eliminators

Vane mist eliminators consist of a series of plates or vanes spaced to provide passage for vapour flow and profiled with angles to provide sufficient change of direction for liquid droplets to impact, coalesce and drain from the surfaces of the plates. KIRK design and manufacture a range of **K-SEP®** vane styles which provide the following benefits:

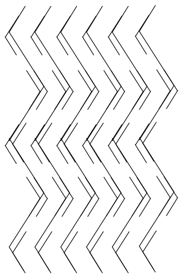
- High vapour capacity
- Resistance to fouling
- Low pressure loss
- Effective removal of high liquid loads
- Easy assembly and disassembly in blocks



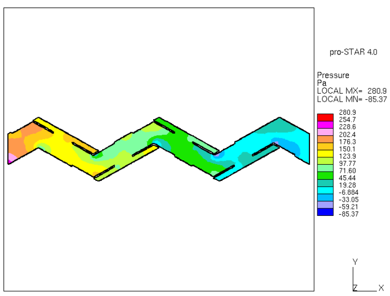
The "KVV" Range is a plain, non-pocketed style designed for larger droplet removal from vapour in normal, light fouling applications with either vertical or horizontal gas flow.



The "KVH-1" Range is designed for droplet removal from vapour flowing horizontally or vertically. In this configuration, the vanes are fitted with hooks to trap and drain the collected liquid. They are generally effective at higher vapour velocities at which smaller droplet size removal can be achieved.

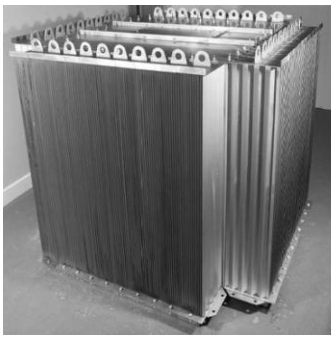


The "KVH-2" Range is designed for droplet removal from vapour flowing horizontally (although it is sometimes used vertically). In this configuration, the vanes are fitted with pockets to trap and drain the collected liquid. They are generally effective at higher vapour velocities with lighter liquids - the pockets prevent the liquid film being re-entrained or stripped from the vanes.



CFD Study of KVH-2 Vanes

All of the above styles can be supplied in sections for installation through vessel manways to be supported on full annular support rings welded to the vessel wall. Alternatively they can also be supplied as complete **"Vane Packs"** where the vanes are enclosed in a **Frame** which is flanged for direct attachment to a "gas box".



Mist Eliminator Design

Mesh pads should be sized so that the face area provides a vapour rate of approximately 80% of the maximum allowable re-entrainment velocity. For estimation purposes, suitable design velocities occur at a K-factor of 0.20 m/s for vertical flow, or 0.275 for horizontal gas flow (due to better drainage) where:

$$Vs = K \,.\, \sqrt{(\rho L - \rho V)/\rho V}$$

where Vs = Actual vapour velocity (m/s)
ρV = Vapour density (kg/m^3)
ρL = Liquid density (kg/m^3)

The designer should also check that the gas momentum and velocity are suitable for impingement separation without excessive re-entrainment drag,

Operating pressure loss across the pad within the above design range is normally less than 1.0 kPa depending upon pack style, thickness, liquid loading and vapour rate. An approximate pressure drop can be estimated from the formula:

$DP\ (kPa) = C \,.\, (\rho L - \rho V) \,.\, K^2$

Where C = 0.02 for a typical KVH-1 style mesh demister.

For optimum designs the K-factor should be modified to take into account the operating pressure, liquid viscosity, surface tension, liquid entrainment, etc, so please confirm sizing against KIRK's proprietary design program.