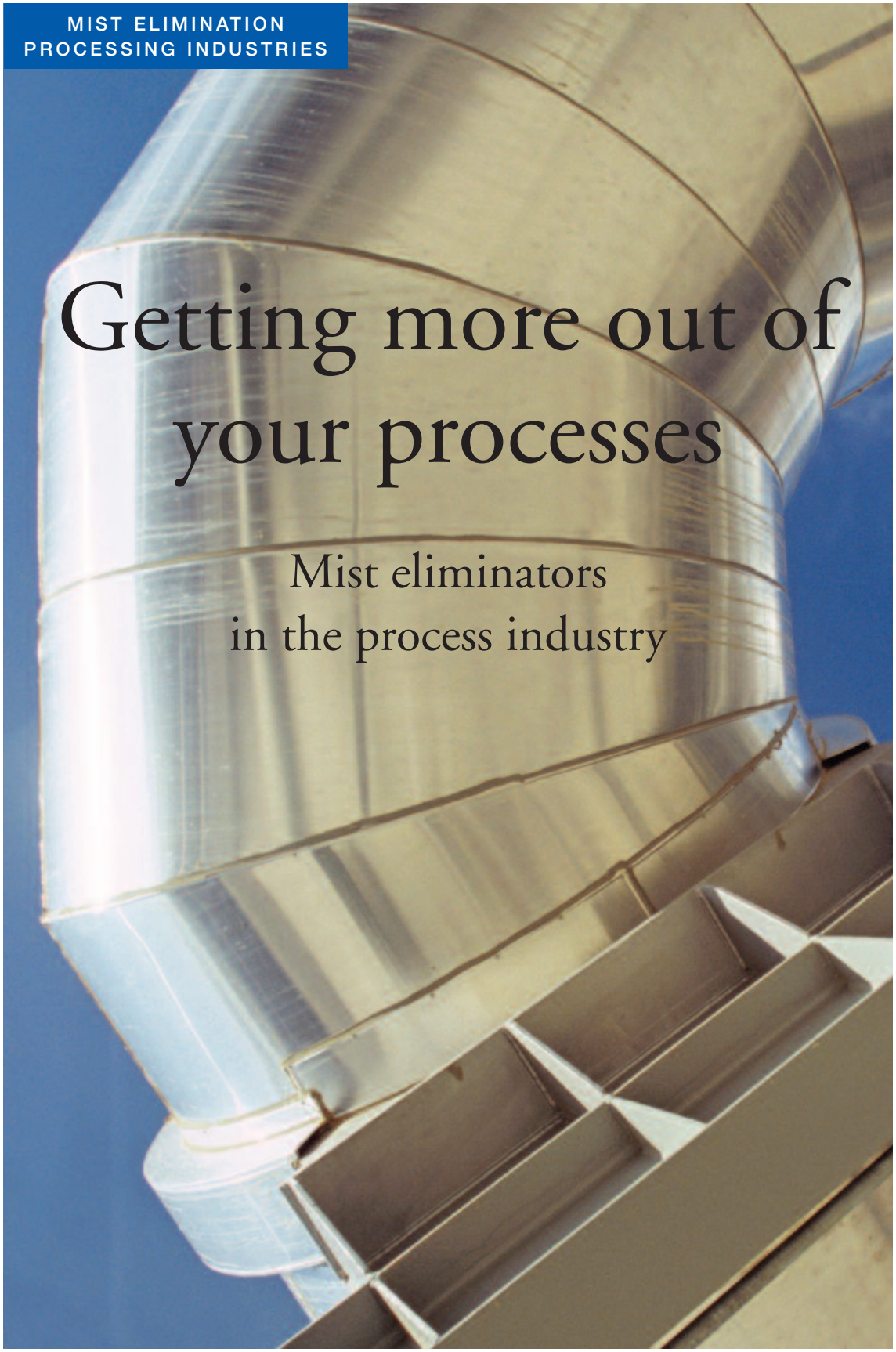
MIST ELIMINATION
PROCESSING INDUSTRIES



Getting more out of your processes

Mist eliminators in the process industry

Munters

Reduce waste. Optimize energy usage

Throughout many industrial processes, mist elimination plays a vital role in recovering lost product and in protecting down-stream equipment and processes from droplets in the process gas stream.

These droplets come from impurities in the gas phase. They are typically caused by condensation during cooling or they are simply caused by high gas velocities resulting in liquid carry-over.

