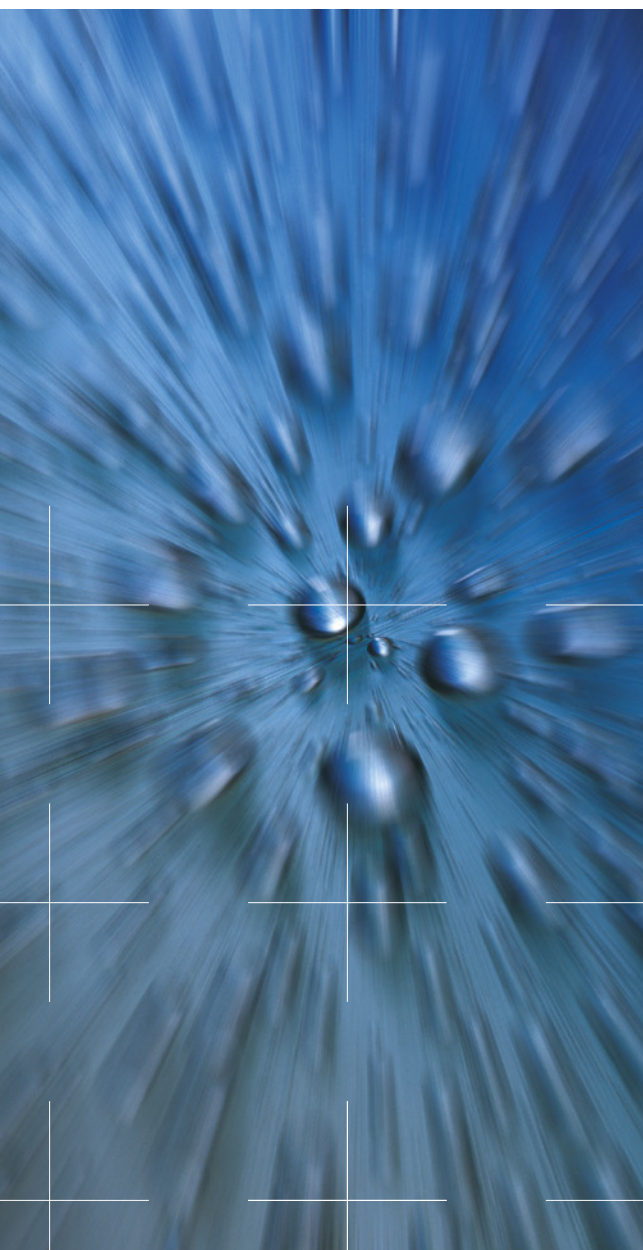


SULZER

Chemtech

KnitMesh V-MISTER™

High performance
mist eliminator



High performance entrainment separation

The Sulzer KnitMesh V-MISTER™ provides high performance wherever liquid entrainment must be removed from a vertically flowing gas stream. Since its introduction, it has set the industry standard for wire mesh mist eliminator vapor and liquid handling capacity. This simple enhancement to a standard mesh pad inherently improves mist elimination since the higher velocities that are used increase the droplets' inertial impact with the wires or filaments. Meanwhile, collecting droplets in strategically placed channels protect against the secondary droplet formation typical in the drainage zone of a standard pad.

Demisting pads with Sulzer's V-MISTER technology employ the mechanism of a Von Karman Roll around a bluff body (See Figure 1a) to obtain high vapor and liquid handling capacity. Here a vortex develops in a low pressure zone downstream of the channel that has been attached to the bottom of the mesh pad. Collected droplets deposit in the trough and form a flowing liquid stream there. Contrast this with the standard mesh pad (See Figure 1b) where a two phase 'fluidized' zone of gas and liquid develops in the bottom third to half of the pad and from which large coalesced droplets must ultimately drain counter-current to the ascending stream. The high capacity channels of the Sulzer KnitMesh V-MISTER shield the collected liquid and then drain it in steady streams, from two sides of the mist eliminator, at the tower periphery where gas velocity is so low that re-entrainment almost never occurs.

