

## WET SCRUBBERS



**MIKROPUL**

DRY FILTRATION  
WET SCRUBBERS  
CYCLONES  
WET ELECTROSTATIC  
PRECIPITATORS

# MIKROPUL WET SCRUBBERS

MikroPul has been a pioneer world-wide in providing wet scrubbers to solve air pollution control problems for over 30 years. We offer six different designs to meet almost any requirement:

- Vaned scrubber with no moving parts
- Dynamic scrubber with integral fan
- High efficiency venturi scrubber
- Multi-venturi scrubber
- Rotary scrubber
- Packed towers for gas absorption

In addition, we can provide these in several configurations and a full range of sizes as well. Our scrubbers can be supplied in carbon steel, plastics/FRP, or exotic stainless steels.

With our experience and worldwide resources, MikroPul has the capability to engineer a wet scrubber system that efficiently meets your needs.

## Industries Utilizing MikroPul Scrubbers

Our scrubbers are found in a wide variety of industries around the world, including:

- Aluminum
- Automotive
- Chemicals
- Coal
- Detergents
- Fertilizers
- Foundries
- Incineration
- Iron ore
- Mining
- Plastics
- Potash
- Pulp & Paper
- Rock products
- Waste water treatment
- Steel

## Systems Capability

MikroPul can provide complete turnkey dust control system design including scrubbers, cyclones, fabric filters, and other components. Our capabilities include:

- Process analysis
- System design
- Equipment supply
- Installation
- Start-up
- Testing

MikroPul offers unmatched collective experience, facilities, equipment, and expertise - the best overall capabilities in the world of dust control and product recovery.

Selection Guide					
Mikro-Vane	Dynamic	Venturi	Multi Venturi	Rotary	Packed Tower
Sample Applications					
Dryers	Lime kilns	Lime kilns	Wood fired boilers	Waste incineration	Waste incineration
General dedusting	Lime shakers	Dryers	Metallurgical fumes	Pigments	Flotation cells
Mining	Dissolving tanks	Foundries	Mining	Fertilizer	Calcining
Polypropylene dryers	Mining	Shredders		Absorption of HF, H <sub>2</sub> S, NH <sub>3</sub>	Odor control
	Minerals	Minerals		Odor removal	Reagent preparation
Typical pressure Drop Ranges [kPa]					
0,5-1,5	1,2-4	2,5-15	1,5-15	0,8-1,5	0,5-0,75
Approximate Liquid Requirement [l/m <sup>3</sup> ]					
0,3-0,6	0,3-0,4	1-2	0,6-2	1-2	Application dependent

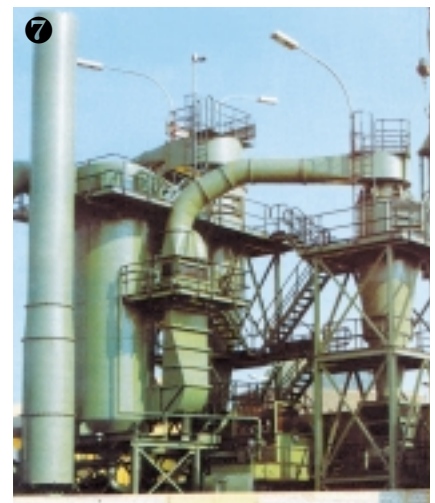
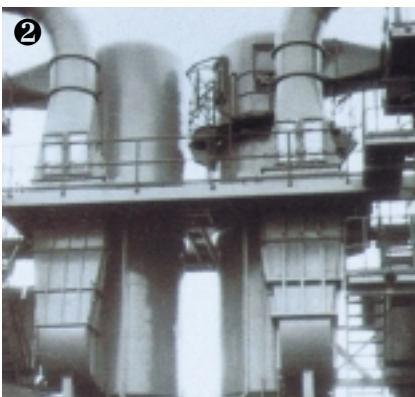


Scrubbers on aluminium pot lines (Australia).

### Installations around the World

MikroPul offers substantial engineering and manufacturing capabilities on a global scale. Examples include:

1. Venturi scrubber for automotive plant foundry (Canada).
2. Venturi scrubbers for car shredding plant (United Kingdom).
3. Dynamic scrubber for ore crushing plant (Australia).
4. Multi-venturi scrubber for Bark boiler (Canada).
5. Packed Tower for ammonia absorption (Germany).
6. Venturi scrubber on autoclave vent for gold mining operation (USA).
7. Pressure-shock resistant venturi scrubber (Germany).
8. Venturi scrubber for mine production shaft dedusting (under construction, South Africa).