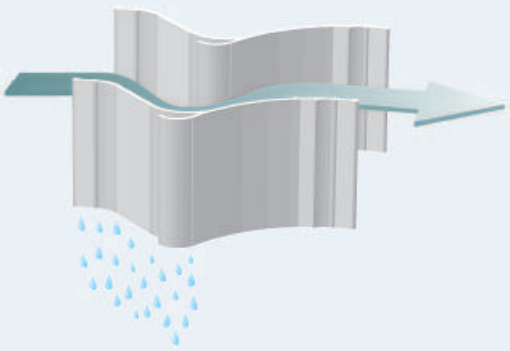
In every case, efficient mist elimination, designed specifically for the job in hand, will save money through recovery of product, enhanced process efficiency and reduced wear and damage to equipment.

But the key is efficiency in mist elimination. Achieving this involves accurate matching of the mist eliminator profile and configuration to the precise characteristics of the gas flow. This in turn requires an in-depth understanding of the process involved and of the physics of the mist elimination itself.

Efficient mist elimination:

- Protects downstream processes and equipment
- Saves energy in subsequent process stages
- Recovers valuable product
- Performs predictably and at high efficiency even under heavy liquid loading
- Using a vane type mist eliminator allows the process to be run at higher velocities, and thus with smaller apparatus diameters

Vertical flow



Horizontal flow

The mist eliminator is made of profiles (vanes), accommodated inside panel systems that divert the gas flow and cause liquid droplets to impact with the vane surface. These droplets collide on the vane surface and they finally form a liquid layer. This layer drains back down because of the force of gravity.

Mist elimination in evaporation process

Thermal separation of products by evaporation is widely used throughout the process industry. The purpose of the extraction varies from application to application but the goal is the same – to get more product with less expenditure of energy and raw material.

These industrial evaporation processes are typically multistage, where the solvent is evaporated step by step, during which time the product phase becomes more viscous and concentrated. This in itself increases the risk of downstream equipment damage in case of carry-over.

In addition, every single droplet lost in the process represents a loss in raw material and energy. Efficient mist eliminators play a crucial role in evaporation processes by both protecting your process equipment downstream of the evaporator and by reducing loss of product.

Munters' mist eliminators, for newbuild or retrofit, enhance the efficiency of the evaporator process in pulp and paper production.

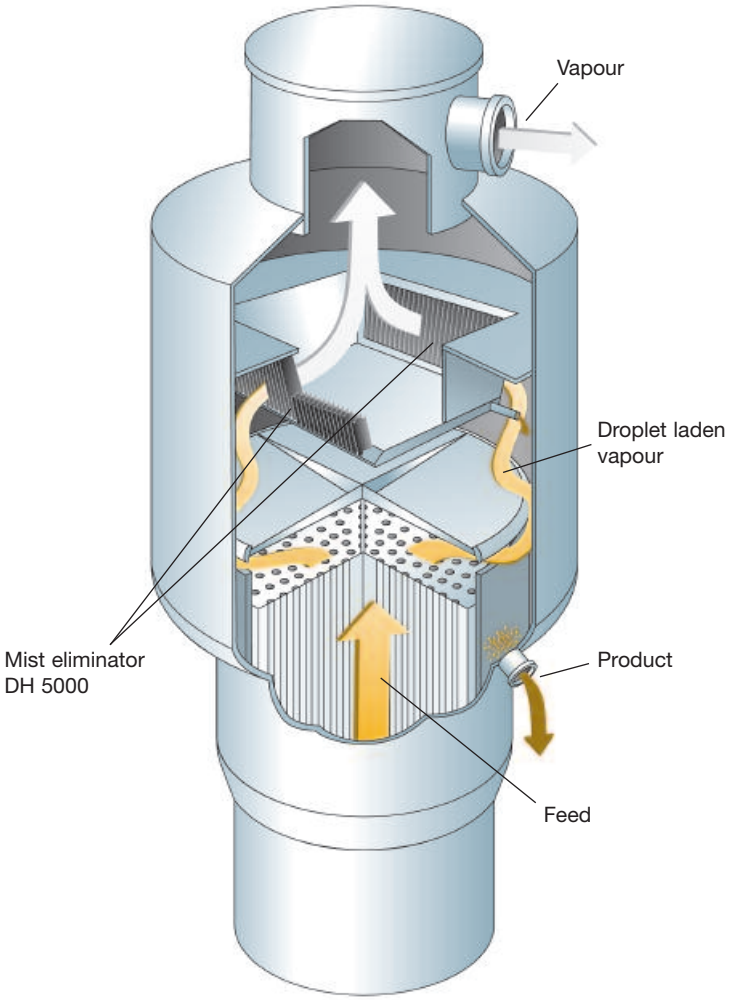
Pulp & paper

Black liquor produced during wood pulping contains a high concentration of chemicals and solid wood fibres. Multi-stage evaporation, followed by efficient mist elimination capable of handling high velocities, can yield up to 70% dry material together with recovery of the process chemicals.

