Oxi-air – sulfite oxidation in the wet scrubber
High yield – efficient separation – lower costs
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Uniform air injection optimizes sulfur dioxide separation

The innovative air distribution system for wet scrubbers maximizes oxygen utilization and thus enhances sulfur dioxide separation efficiency. The advantage for your plant: a reduction of sulfur dioxide peaks, less caustic soda consumption, and lower operating costs.

The occurrence of sulfur dioxide (SO$_2$) in combustion processes cannot be prevented. For this reason, noxious acidic gases and dust are removed in multistage wet scrubbers. The separation of sulfur dioxide takes place mainly in the neutralized scrubber stage and involves two steps:

1. The sulfur dioxide present in the flue gas reacts with caustic soda, forming sodium sulfite (Na$_2$SO$_3$).

2. With oxygen, the sodium sulfite is oxidized to sodium sulfate (Na$_2$SO$_4$) which ends up as sulfate in the scrubber blowdown.

If the intensity of oxidation is insufficient, sulfite is decomposed again in the acidic scrubber stage during the blowdown phase and already separated sulfur dioxide can escape (SO$_2$ peak, additional caustic soda consumption).

Example of an arrangement for a scrubber with 7 stacks:

Possible arrangement of the nozzles in a neutralized scrubber stage (view from above)
The advantages at a glance
The additional aeration in the sump of the neutralized scrubber stage pays off:

- In the presence of high SO$_2$ concentrations in the flue gas upstream of the scrubber ($c_{\text{SO}_2 \text{ flue gas}} > 300 \text{ mg/Nm}^3$), the magnitude of the SO$_2$ peaks in the clean gas that can occur during blowdown to the acid stage is reduced by at least 50 percent.

- If high SO$_2$ concentrations upstream of the scrubber ($c_{\text{SO}_2 \text{ flue gas}} > 300 \text{ mg/Nm}^3$) occur regularly and over longer periods of time, the expected reduction of caustic soda consumption is in the order of 10 to 20 percent.

- Lower caustic soda consumption reduces operating costs.

**Distribution system with aeration membranes**
To promote oxidation, improve SO$_2$ separation and prevent possible SO$_2$ peaks during blowdown to the acid scrubber stage, ambient air is injected into the sump of the neutral scrubber stage. To make the best possible use of available oxygen, Hitachi Zosen Inova has developed a specific distribution system. It optimizes the injection of air through aeration membranes into the scrubber sump. Thus resulting in a uniform air distribution and the size of the bubbles generate an increased surface area insuring a high oxygen yield.

**Customized configuration**
The new distribution system consists of a circular pipeline with multiple nozzles to cover the sump surface as thoroughly as possible. The positions of the nozzles are determined separately for each plant. They depend mainly on the scrubber diameter and the arrangement of the stacks. The nozzles consist of support tubes, each covered with an aeration membrane. The membranes are suitable for the application of highly concentrated and corrosive media, and they are hardly susceptible to deposits.
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