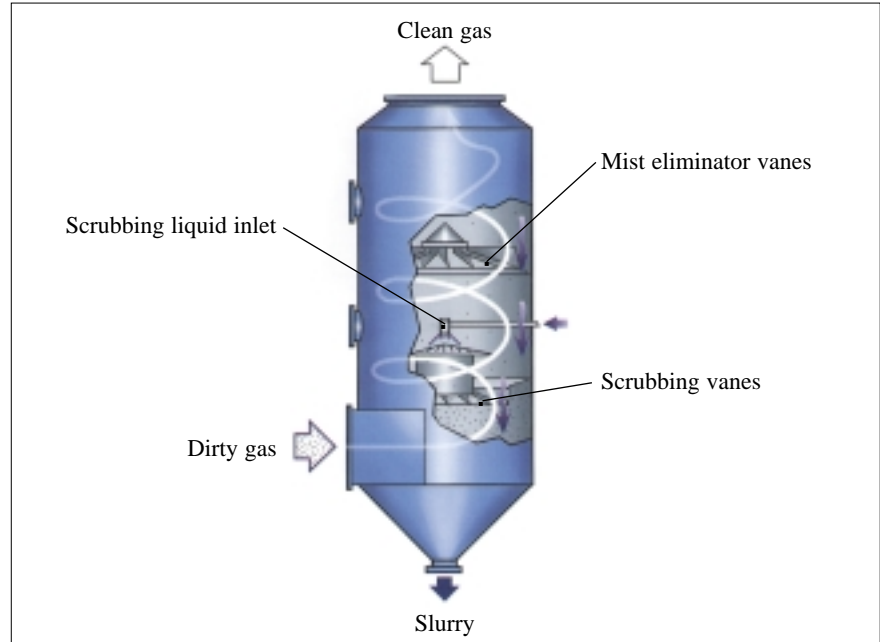
# MIKRO-VANE SCRUBBER

## Operation

Scrubbing liquid is introduced into the scrubber as a spray directed down over a circular “scrubbing vane” arrangement. As the liquid drains through the vanes, it creates curtains of scrubbing liquid. Dust laden gas enters the scrubber tangentially and collides with the curtains initiating particle agglomeration. The coarser particles produced are washed down to the slurry outlet.

A restriction disc located in the scrubbing vane assembly accelerates the spin velocity of the gas. This action combined with the flood of atomized liquid from the spray causes the formation of fine liquid droplets which encapsulate the fine particulates, again enhancing agglomeration.

The cyclonic action of the saturated gas stream as it spins upward forces the agglomerated particles to fall out of suspension. The coarser droplets



impinge on the mist eliminator vanes and the finer droplets are forced to drop out of suspension by gravitational

and centrifugal forces acting on the gas stream as it exits through the top.

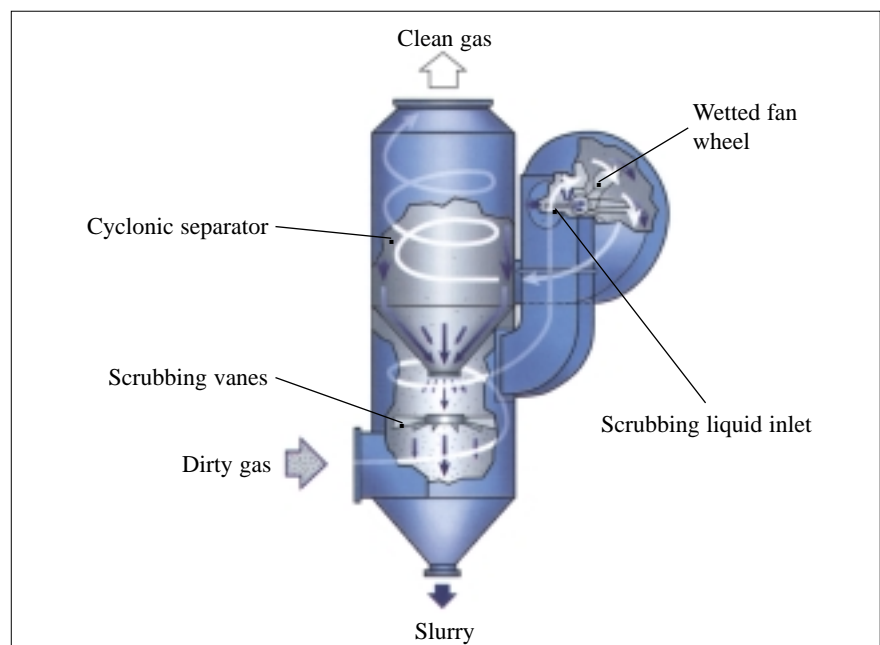
# DYNAMIC SCRUBBER

## Operation

Dust laden gas enters the lower chamber of the scrubber tangentially, imparting a cyclonic action to the stream. Coarse particles are removed by a combination of centrifugal and gravitational forces.

