

APPLICATION NOTE

Sulfur Dioxide Scrubber: pH Control

Introduction

Power plant boiler houses designed to burn coal or high sulfur oil are required by Federal and State pollution regulations to “scrub” (remove) sulfur dioxide from flue gasses to meet emission limits. SO₂ in flue gasses is known to be harmful to the environment, as it is one contributor to the formation of acid rain. pH control is critical for the proper functioning of the scrubber system.

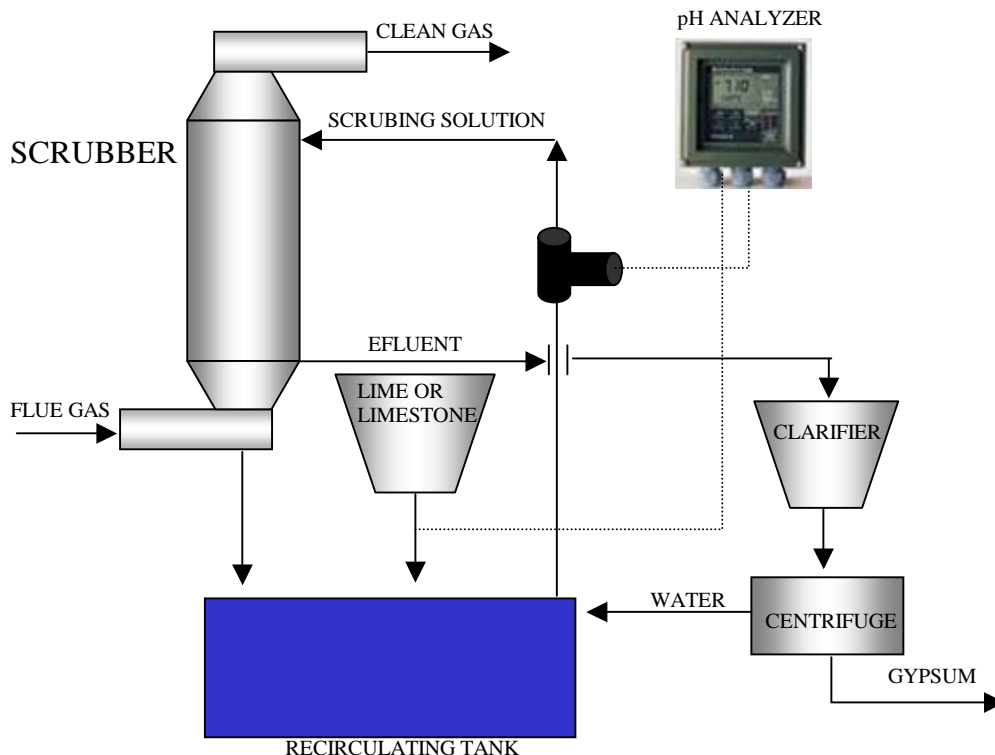
The Scrubber System

The basic principle of a sulfur dioxide scrubber system is the removal of SO₂ by using its chemical characteristics to combine with water. In some cases, parallel

rotating rods create a series of short throat Venturi openings. A series of low pressure, large orifice spray nozzles direct the scrubbing solution into the system. “Scrubbing liquor” is introduced into the system with the flue gas stream. Depending on the design of the scrubber, the gas can flow either concurrent (with) or counter-current (against) the scrubbing liquor. The high velocity turbulence caused by the Venturi openings ensures maximum gas to liquid contact. It is here that the droplets absorb the SO₂ as well as impacting and dropping particulates out of the stream. The scrubbed gas is then sent through a de-mister or re-heater to prevent condensation and exhausted to the atmosphere.

The scrubbing liquor can be a slurry of either lime, Ca(OH)₂, or limestone, CaCO₃. Either lime or limestone will combine with the sulfite ions from the flue gas to form gypsum, CaSO₃. Spent scrubbing liquids are sent to a clarifier where the insoluble gypsum is removed and the water is returned to the scrubber system.

The addition of lime or limestone to the scrubbing solution is controlled by monitoring the pH of the solution. Lime slurries are generally alkaline with a control point near 12 pH while limestone slurries are more neutral. The pH sensor can be located in the recirculating tank or the recirculating line.



Summary

Using pH to automatically control the addition of lime or limestone can reduce the raw material costs associated with these chemicals. Only adding what is needed at the appropriate time eliminates waste. Some facilities add anti-scaling chemicals to the system whose effectiveness is pH dependent. Ensuring that the system is running at the optimal pH cuts down maintenance time due to scale up of the equipment.

Recommended Products:

Transmitter:

PH202 two-wire pH Transmitter

Converters:

PH402 four-wire pH Converter

PH150 ¼ DIN panel mount Converter

Sensors:

Contact Analytical PMK for mounting considerations.

