Technology Portrait:
Doosan Lentjes Wet Scrubber

We have decades of experience in the design, construction and optimisation of wet scrubbers. To date, over 200 wet flue gas cleaning systems based on Doosan Lentjes technology have been installed in various plants around the world.

Our technology can be applied in sewage sludge incineration plants, in power plants as well as in industrial facilities and plants for the thermal treatment of waste.

Due to the optimal utilisation of additives, wet scrubbers are used when you aspire to keep the operating costs for additives and the amount of residual material low.

If lime-based additives are used (e.g. limestone or hydrated lime), the valuable material gypsum can be produced instead of residual material to be landfilled. Furthermore, the use of wet scrubbers as the second stage of a flue gas cleaning system is an option if your aim is to achieve particularly low emission values.

Separation of the pollutant load

Depending on individual project requirements and goals, we offer acidic and alkaline systems. If a separation of the pollutant load in the wastewater is required, acidic and alkaline wet scrubbers are designed as separate cleaning stages. This is done either in a sequential design with separate scrubbing towers or in a combined scrubber design.

The combined scrubber provides for integration of the acid scrubber into the alkaline one, with both systems separated by a separating floor. This design reduces both space and resource requirements and optimises investment and operating costs.

If separation of the pollutant load is not necessary, the toxic substances SO_x, hydrogen chloride (HCl), hydrogen fluoride (HF), ammonia (NH_3) and mercury (Hg) can in principle be separated in an alkaline system.

Acid wet scrubbers

Our acid wet scrubber systems are primarily used to absorb the pollutant components HCl, HF, NH_3 and Hg from the flue gas. An acid scrubber is usually operated in combination with a separate alkaline SO_x scrubber. The Doosan Lentjes variant of integrating both scrubber stages in one scrubbing tower is more cost-efficient.

The process

The flue gas enters the acid scrubber above the absorber sump. It flows upwards through the absorption zone in a countercurrent process before entering the alkaline stage through a separating floor.

In the acidic stage, the flue gas quench takes place. The missing amount of liquid can be compensated by blowdown water from the alkaline stage. Since the scrubbing solution used contains recirculated absorbent, the acidic stage usually does not require additional sorbent if neutralisation of the wastewater takes place externally.

Maximum process efficiency

To increase process efficiency, a fluidised bed generator – a so-called tray – is installed below the nozzle level. A fluidised bed forms on the tray as an additional absorption zone that intensifies the contact between flue gas and scrubbing suspension. Our patented technology with a variable tray allows the geometry to be adjusted during operation and thus ensures optimum separation performance across all load ranges.

Mercury separation

For additional separation of mercury (Hg), precipitant is dosed into the absorber sump, which chemically binds Hg.

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Alkaline wet scrubbers

If the alkaline scrubber is preceded by an acidic cleaning stage, the absorption of sulphur dioxide (SO_2) and sulphur trioxide (SO_3) as well as the partial absorption of the remaining pollutants mainly takes place in it. If your project does not require separation of the pollutant load in the wastewater, the alkaline wet scrubber can be used as a stand-alone solution to absorb all toxic substances contained in the flue gas (SO_2, SO_3, HCl, HF, NH_3,Hg).

The process

The flue gas enters the alkaline scrubber from below. The absorbent is distributed in the flue gas via nozzle levels using the counterflow principle. Depending on the requirements and project conditions, limestone, milk of lime, caustic soda or seawater, for example, can be used as a sorbent. If lime-based additive is used (e.g. limestone or hydrated lime), the valuable material gypsum can be produced instead of residual materials to be landfilled.

The washing solution used is recirculated by means of pumps in order to optimise the use of the absorbent. In the process, a reserve spray level with stand-by pump enables high plant availability.