Wet Scrubbers

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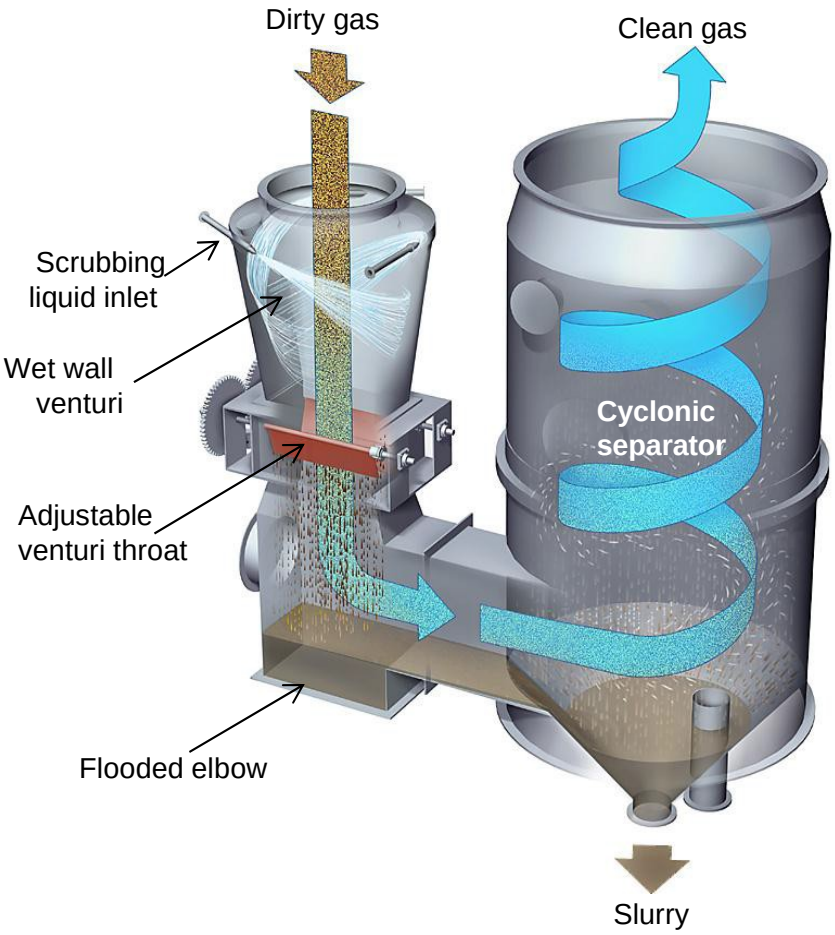
ACTOM

Wet Scrubbers

Venturi Scrubbers

- Typically used for removing particles in sub-micron to 3 micron range.
- Wetted wall venturi inlet eliminates build-up.
- Adjustable venturi throat maintains constant pressure drop at varying airflows.
- 98%+ collection efficiency in 1 – 3 micron range.
- Capacities of 700 – 500,000 m^3/hr



Operation:

The design of the 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.

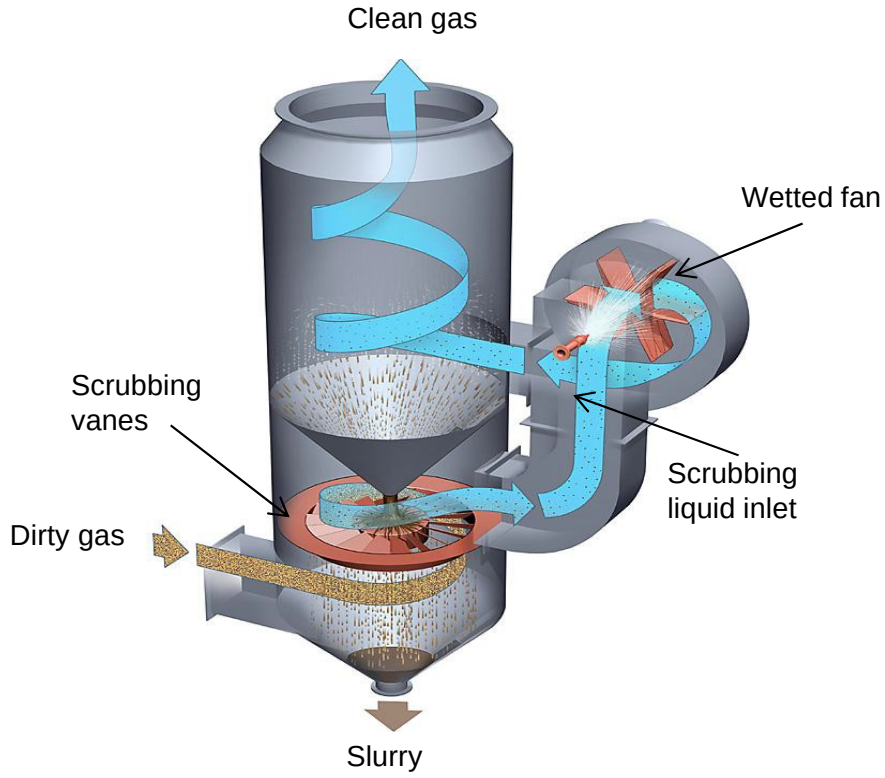
At the venturi throat, the gas and liquid streams collide and the liquid breaks down into droplets which trap dust particles. This gas/liquid mixture passes through a flooded elbow, and then enters the entrainment separator through a tangential inlet. Centrifugal action removes the heavy wetted particles from the gas stream. As an alternative, 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 leave through the top of the separator.

