

Application Note

Continuous HF stack monitoring in Aluminium Plants



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Emissions from the Aluminium smelting process contains harmful gases for the environment, one of these gases is Hydrogen Fluoride (HF).

The aluminium smelting process generates large amounts of HF gas, the majority of this gas is captured and treated in wet or dry scrubbers. NEO Monitors LaserGas™ II SP HF monitor is an excellent instrument for process and emission control, because of its low detection limit of HF gas, short response time and low maintenance requirements.

HF emission is subject to increasingly stringent national and regional regulations, due to the demand for toxic gas measurement in the environment along with the emphasis on safety.

PROCESS:

Primary Aluminium is produced by reduction of Alumina by electrolysis in a molten bath of Cryolite.

Aluminium Fluoride (AlF₃) is one of the additives used to reduce the melting point, and the addition of AlF₃ results in gaseous Hydrogen Fluoride (HF).

A dry scrubber is typically used to remove HF from the off gas by mixing it with fresh (primary) Alumina. The gaseous HF bonds to the primary Alumina and the HF enriched Alumina is gathered in a bag filter system and transported to the process to be used in the electrolysis process.

TYPICAL PROCESS DATA

HF concentration:

200-400 mg/m³ (scrubber inlet),

0-1 mg/m³ (dry scrubber outlet/ stack),

<0.1 mg/m³ (wet scrubber outlet/ stack)

Temperature: 100-150 °C

Pressure: atmospheric

Optical Path Length: 1-6 meter

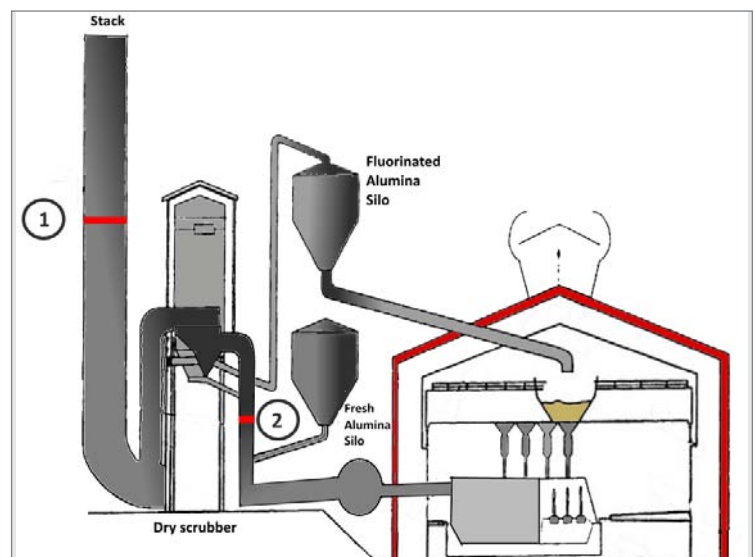


Fig 1: HF measuring points in a typical aluminium plant. HF is commonly measured at the inlet (2) and outlet(1) of the scrubber system.

MOTIVATION:

The accurate measurement of HF gas is of great importance for all aluminium plant operators due to the following reasons:

- Reduce HF gas emissions to air
- Complying with increasingly stringent emissions regulations
- Ensure HF worker safety and plant environment
- Monitor the injection of additive AIF3
- Monitor scrubber system effectiveness and optimize its performance
- Indication of faulty process conditions
- Fast and reliable In-situ monitoring

SOLUTION:

The solution is LaserGas™ II SP HF monitor.

With the high reliability and low maintenance requirements, it is the preferred solution to monitor HF emissions.

The monitor is tailor made for the relevant process and it is HF specific, i.e. no interference from other gases

With its high sensitivity LaserGas™ II is the best in-situ monitor for measuring low concentration of HF.

LaserGas™ II SP HF is factory calibrated. No field calibration necessary and internal span check possible.

LaserGas™ II SP HF can be delivered as a TÜV, MCERTS certified monitor.

BENEFITS:

- Monitor and reduce HF emissions
- In-situ measurement (no sampling system)
- High sensitivity and low detection limits
- Fast measurements
- Low maintenance requirements
- Reliable & well-proven technology, TÜV, MCERTS approved
- High quality monitor by leading company in the TDLA market

LaserGas™ II HF SP

- Measure directly in the process (In-Situ)
- No need for sampling systems
- Response time down to 1 sec
- Continuous line tracking
- Stable calibration
- Highly reliable & real-time measurements
- No Zero drift
- Span check solution (optional)
- No consumables
- Low maintenance cost
- Long lifetime
- Applicable for SIL1 systems
- Applicable for high dust concentrations
- TÜV, MCERTS, GOST approved
- Well proven technology
- ATEX/CSA certified



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