Customer benefits:

- Minimal pressure loss even at high velocity
- Predictable performance
- High corrosion resistance for long life
- Easy maintenance

For more product information, please see the technical leaflets for DV 270 (T 271) and DH 5000 (TS-5).



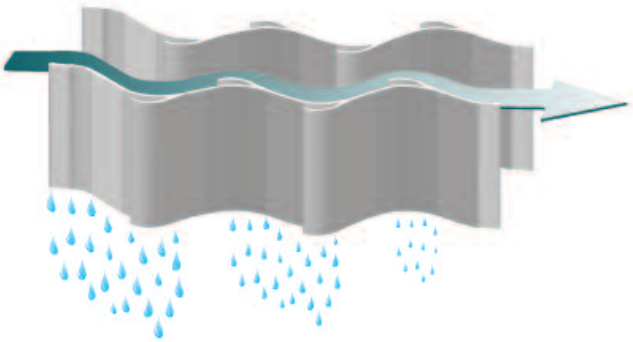
Sugar production

Sugar refining, whether from beet or cane, highlights the problem of viscosity. Concentration of product in the evaporation process requires efficient mist eliminator vane design to capture and return the product efficiently without clogging.

Customer benefits:

- Efficient recovery of product thus minimizing sugar loss
- Predictable performance
- No clogging design of the mist eliminator

For more product information, please see the technical leaflets for DV 270 and DH 5000.



DH 5000 (TS-5) droplet separator is designed for horizontal gas flow.
The gas charged with liquid droplets is directed through eliminator chambers which are designed for maximum effect on the gas flow.

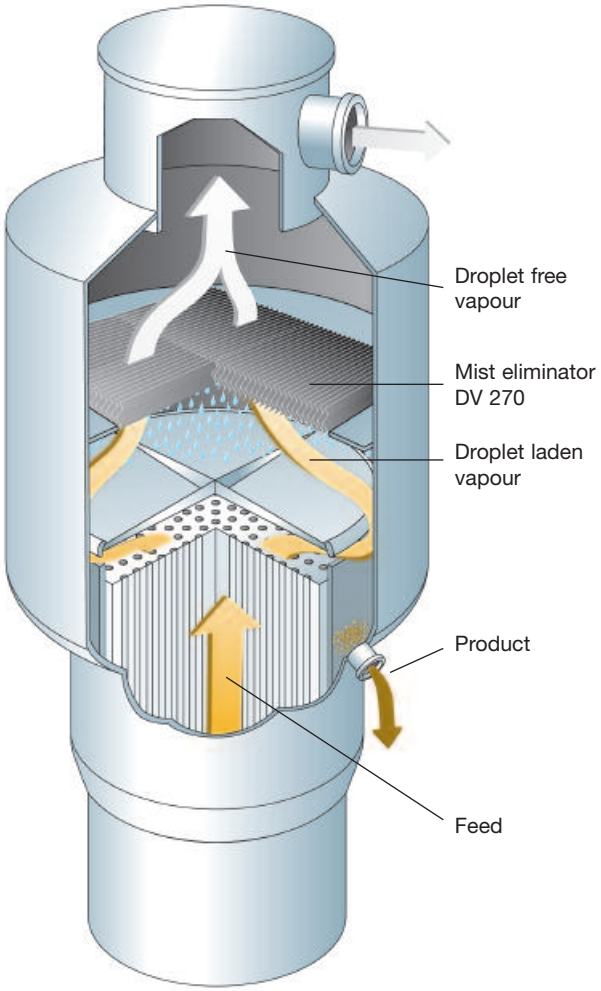
Desalination

Desalination processes generally require high velocity, high volume treatment. This calls for mist eliminators capable of operating efficiently at high flow velocity and also capable of resisting the highly corrosive nature of the salt condensate.

Customer benefits:

- High efficiency at high velocity
- Possible reduction of apparatus diameter
- High resistance to corrosion
- Efficiency of condensate removal facilitates downstream operation

For more product information, please see the technical leaflets for DV 270, DH 2100, DH 4300 and DH 5000.



