Enhanced™ Vane Mist Eliminators

Features

- *High gas velocities*
- *High liquid loadings*
- *Ideal for very viscous liquids*
- *Excellent resistance to solids fouling*
- *Sturdy, durable construction*
- *Wide variety of construction materials*
- *Custom-designed*

What are Enhanced Vane mist eliminators?

Enhanced Vane mist eliminators are inertial impaction devices composed of multiple parallel blades. They are assembled with wide clear channels to minimize fouling, provide unrestricted draining and enhance cleanability. Blade spacing, number of passes, turning angle, presence or absence of either drainage hooks or specially designed pockets, all engineered for specific process requirements. Sturdy construction eliminates fluttering and vibration.

How do Enhanced Vane mist eliminators work?

As liquid-laden gas enters the element, it is forced to change direction through the multiple passages of the

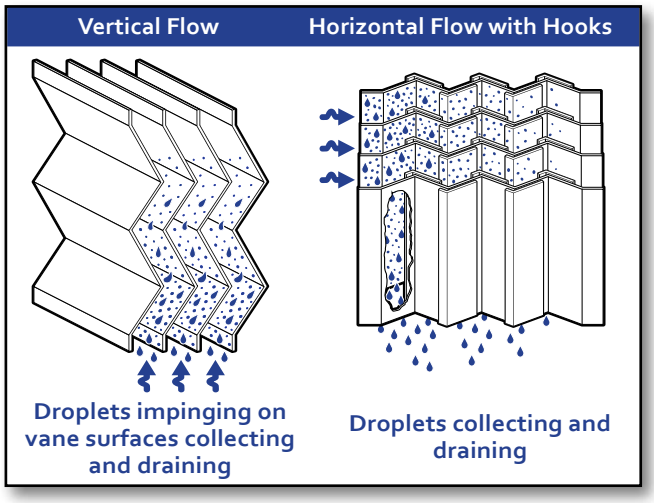
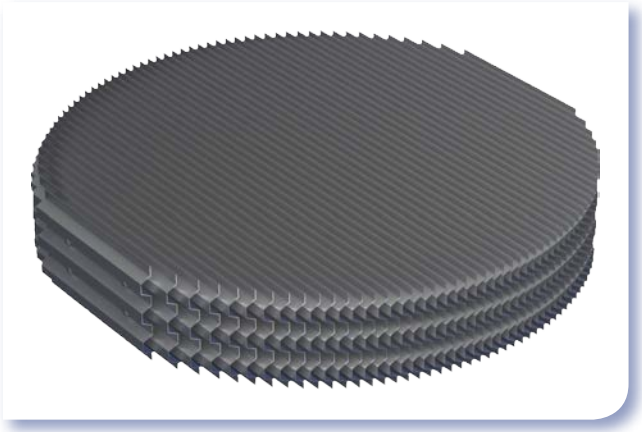


Figure 1
Left: vertical up-flow Enhanced Vane mist eliminator. Right: horizontal flow Enhanced Vane mist eliminator. Note drainage hooks for higher throughput capacity.



Typical Enhanced Vane mist eliminators for vertical flow units can be fabricated up to 15.24 m (50 ft) diameter.

Enhanced Vane separator. Entrained droplets impinge on blade surfaces due to their greater inertia. Droplets coalesce into larger drops and rain by gravity. In horizontal flow design, drainage hooks channel collected liquid to the bottom of the unit. This permits higher throughput capacity. Most entrained liquid and solids are removed in the first pass. Subsequent passes remove remaining liquids and solids. Multiple pass designs result in higher efficiencies. Open channels give very low pressure drop and minimize fouling.

Where are Enhanced Vane mist eliminators used?

- ***scrubbers*** – improve particulate removal in flue gas desulfurization systems – prevent entrainment and fouling in blast furnace, open hearth, BOF and coke oven scrubbers – reduce entrainment in asphalt heaters.

- ***evaporators*** – limit dissolved solids to 10 ppm or less in overhead steam condensate – reduce carryover of fibrous and dissolved solids in black liquor and other pulp mill evaporators – handle high liquid loads common in long tube rising film evaporators.

- ***knockout drums*** – reduce drum size with horizontal flow chevron design – improve wellhead separation of crude, gas, and water – remove slugs of liquid hydrocarbons and water in pipeline separators.

- ***atmospheric and vacuum pipe stills*** – reduce entrainment from wash oil zones where coking is a concern – minimize carbon and metals levels in side draws for deeper cuts and greater throughputs.

- ***other distillation columns*** – remove viscous, tacky liquids to improve capacity and product purity in dewaxing, de-asphalting and de-oiling draws – use lower grade crudes.

