

Appendix 16 – Chemical Scrubber Design Specification



Figure 1 – picture of the type of scrubber to be installed

Stage 1 & 2

The first stage is the scrubber tower, where the incoming gas stream to be treated is met by an opposing stream of neutralising reagent, which falls from 2 banks of spray nozzles at the top and the middle section of the scrubber. The sections below the spray nozzles are packed with the "Pall Rings", which are designed to give a maximum surface area of contact between the reagent and the gas stream to ensure the maximum abatement is achieved. The reagent falls into the reagent tank at the foot of the scrubber from where it is re-circulated to the spray nozzles by the pumps. The spray nozzles are designed and arranged to give a uniform spray over the complete cross section of the scrubber.

The two re-circulation pumps are a single stage vertical shaft configuration, allowing the pumps to be completely submerged in the reagent while the motor is above the tank and away from the reagent. This configuration allows all suction pipe work to be internal within the reagent tank. The pump body and internals are all constructed from corrosion resistant materials. A pressure switch will sound an alarm if the water pressure fails (pump stops running) in normal operation.

Both the scrubber pumps will run at the same time, treating section 1 & 2. If a pump fails, the scrubber is still being treated and an alarm will be sent via text to maintenance department

phones and the alarm will activate on the panel. This is our supplier's preference and has proven effective under Phase 1.

The scrubber will be constructed from polypropylene sheet, formed and fusion welded, then reinforced with GRP, all designed and constructed in accordance with BS EN 131 21. The reagent tank is of similar construction and will also have stiffeners around the body. The scrubber tower shell will extend through to the floor of the reagent tank for additional strength.

The three remaining scrubber stages remove moisture droplets formed in the scrubbing process from the gas stream.

Stage 3

The third stage is a 150mm thick woven polypropylene filament pad, situated above the spray nozzles, and is designed to remove the largest moisture droplets from the gas stream, turning them back to fall down the scrubber with the rest of the reagent.

Stage 4

The fourth stage comprises of 2 banks of specially designed droplet eliminator blades, in series. These remove moisture droplets down to 12 microns. The eliminator blades have a scientifically designed aerodynamic profile which forces the moisture droplets sideways into an integral drainage channel. At the foot of the eliminator blades the droplets collect in a small sump, which in turn drains back to the reagent tank at the foot of the scrubber.

Stage 5

The fifth and final stage of the scrubber is a finely woven polypropylene filament pad, situated immediately after the eliminator blades at the foot of the filament pad the droplets collect in a small sump, in common with stage 4. this to remove the finer droplets down to 5 microns.

Reagent Dosing

An automatic reagent dosing system and instrumentation system doses sodium hypochlorite and sodium hydroxide solutions into the reagent tank. There is a control system for the fan, via an inverter to allow easy start and complete speed control. A timer is fitted for slower running options out of hours to reduce noise from the fan as for unit 1. The control system also operates two reagent pumps and two dosing pumps. The level relay inhibits the reagent pumps and dosing pumps. The reagent pumps start up first, then the fan will run. Once the fan is running the dosing pumps operate as needed by the pH and Redox levels.

The dosing pump 4-20 mA signal will feed straight to the indicators on the panel door, to indicate the stroke length.

Telemetry and Controls

A remote monitoring and GSM unit sends out SMS messages when an alarm is generated to the unit, such as pump/fan fault. The pH and Redox levels also feed to the unit and operators can see in real time the actual pH and Redox levels. A local audible/visual alarm warns of power to the fan or pumps failure.