DV 270 (T 271) is a vane type separator for vertical flow.
The gas charged with liquid droplets is directed through eliminator chambers which are designed for maximum effect on the gas flow.

Distilling

Predictable, efficient recovery of the high value product is essential to the distilling industries. The wide choice of mist eliminator profile material also ensures a neutral reaction with the product.

Customer benefits:

- Efficient, predictable recovery of product
- Flexible installation – will fit any vessel
- Choice of material

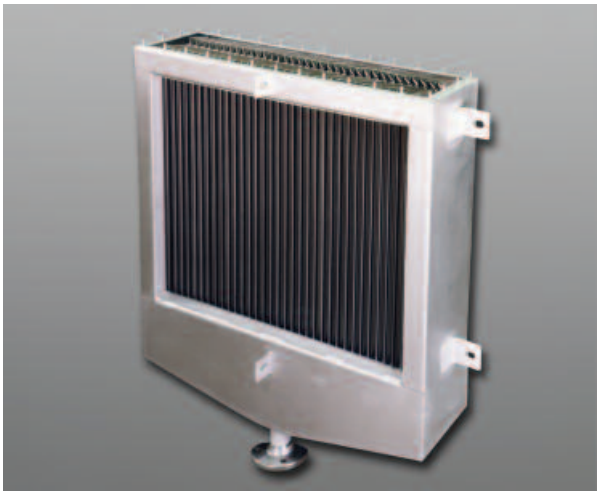
For more product information, please see the technical leaflets for DV 270 and DH 5000.

Reduce wastage and prevent damage

Water in a vacuum boils at a lower temperature so evaporators with vacuum columns save energy and can also save raw material. The evaporated water serves to heat up the next stage of the process but if impurities are contained in the heating steam, as they usually are, damage can very quickly be caused downstream.

Since every droplet lost in the heating system represents wastage, mist eliminators should be installed at the top of the evaporators. By purifying the superheated steam, this not only eliminates clogging and fouling, it also reduces product loss.

DV 270 vane type mist eliminator for vertical flow, here in black PVC.



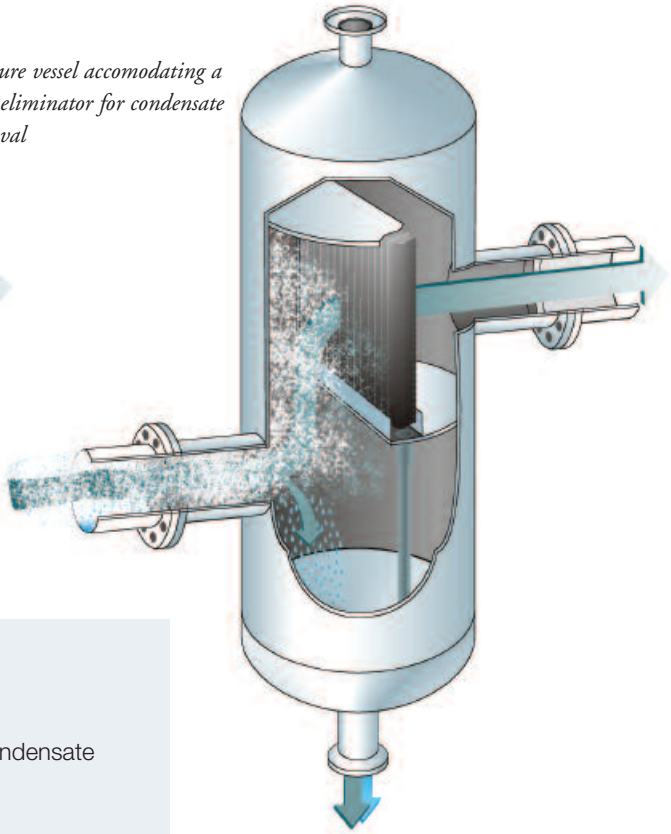
Stainless steel separator with a DH 5400 vane section.

Cooling down gases

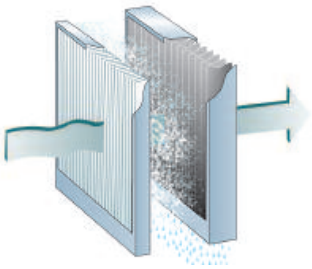
Condensate forms whenever cooling down of gas occurs. Unless removed, this condensate is likely to be highly damaging to the equipment located downstream. Moreover, without removal of entrained moisture, more energy will be required to compress gas before it is passed to next process phase.