Enhanced Vane Mist Eliminators

Table 1 – Selected Enhanced Vane Styles		
Flow Direction		Description
Vertical	*Horizontal*	
VP-51	HP-52	Economical design, severe fouling service, lowest pressure drop
VP-61	HP-62	Good capacity, good efficiency
VPDP-96		High capacity, high efficiency

Design parameters

As with other types of mist eliminators, selection of the proper Enhanced Vane is affected by gas and liquid properties, temperature, pressure, quantity of entrainment, particle size distribution and, of course, desired performance. For purposes of preliminary selection, determine actual velocity by using K values of 0.14 (0.46) for vertical up-flow and 0.20 (0.65) for horizontal flow usually provide good estimates of space requirements.

Design velocity and pressure drop

V = K[(ρl-ρv)/ρv]1/2
V = velocity in ft/sec
ρv = density of vapor in lb/cu ft
ρl = density of liquid in lb/cu ft
K = capacity factors for free flowing systems

Depending on system process conditions, higher K values as shown in Table 2 can be achieved but it is good practice to over-size equipment by 10-30%. Note in Figure 3 that Δρ is low–generally less than 12.7mm H_2O (0.5" WC) and is higher for horizontal flow because of the drainage hooks or closed pockets.*

Flow rate will vary in most processes. Table 2 indicates turndown ratio achievable at optimum efficiency. Using Enhanced Vane eliminators it is possible to efficiently remove droplets as small as 12-15 microns in diameter. Figures 2 and 3 show the performance of five standard vanes in an air/water system. Actual droplet size separation efficiency in other systems will be affected by gas velocity and liquid and gas densities.

Table 2 – Turndown Capability Range			
FlowType	Operating K value		Re-entrainment point
	minimum	*maximum*	
VP-51/61	0.04 *(0.12)*	0.15 *(0.50)*	0.16 *(0.55)*
HP-52/62	0.04 *(0.12)*	0.20 *(0.65)*	0.24 *(0.80)*
VPDP-96	0.04 *(0.12)*	0.26 *(0.85)*	0.29 *(0.95)*
Note: English units listed in *(italics)*			

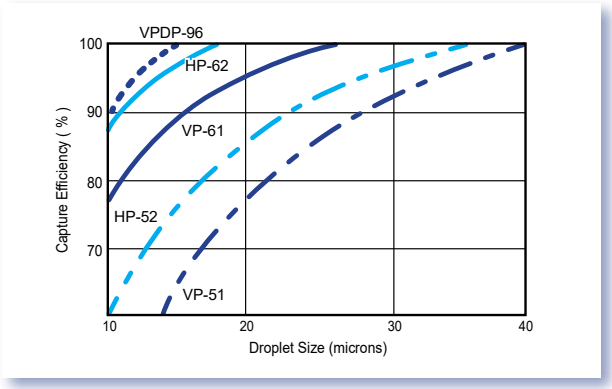


Figure 2
Capture efficiency vs. particle size for five standard Enhanced Vane mist eliminators.

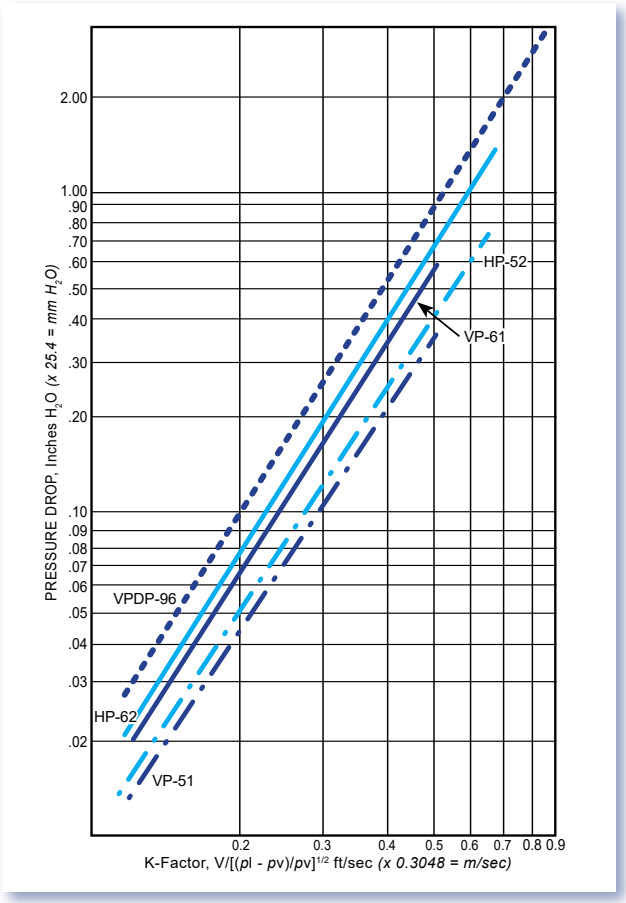


Figure 3
Pressure drop vs. K factor for standard Enhanced Vane mist eliminators.

** This denotes high capacity double pocket Enhanced Vanes – style VPDP-96.*

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