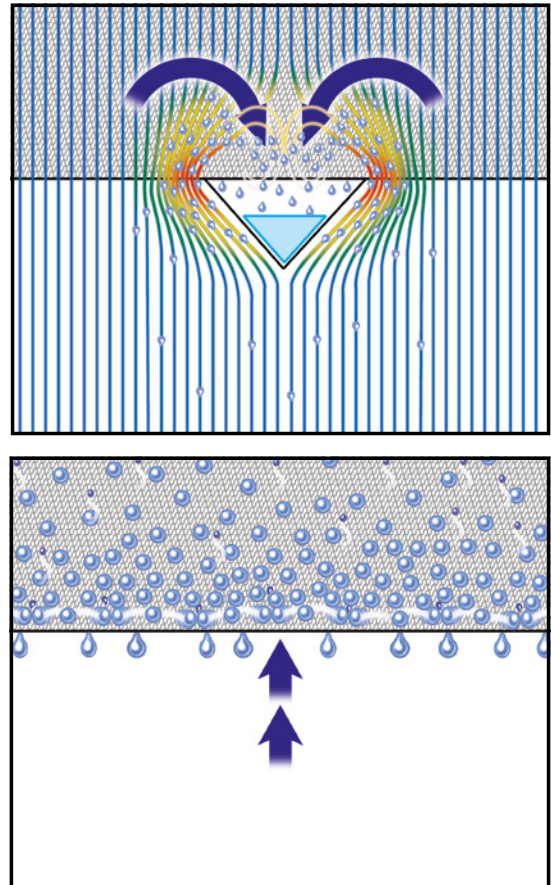


Figure 1a: Von Karman Roll Vortex depositing droplets into channel

Figure 1b: Drainage from a traditional pad promotes the secondary formation of fine droplets.

At conditions above approx. $2.2 \text{ m}^3/\text{m}^2 \text{ hr}$ a Sulzer KnitMesh V-MISTER will handle up to 20% greater gas flow over a standard mesh pad (See Figure 2). We have found that for design at lower liquid loads, a 20% increase is still very reliable. Example: At a liquid load of $1.1 \text{ m}^3/\text{m}^2 \text{ hr}$ a conventional mesh pad is normally designed with a K-value of 0.105 m/s (0.34 ft/s) which meets a design velocity of 3.0 m/s for an air/water system at atm. pressure. This design velocity is still 20% less than the design velocity of 3.6 m/s (= 75% of 4.8 m/s at same liquid load) for the Sulzer KnitMesh V-MISTER.

In the high liquid loading situations, such as a tray tower being pushed to its limits or a knockout drum with an undersized inlet, a V-MISTER pad will handle up to $3.4 \text{ m}^3/\text{hr m}^2$ ($1.4 \text{ gpm}/\text{ft}^2$) at the same gas loading as a standard pad (See Figure 3). That's a 300% increase!

Since a Sulzer KnitMesh V-MISTER is the same height as a mesh pad with top and bottom grids, direct replacement is usually possible with no modifications to the vessel or column. Also, since the collection troughs are relatively narrow, there are no problems with alignment between the hold-down hardware, such as tie wires or J-bolts, required to secure a pad to a support ring or support beam(s). Whether you are building a new tower, want to increase the capacity of an existing separator, or just looking for more insurance against upsets, the Sulzer KnitMesh V-MISTER will meet your needs with virtually no difference in the scope of your project.

