Hitachi Zosen
INOVA

Oxi-air – sulfite oxidation in the wet scrubber

High yield – efficient separation – lower costs

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.

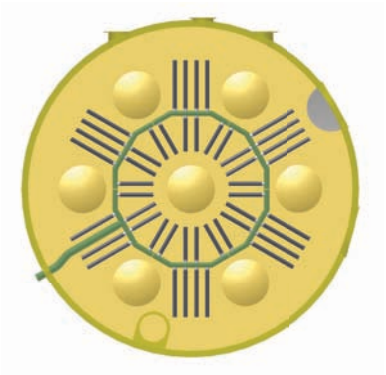
The occurrence of sulfur dioxide (SO_2) in combustion processes cannot be prevented. For this reason, noxious acidic gases and dust are removed in multistage wet scrubbers. The separation of sulfur dioxide takes place mainly in the neutralized scrubber stage and involves two steps:

1. The sulfur dioxide present in the flue gas reacts with caustic soda, forming sodium sulfite (Na_2SO_3).

2. With oxygen, the sodium sulfite is oxidized to sodium sulfate (Na_2SO_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)

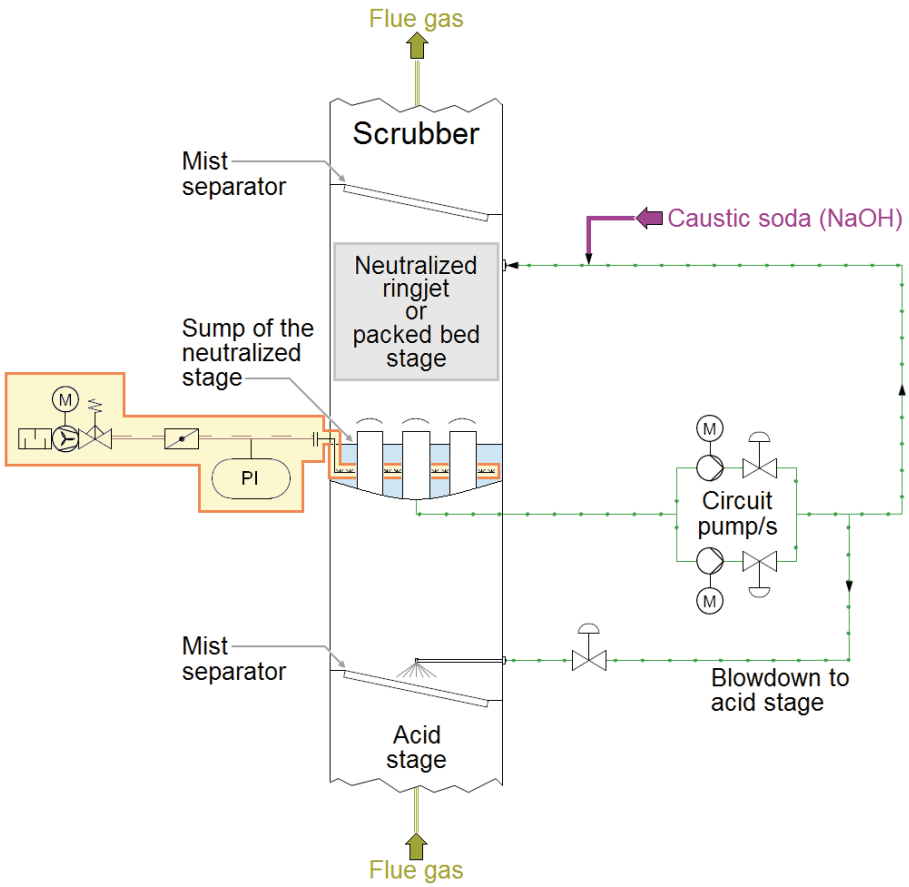
Possible arrangement of the nozzles in a neutralized scrubber stage as 3D-illustration

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.



Basic diagram of an air-injected sulfite oxidation unit

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 ($c_{raw\ gas}$ > 300 mg/Nm³) , 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 ($c_{raw\ gas}$ > 300 mg/Nm³) 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.

Hitachi Zosen Inova AG
Hardturmstrasse 127
P.O. Box 680
8037 Zurich
Switzerland

Phone +41 44 277 11 11
Fax +41 44 277 13 13
info@hz-inova.com
www.hz-inova.com

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