Whenever condensation occurs, either when forced by cooling or compression or caused naturally by temperature-drops in the process mist elimination is essential. By using the appropriate 'low drag' mist eliminator profiles however, higher gas velocities can be accommodated without excessive pressure drop, enhancing overall process efficiency. This optimizes the process flow and also helps reduce the energy requirement. Gravity draws the collected liquids away for treatment, re-use or disposal.

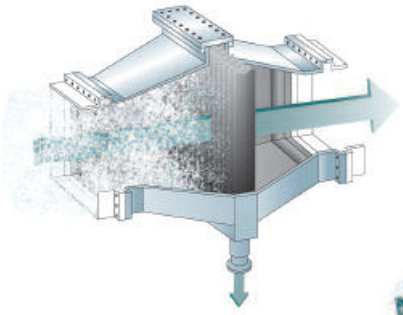
The formation of aggressive condensate from process gases can terminally damage compressors and other equipment. Effective mist elimination with optimized profiles protects this equipment while still permitting high gas velocities without moisture carry-over.



Pressure vessel accomodating a mist eliminator for condensate removal



Condensate after the heat exchanger.



Housing accomodating a mist eliminator for condensate removal.

Customer benefits:

- Protects valuable downstream equipment from corrosive condensate
- Reduces risk of malfunction and process outages
- Stainless steel, plastic or other special materials
- High efficiency at high gas velocities
- Minimal maintenance (only when contaminants in gas flow)
- Standard and customized dimensions

For more product information, please see the technical leaflets for DV 270, DH 2100 and DH 5000.

Gas cleaning

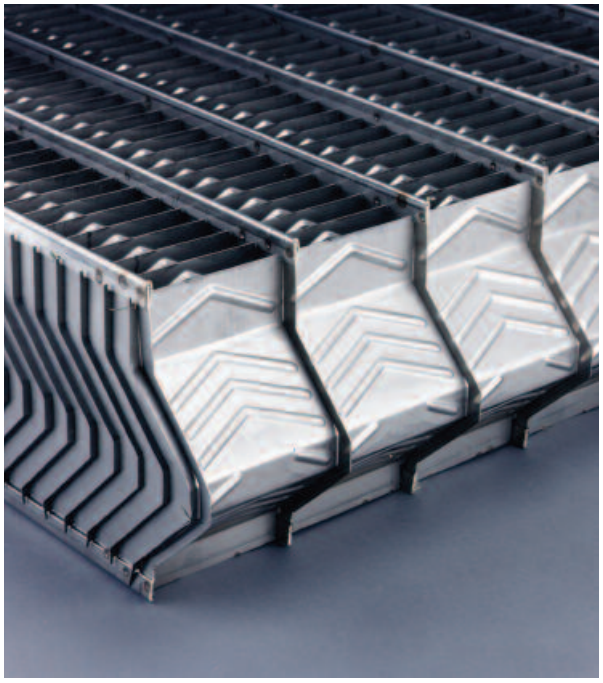
The growing ability of wet gas scrubbers to remove contaminants from industrial process gas streams requires efficient mist eliminators to remove entrained scrubber liquid. Demands on process speed frequently result in high gas velocities and this in turn can result in carry-over of liquid. This liquid may be highly aggressive. Efficient elimination of this liquid and preventing droplets from being carried over, the downstream components are protected from damage and possible process outages are prevented.

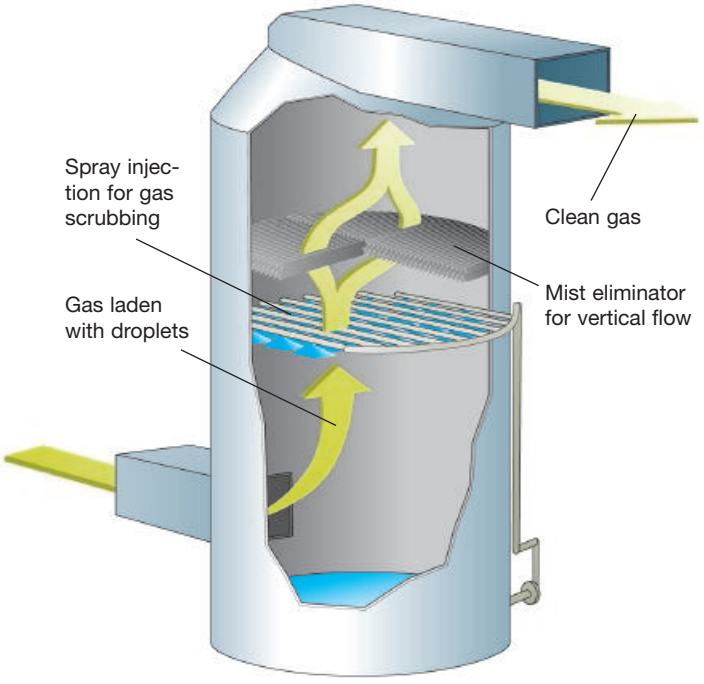
This technique has been in extensive use for more than 30 years but evaluation of the design parameters is a complicated process and inappropriate equipment can hinder process efficiency. As mist elimination and humidity experts, Munters offer a wide range of standard and customized solutions for both newbuild and retrofit installations. Available in polypropylene, PVC, PVDF, stainless steel and other materials, these mist eliminators can also be installed as two or three stage systems where the particulate loading is high.