Wet Scrubbers

Dynamic Scrubbers

- Versatile, compact design with integral wetted fan.
- Reduced installation and energy costs.
- At 1,25 kPa, performance equal to Venturi Scrubber at 3,75 kPa.
- 98%+ collection efficiency in 1 – 3 micron range.
- Capacities of 700 – 130,000 m³/hr



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.

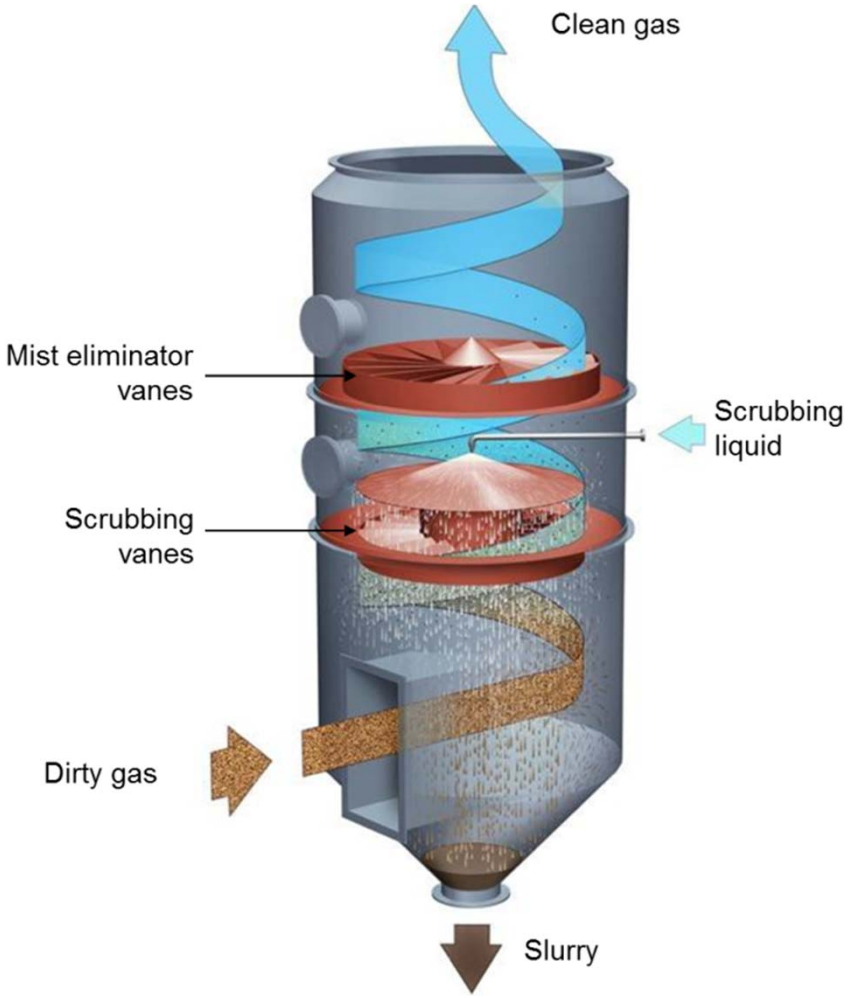
The gas stream containing the remaining fine dust is drawn into an adjacent chamber containing a fan. Atomized scrubbing liquid is sprayed into the eye of the fan, further reducing droplet size. These droplets encapsulate the fine dust particles, thus enhancing agglomeration.

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.

Wet Scrubbers

Vane Scrubbers

- Generally used for de-dusting applications.
- Most economical wet scrubber lineup.
- Low liquid and energy requirements.
- 90%+ collection efficiency in 1 – 3 micron range.
- Capacities of 700 – 100,000 m^3/hr



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.