The stream encounters slurry, created in a later stage, coming down from the upper chamber and becomes partially wetted, initiating agglomeration. As the stream spins through a series of scrubber vanes, intermediate sized particles impinge on the wetted surfaces of the vanes. These particles are then washed down.

The gas stream containing the remaining fine dust is drawn into an adjacent chamber containing a fan. Atomized scrubbing liquid is sprayed into the eye of the fan, further reducing droplet size. These droplets encapsulate the fine dust particles, thus enhancing agglomeration.



The gas stream then flows into the upper chamber tangentially at high velocity. The wet agglomerated particles are forced by cyclonic action against the

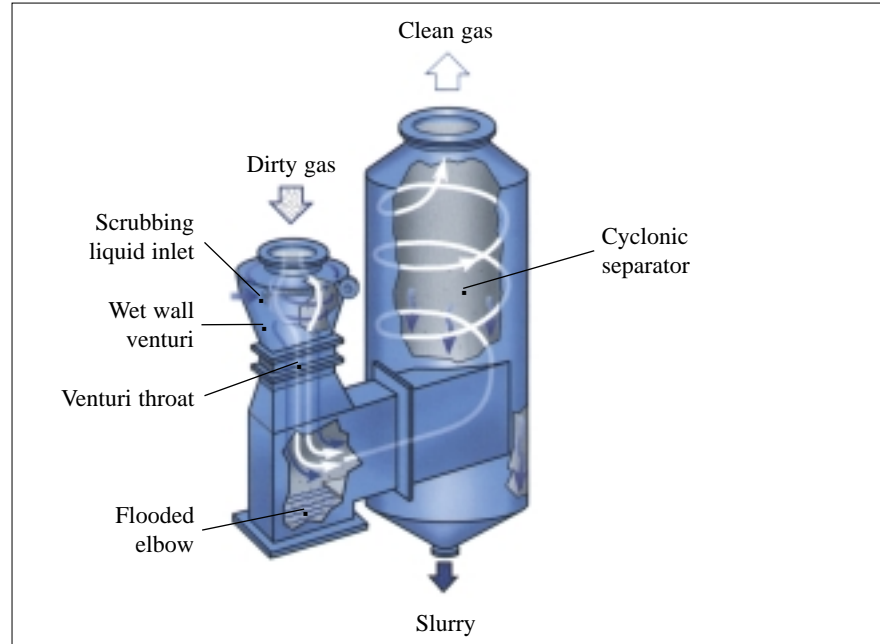
chamber walls and drain down to the internal discharge cone. The gas stream, free of liquid droplets, spins out through an outlet atop the scrubber.

# VENTURI SCRUBBER

## Operation

The design of the MikroPul Venturi Scrubber consists of a “wet approach” venturi followed by a liquid entrainment separator. Dust laden gases enter the venturi and instantly make contact with the tangentially introduced scrubbing liquid swirling down the venturi’s converging walls.

At the venturi throat, the gas and liquid streams collide and the liquid breaks down into droplets which trap dust particles. This gas/liquid mixture passes through a flooded elbow, and then enters the entrainment separator through a tangential inlet. Centrifugal action removes the heavy wetted particles from the gas stream. As an alternate, when very large diameter separators are required, the liquid is separated by passing the stream through a chevron-type mist eliminator baffle.



The dust/liquid mixture is discharged from the separator bottom drain and

the cleaned gas leaves through the top of the separator.