Customer benefits:

- Efficient removal of entrained scrubber liquids
- High efficiency even at high gas velocities
- Easy installation and maintenance
- Newbuild and retrofit

For more product information, please see the technical leaflets for DV 270, DV 880, DV 210 and DH 2100.





Wet scrubber with mist eliminator. Liquid carry-over from the cleaning process is eliminated in the vane section of the scrubber and falls back by gravity. Depending on the required cleaning efficiency the mist eliminator can consist of 2 or 3 stages.

Mist elimination in other processes

Stack “rain-out”

Addressing the demands of the increase in clean air legislation around the world is a major concern of the process industry and it affects both newbuild plants and retrofits. These demands can affect the very profitability of a plant so it is essential that the cleaning technology not only meets the requirements and does so without adversely impacting the process itself.

Stack rain is one of the most visible manifestations of industrial processes. It occurs every time when saturated exhaust gas is released into colder air. Depending on the process stack rain, its elimination is straightforward with Munters’ spin vane separators.

The design of the spin vane rotates the gas flow so that the entrained liquid droplets impinge on the separator before being drawn by gravity into a drainage chamber for recycling or disposal. This design renders the eliminator insensitive to deposits to reduce maintenance and cleaning requirements.

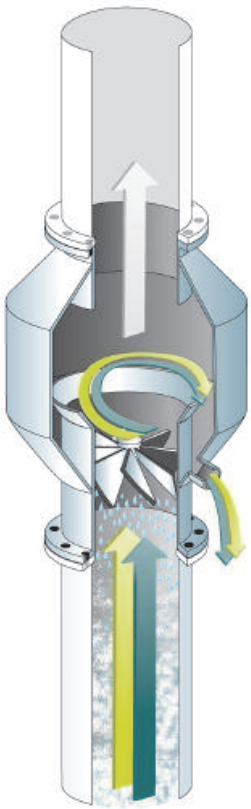
Stack rain separation units help to clean the emissions.

Featuring a modular design, these can be retrofitted as well as manufactured for new chimneys. Installation is straightforward and even horizontal gas flows can be accommodated.

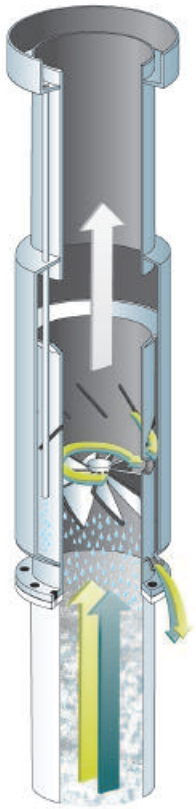
Customer benefits:

- Visible reduction in emissions
- Fits all chimney stacks
- Easy installation – newbuild and retrofit
- Droplets and particles can be recovered for use and disposal
- Meets the most stringent emission requirements
- Also accommodates horizontal flow configurations

For more product information, please see the technical leaflets for DS 8200 and DS 8300.



Spin vane separator DS 8200 for vertical and horizontal flow.



Spin vane separator DS 8300 for vertical flow.

Mist elimination is our business

Wherever droplets need to be separated from gas flow, mist eliminators can do the job. But while the principle is simple, applying the technology efficiently and to maximum effect is demanding. Munters have the knowledge and the experience to handle it.

Munters have been refining the technology for decades, and working closely with customers in a wide range of process industries. The mist eliminator profiles are continuously assessed and developed as processes and conditions evolve. Design parameters for installations are evaluated using an extensive database and a powerful design program. The results are then laboratory tested. Our close attention to detail and the expertise of our R&D departments have made us the leaders in this technology.

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