

STAMI UREA



## MICROMIST™ VENTURI SCRUBBER

The best available technique  
for emission prevention in  
urea production.

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The innovation & license company  
of Maire Tecnimont.



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## The challenge

Over the past decades, emissions have become a regulatory priority for many governments. Adverse human health effects associated with both long-term and short-term respiratory exposure to fine ambient particulate have been well documented.

As emission standards become increasingly stringent, there is a constant demand for more effective pollution control technologies. In addition, the operating costs of running pollution control equipment can be substantial, and so there is a simultaneous demand for economically efficient emission control technologies.

## Our Solution

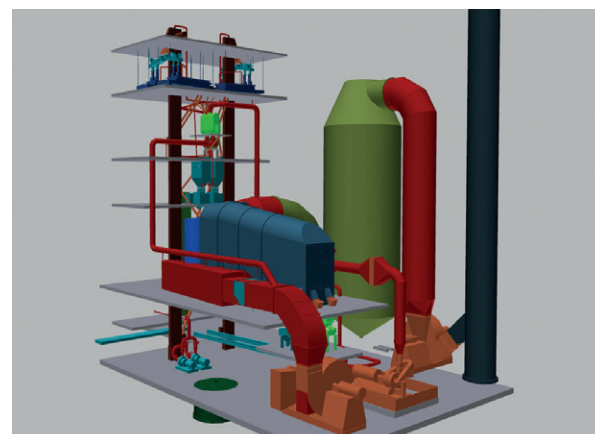
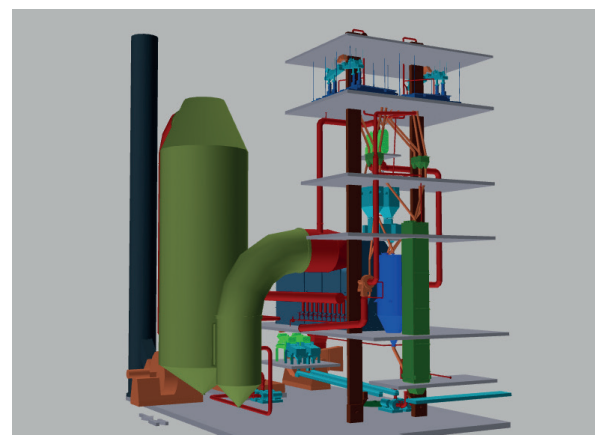
### The MicroMist™ Venturi Scrubber

A high-efficiency scrubbing technology which allows high submicron particulate matter ( $< 1.0 \mu\text{m}$ ) and efficient ammonia collection, while producing concentrated blowdown streams.

By using this technology, urea dust emissions as low as  $10 \text{ mg/Nm}^3$  can be obtained. An additional polishing Wet ElectroStatic Precipitator (WESP) can be integrated into the MMV scrubber vessel to further reduce urea particulate emissions to as low as  $5 \text{ mg/Nm}^3$ . This scrubbing technology has been paired with Stamicarbon's urea fluidized-bed granulation technology, setting a new standard in urea granulation and emission control.

## Benefits:

- Easy installation due to modular design
- Meets new stringent emission regulations
- Demonstrated High Performance Collection of Submicron Particulate
- Best available turndown ratio
- High quality, low maintenance components
- Suitable for revamping or retrofitting existing scrubbers
- Proven track record