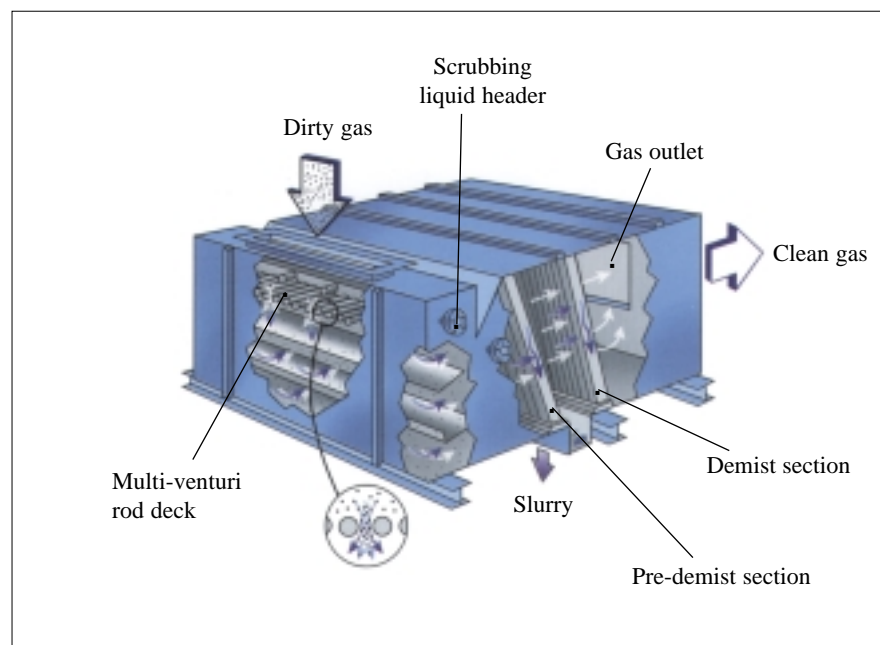
# MULTI-VENTURI SCRUBBER

## Operation

The dirty gases are directed through a venturi-rod deck where atomized scrub water is introduced concurrently with the gas stream. The scrub water is sprayed through a series of low pressure, large orifice nozzles, distributing it evenly across the deck.

The gas rapidly accelerates as it passes through the venturi-rods. This action creates smaller droplets, causing encapsulation of the particles and increasing the collection efficiency of submicron particles.

As the gases exit the venturi-rod area, velocity slows causing the larger particulate laden droplets to fall out of the stream. The scrubbed gases are then directed toward a two-stage demisting zone by distribution baffles or turning vanes. Primary demisting and gas distribution occurs in the predemist area, which removes 90% of the water. The remaining free water



droplets are removed by impingement on the final stage demist vanes.

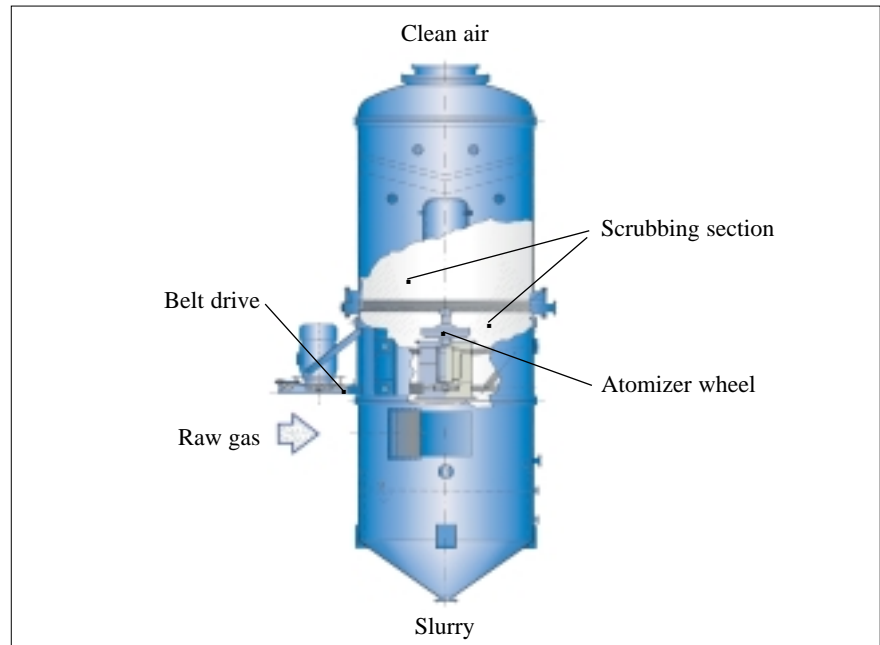
The scrub water collected prior to the

demist section flows down the scrubber floor to the drain trough. The dewatered scrubbed gases are exhausted via the scrubber outlet.

# ROTARY SCRUBBER

The dust laden gases enter the unit tangentially. A significant portion of dust is eliminated by intermixing the scrubbing liquid with the cyclonic gas flow.

