

## AMMONIA SCRUBBER FOR DILUTION PROBES

Ammonia is becoming a very common topic when discussing CEMS. Most new plants built today utilize SCR's for NO<sub>x</sub> control and many existing plants are being retrofitted, or will be adding SCR's in the near future.

Ammonia (NH<sub>3</sub>) is a very sticky and reactive gas and brings a unique set of problems to any device or piece of instrumentation exposed to it.

One of the problems present when monitoring for gaseous emissions after an SCR, or on the inlet of an SCR, is the NH<sub>3</sub> present in the gas stream will react with the SO<sub>2</sub> present to form a white particulate.

This material coats the inside of a probe, sample lines, and even the inside of the analyzers over a period of time. This build-up can cause false readings and adds to the maintenance required for the system.

The best approach for handling this problem is to remove the NH<sub>3</sub> from the sample stream as early as possible in the sample handling system (i.e. probe, umbilical, scrubbers, dryers, etc.). This can be accomplished with a special mantle for an in-stack dilution probe, which removes the NH<sub>3</sub> before it

enters into the system. Scrubbing the NH<sub>3</sub> in-situ as opposed to after the dilution takes place offers many benefits:

1. By removing the NH<sub>3</sub> before the critical orifice, build-up occurring inside the probe and analyzers can be prevented.
2. NH<sub>3</sub> scrubbing media works best at an elevated temperature. By placing the scrubbing media in the gas stream, the need for added heater blankets to heat the media's canisters is eliminated.
3. The NH<sub>3</sub> is scrubbed at the highest concentration. This helps to minimize any breakthrough from the media.
4. Even when the feed rate of NH<sub>3</sub> is closely controlled, there are periods of time when the level present can be high enough to cause problems. It is much easier to replace the scrubber media when doing probe maintenance, than to have the probe sent out for cleaning.

The scrubbing of NH<sub>3</sub> before the critical orifice also helps to prevent build-up from occurring on the quartz wool, and then reacting with the SO<sub>2</sub>. This can lead to false readings and calibration drift problems.

## PREDICTIVE OR DIRECT AMMONIA MEASUREMENT?...

One question that comes up frequently when discussing ammonia measurement with SCR's is whether to measure the ammonia directly (utilizing an NH<sub>3</sub> converter, dedicated umbilical, and special analyzer), or predict ammonia slip utilizing two NO<sub>x</sub> monitors – one up and one downstream of the SCR.

While the later method is sometimes utilized, it's not used as often because of naturally inherent problems. The term used for NH<sub>3</sub> is "NH<sub>3</sub> Slip". This term "slip" refers to the excess NH<sub>3</sub> present in the gas stream after the SCR.

A large portion of the NH<sub>3</sub> comes from bypassing or "slipping" around the catalyst. The ammonia that passes around the catalyst cannot be predicted by measuring NO<sub>x</sub>. All that one can do is assume some efficiency value for the catalyst and that all the NH<sub>3</sub> contacts the catalyst. This is the only way of predicting the NH<sub>3</sub> levels using two NO<sub>x</sub> analyzers and does not provide very accurate or reliable results.

At the present time, converting the NH<sub>3</sub> to NO, measuring it, and then subtracting the NO<sub>x</sub> readings is the best way to measure NH<sub>3</sub>.

## CEMS NEWSLETTER

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