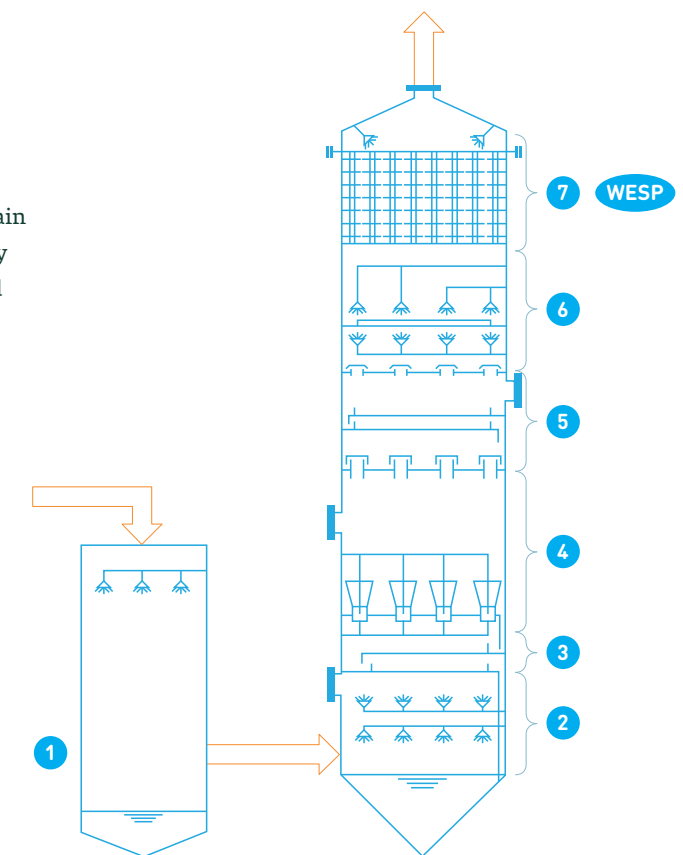


## The MicroMist™ Venturi Scrubbing Technology

The Envirocare MMV scrubbing system can contain up to six stages that progressively treat and purify the exhaust gas from Stamicarbon's fluidized-bed urea granulator.

## The six stages are represented in the figure and consist of:

- 1 - Concentrated urea quench
- 2 - Diluted urea quench
- 3 - DOI conditioning trays
- 4 - MicroMist™ Venturi (MMV) tubes
- 5 - Acid treatment for  $\text{NH}_3$  capture
- 6 - High-efficiency mist eliminator stage
- 7 - Wet Electrostatic Precipitator (WESP) - optional to further reduce dust



## The MicroMist™ Venturi submicron collection Stage

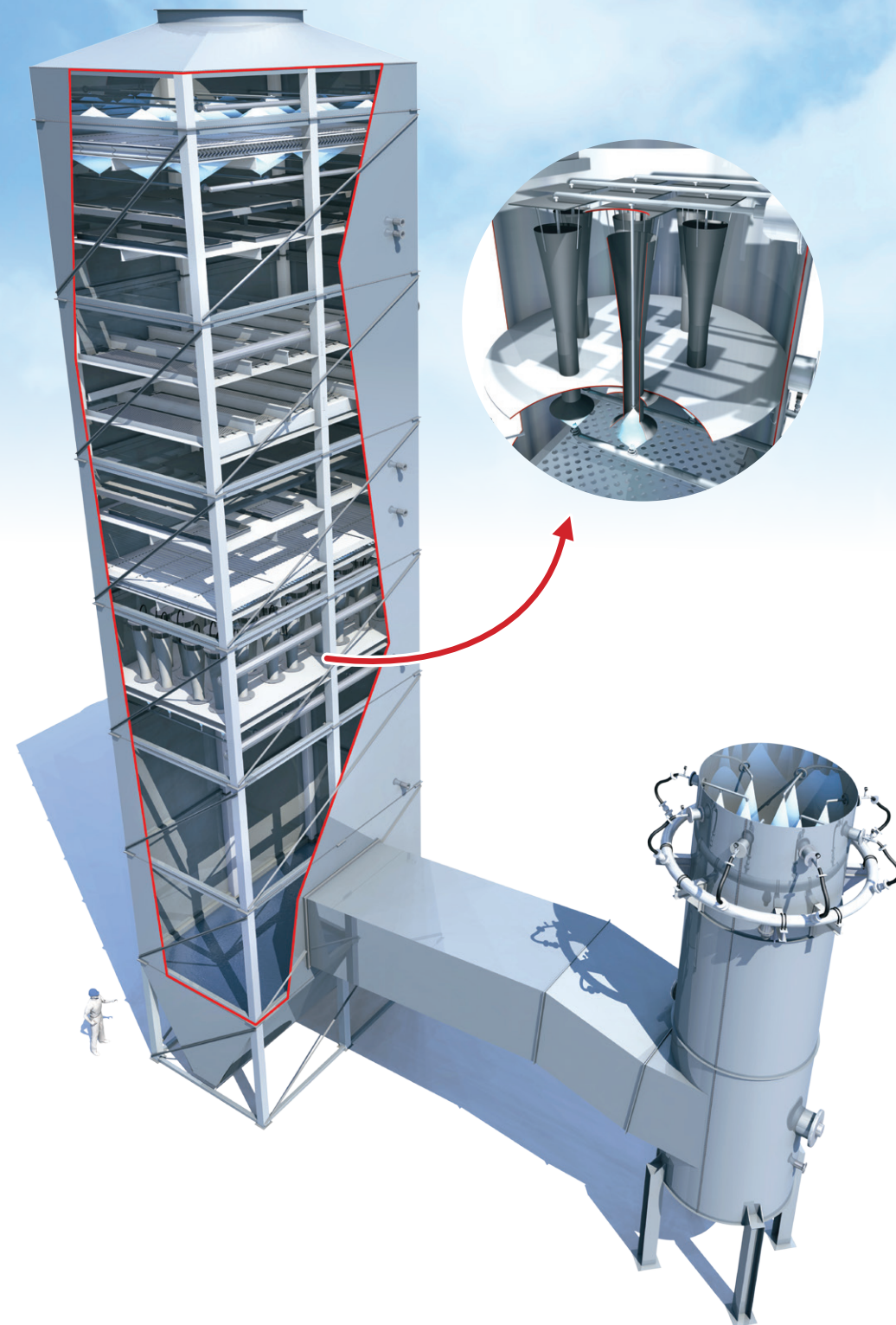
Each Venturi tube includes a converging conical section (the inlet), where the exhaust gas is accelerated to throat velocity, a cylindrical throat, and a conical expander, where the exhaust gas is slowed down and energy is recovered.