The gas passes one or two washing sections. Drop dispersion takes place there through a fast rotating atomizer wheel which is driven by an electric motor with a belt, both located outside the scrubber housing. The washing liquid is centrally supplied to the guide vanes of the atomizer wheel and accelerated in guide channels to a thin liquid film. At the outside edge of the wheel the liquid film disintegrates into fine droplets, whose size can be influenced by the number of revolutions and the liquid quantity. Over the entire cross section of the flow a continuous liquid curtain is created. Due to forces of inertia and diffusion, solids and gaseous pollutants in this vortex wash zone are separated. Particle/droplet agglomerates are forced against the



chamber walls and washed down to the sludge outlet. If higher separation efficiencies are necessary, a second

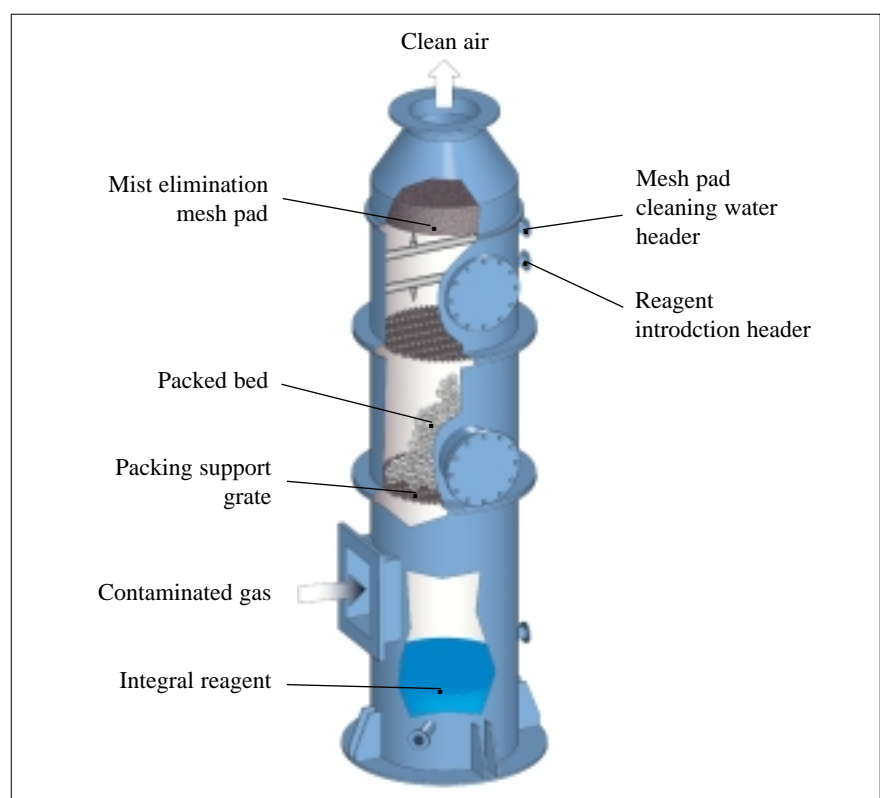
washing section is applied. The final stage is a mist eliminator, after which the cleaned gas exits atop.