Performance range

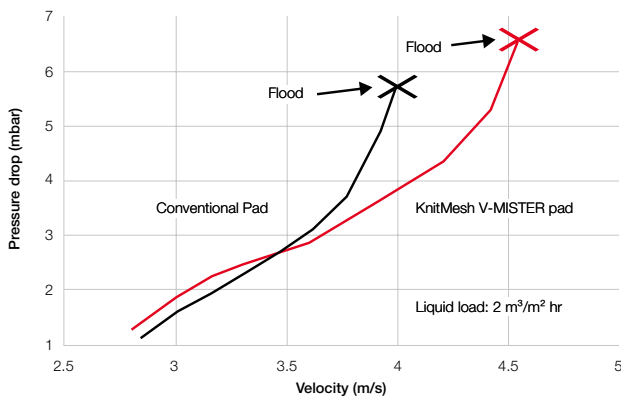


Fig. 2: 15% greater flooding capacity at this liquid load

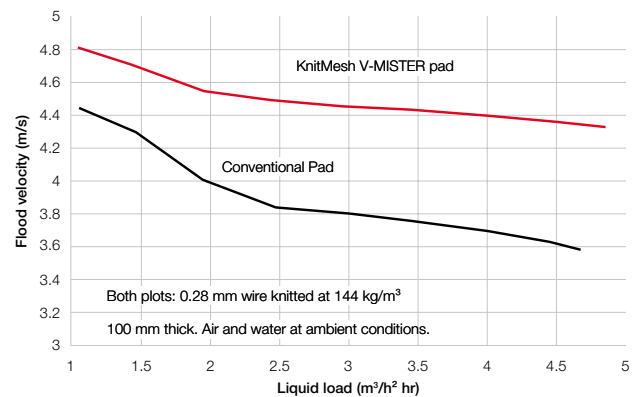


Fig. 3: V-MISTER pad handles 3 X the liquid load at the same gas velocity



Specifications

Features

- High liquid handling capacity, up to three times greater than conventional mesh pads
- Proven 20% greater vapor capacity than traditional technology
- Easily handled and installed, fits between existing double rings (top and bottom supports)
- Low cost and lower height than 'Z-Baffling' a conventional pad
- Works with all types of mesh pads, including composite co-knits of multiple materials

Materials

Sulzer KnitMesh V-MISTER are available in a wide variety of metals including:

- 300 and 400 Series Stainless Steel, Alloys 20, Monel and other corrosion resistant materials
- Base metals such as Aluminum, Copper and Nickel
- Exotic metals such as Tantalum, Titanium, and Zirconium
- Plastics include: Polypropylene, PVDF, PTFE, PFA and FEP

Typical applications

- Towers upgraded with latest generation packings and trays that need mist eliminators to handle their higher vapor flowrates and/or entrainment loads
- Knock-out drum retrofits, saving the capital investment of a new vessel
- High pressure applications where there is a close differential between vapor and liquid densities
- Low surface tension systems, such as NGL's, where atomizing by secondary droplet break up becomes so prevalent
- Installed below a high capacity vane where the mesh pad pre-conditions and coalesces the fine droplets so they can be captured by the vane, while the troughs direct the collected liquid to the vessel periphery
- High turndown situations - 50% more than conventional pads - where high droplet removal efficiencies are required even during plant startups or break-in periods.

As with any vertical vapor-liquid separator containing a low pressure drop mist eliminator, it is important to evenly distribute both the inlet and outlet vapor flow while minimizing liquid load to the mesh pad. Sulzer Chemtech has a complete line of inlet distributors from simple inlet baffles to the sophisticated Shell Schoepentoeter™ Plus that can handle even the most challenging applications.

If fouling is your problem, spray nozzle headers are the Sulzer solution.

We even have a design which can be installed without welding onto the walls of a coded pressure vessel.