A MicroMist™ atomization nozzle is located at the entrance of each Venturi tube for co-current spray. A second nozzle is coaxially located in the throat of the Venturi tube. The throat nozzle is directed upstream for counter-current spray, and is primarily used to maintain the required pressure drop across the Venturi to assure gas/particle interaction, when there are large fluctuation in the exhaust gas volume to be treated.

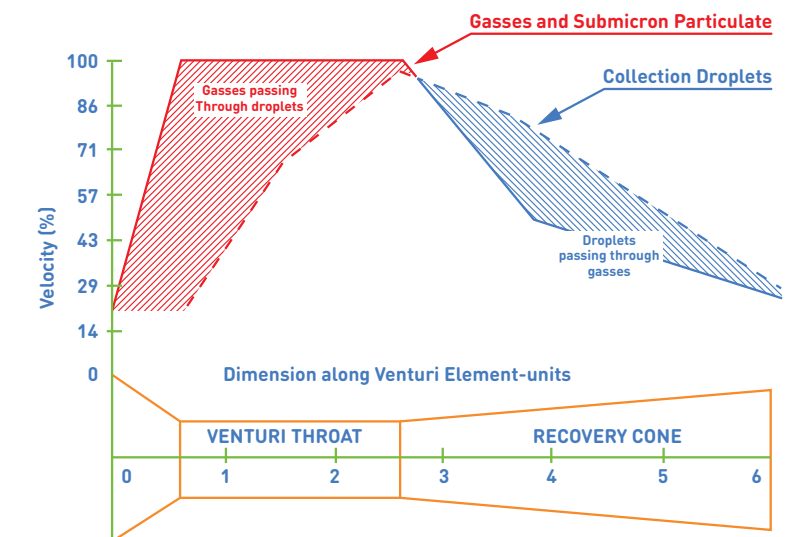
Both the inlet and throat nozzles are operated at high pressure, producing fine droplet sprays. In the MMV tube, exhaust gases containing particulate matter interact twice with the scrubbing liquid droplets (acceleration and deceleration). This promotes submicron particulate collisions with MicroMist™ droplets, resulting in high capture efficiencies of submicron particulate matter.

The final design, configuration, the total pressure drop over the MicroMist™ Venturi scrubber and the setup of the acid treatment is driven by the requested urea dust and ammonia emission values present in the air permit of the plant and the specific requirements of the client.





#### Particle-droplet double collisions along the MMV stage



#### Did you know?

- Stamicarbon has the skills and capabilities to revamp/retrofit an existing tray or wet scrubber to a MMV scrubber design in order to improve the collection efficiency for submicron urea dust.
- Stamicarbon designed a high efficiency scrubber concepts that collect the submicron urea dust coming from a prilltower. The newly developed scrubber technologies can either be installed on top of the prilltower or at ground level, depending on the allowable dynamic load of the prilltower and your requirements.
- Stamicarbon can offer its customer tailor-made schemes for reprocessing both Ammonium Sulfate (AS) as well as Ammonium Nitrate (AN) salts generated by acidic scrubbing processes with the possibility for full integration with the production of UAN or UAS product: [www.stamicarbon.com/ammonia-salt-rework-design](http://www.stamicarbon.com/ammonia-salt-rework-design)