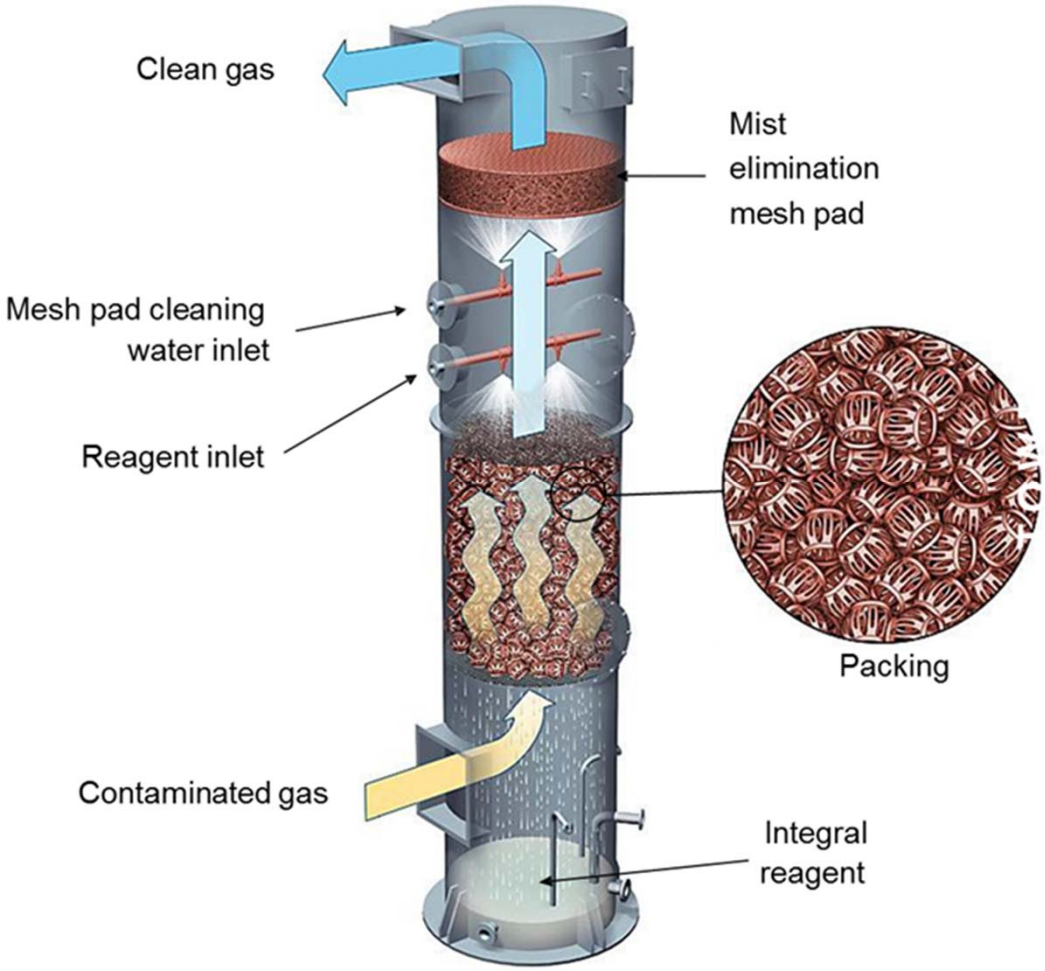
A restriction disc located in the scrubbing vane assembly accelerates the spin velocity of the gas. This action combined with the flood of atomized liquid from the spray causes the formation of fine liquid droplets which encapsulate the fine particles, again enhancing agglomeration.

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 acing on the gas stream as it exits through the top.

Wet Scrubbers

Packed Tower

- Can be used for gas absorption, cooling, humidification or condensing.
- High removal efficiencies for many gaseous pollutants, such as SO_2, HCI, HF, NH_3 ,etc.
- Complete skid mounted units with reagent preparation, fan, pumps, controls, etc.
- Custom engineered and optimized.
- Capacities of 850 – 130,000 m³/hr.



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. Make up liquid is constantly introduced, and reagent is added on demand using a dosing pump controlled by a pH monitor.

Wet Scrubbers

Selected references:

Kumba Iron Ore
Kolomela Mine, Sishen South

Venturi Scrubbers
Crushing and Screening Plants

Kumba Iron Ore
Sishen Expansion Project

Venturi Scrubbers
Crushing and Screening Plants

Hulamin

Venturi Scrubber – Linishing Plant
Dust Extraction