Get results like these typical cases

Improved performance of caustic-chlorine plant evaporators

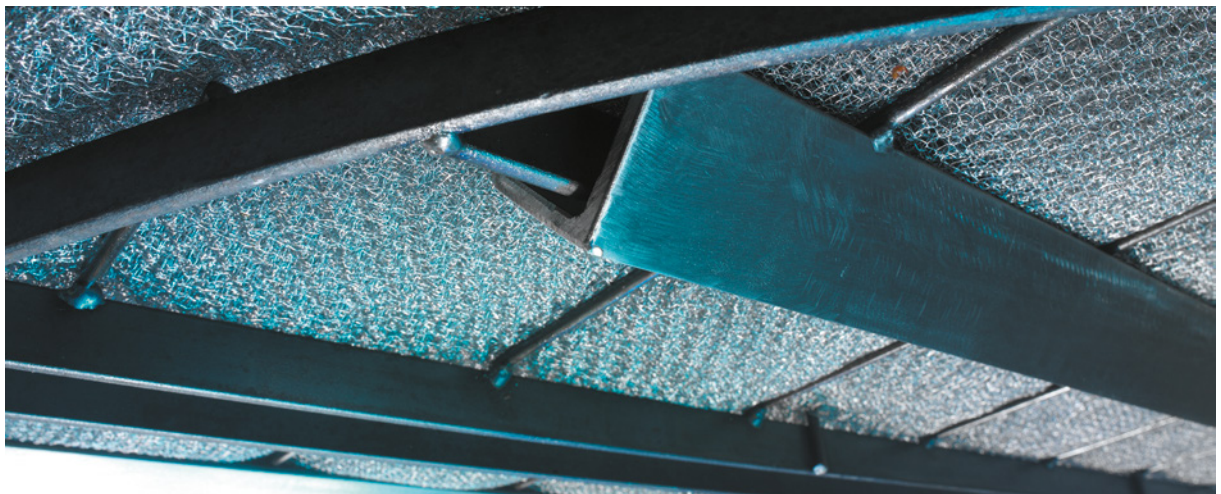
A caustic-chlorine plant had a ten year history of chronic problems with caustic mist carryover from the 4th effect evaporator. To prevent salt buildup and plugging of the mist eliminator they were spraying water on the mist eliminator pad at a rate of 1.3 m³/min every 30 minutes. This liquid load flooded the pad and shortly after spraying, the pH downstream of the cooling tower would spike to a pH of 11-12. On each spray cycle, acid would have to be added to the cooling water to neutralize the caustic.

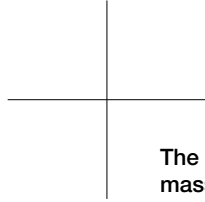
Sulzer KnitMesh V-MISTER pads were installed in the 2nd, 3rd and 4th effect evaporators. Salt build-up was slowed down to the point that the plant was able to reduce spray rates on the 4th effect to 0.2 m³/min for 1 minute every hour. During spray wash, the pressure drop on the 4th effect V-MISTER pad held at only 3.7 mbar. Not only was caustic loss and acid consumption eliminated, but it was found that a higher vacuum could be maintained, and water boil-off was much more rapid. Results were that the replacement with KnitMesh V-MISTER saved the company USD 194'000 per year.

Installation of Sulzer KnitMesh V-MISTER solves pollution problem at steel plant

A major steel company had a severe stack mud-mist carryover problem in their BOP (Basic Oxygen Process) scrubber system. The scrubbing system for the blast furnace consisted of venturi scrubbers feeding a cooling-condensation spray tower, followed by the exhaust fan and a conventional mist eliminator pad assembly prior to the stack. Because the fan was running wet and entraining mud droplets, the mist eliminators plugged and failed in the first week after startup and had to be removed. Consequent emission of entrainment from the stack meant that the plant violated emission limits, and was about to be heavily fined unless the problem was addressed.

A review of the operation showed that if the fan could be run dry, there would be no need for a downstream mist separator. Accordingly, a 8.5 m diameter Sulzer KnitMesh V-MISTER assembly was designed and installed in the outlet cone of the cooling tower upstream of the fan, above the cooling tower water sprays. In order to keep the eliminator from plugging with mud carryover, a dedicated clean water face-spray system was installed to continuously wash the V-MISTER assembly co-current with flow at a rate of 1.5 m³/min. On system startup, the fan and stack both ran clean and dry. Stack testing showed complete compliance with emission requirements and the pending fines were cancelled. Monitoring of the pressure drop across the V-MISTER over the first year of operation showed no increase, indicating freedom from plugging.





The Sulzer Chemtech division is the global market leader in innovative mass transfer, static mixing and polymer solutions for petrochemicals, refining and LNG.

Chemtech is also leading the way in ecological solutions such as bio-polymers as well as textile and plastic recycling, contributing to a circular economy. Our product offering ranges from technology licensing to process components all the way to complete separation process plants. Customer support ranges from engineering and field services to tray and packing installation, tower maintenance, welding and plant turnaround projects – ensuring minimal downtime.

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