# ABSORPTION TOWER

## Operation

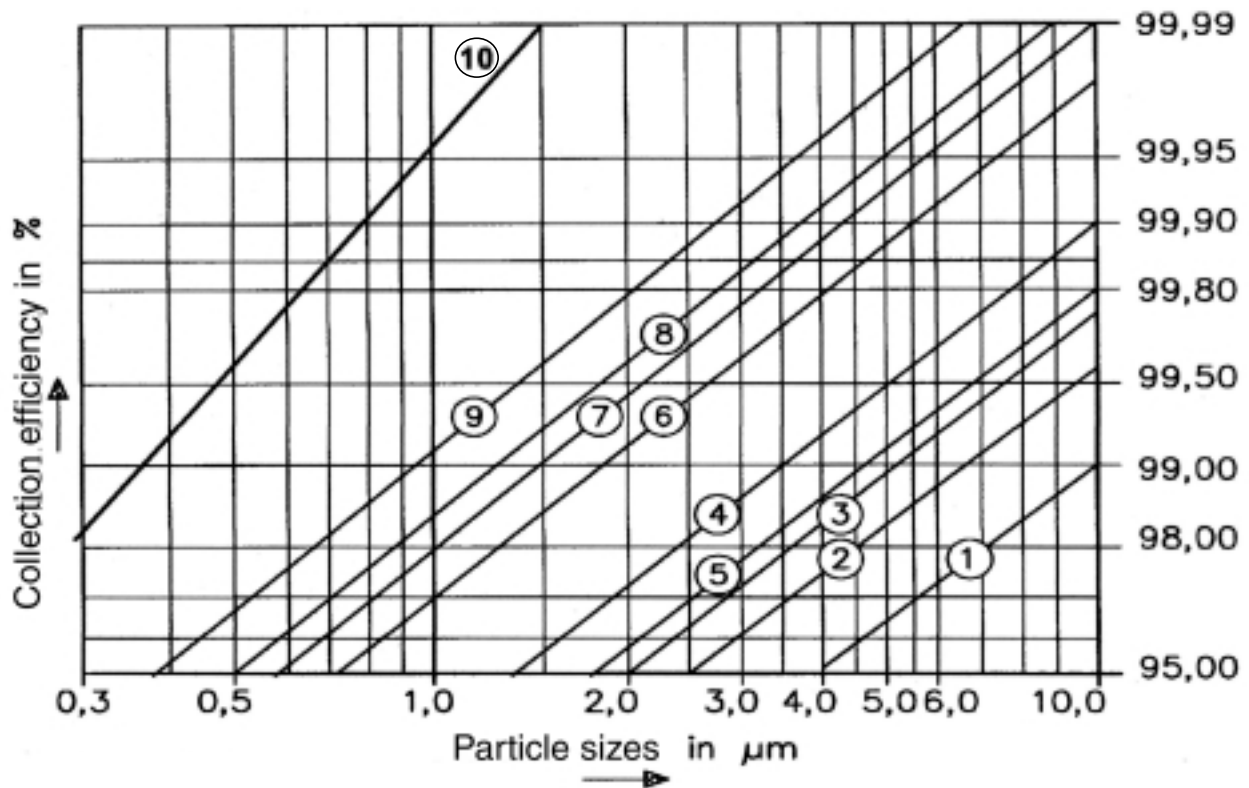
Pollutant laden gases enter at the bottom of the packed tower and rise upward, making contact with the scrubbing liquid draining down through the packed column. Since the pollutant concentration decreases as the gas rises, there is constantly fresher solvent available for contact, resulting in an efficient removal of contaminants. Finally, the fine moisture droplets, still suspended in the cleaned gas stream, are removed by a mist eliminator.

Scrub liquid from the eliminator is collected in an integral reservoir and recycled to the tower. Makeup liquid is constantly introduced, and reagent is added on demand using a dosing pump controlled by a pH monitor.



# EFFICIENCY GUIDE

## General Scrubber Fractional Efficiencies



## Scrubber Type and Pressure Drop in Pa (100 Pa = 1 mbar = 10 mm WG)

1. Mikro-Vane Scrubber	LPS	1000
2. Mikro-Vane Scrubber	LPS	1300 - 1500
3. Mikro-Vane Scrubber	LPS	2000 - 2300
Mikro-Venturi Scrubber	MVS	1500
4. Mikro-Vane Scrubber	LPS	2800 - 3000
5. Rotary Scrubber one stage	MRW	800
with 1,0 Liter Washwater/m <sup>3</sup> Gas		
6. Venturi Scrubber	SVS	4000
Dynamic Scrubber	DS 2	3500 - 4000
Multi-Venturi Scrubber	MVS	3500 - 4000
7. Rotary Scrubber one stage	MRW	850
with 1,6 Liter Washwater/m <sup>3</sup> Gas		
8. Venturi Scrubber	SVS	6500 - 7600
9. Venturi Scrubber	SVS	10000
10. Wet-Pulsaire® Filter	WET	4500

# MIKROPUL SUPPORT

MikroPul backs up our products and systems with worldwide customer support. Call us any time you need help.

## Parts

Because we know your equipment, MikroPul is your best resource for parts. We carry a full line of replacement parts, and keep high wear items such as pumps, valves, fans, spray nozzles, packing, vanes, etc. in stock for immediate shipment.

## Services

MikroPul provides an array of services to help you select, install, operate, and maximize your equipment investment. We also have the unique capability to update your system to meet today's changing operating

conditions and performance requirements. Services include:

- Complete systems evaluations
- Mechanical equipment review and evaluation
- Equipment refurbishing
- Equipment rebuilding
- Technical training
- Maintenance training

Whether you need spare parts, equipment service, or complete system rebuilds, we are here to support your requirements.



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