

Case Study

GORE® DeNOx Catalytic Filter Bags: HeidelbergCement Reduces NOx and NH₃ Emissions Far Below Limit Values

Challenge

HeidelbergCement AG's Paderborn cement plant has undergone continuous development since it was founded in 1926. Today's advanced methods of cement production have fundamentally transformed this plant's operations.

For example, in the rotary kiln, which burns at a temperature of around 1,450 °C, a chemical conversion process (sintering) produces a new material: cement clinker. And today, all the rotary kiln plant's exhaust gas emissions are continuously monitored and recorded. Thanks to modern gas-cleaning technologies, emissions of all pollutants in the exhaust gas are maintained well below the limits established by the 17th BImSchV federal emissions regulations.

The limit values for permissible residual NOx emissions have been tightened several times over the years, most recently to 200 mg/Nm³. The installed NOx abatement system (SNCR) has been continuously optimized to safely comply with these changing NOx limits. However, an additional challenge was the plant's need to simultaneously minimize ammonia slip, stabilizing it at levels below 30 mg/Nm³. This was not possible with SNCR technology alone.

Solution

After extensive testing of various techniques and the temporary use of other catalytic filter bags, GORE® DeNOx Catalytic Filter Bags were installed in the rotary kiln filtration system in the spring of 2021. Gore monitored the installation of the bags for compliance with all recommended procedures, and assisted HeidelbergCement in optimizing the entire system. These two factors ensure efficient system operation, and also the longest possible service life for the catalytic filter bags.



HEIDELBERGCEMENT

Application:

Cement production,
Rotary kiln dedusting

Capacity:

1250 tons per day

Temperature:

230 °C

Gas flow rate:

340,000 m³/h

Cleaning System:

Pulse Jet

NOx clean gas value:

< 200 mg/Nm³

NH₃ clean gas value:

< 30 mg/Nm³

Filter material:

GORE® DeNOx
Catalytic Filter Bags

“By using new filter technologies ... we reduce pollutants and thus mitigate the impact of our activities on the environment and neighbouring communities.”

www.heidelbergcement.com/en

Results

The nitrogen oxide emissions from the Paderborn cement plant of HeidelbergCement AG have been reliably maintained well below the officially-approved lower limit value (see Figure 1).

The ammonia slip no longer exceeds the specified limit values. Measured values from 2021 show NH₃ emissions of less than 3 mg/Nm³ — far below the limit of 30 (see Figure 2).

Since the installation of the GORE® DeNOx Filter Bags, even the filter resistance of the fabric filter system is slightly lower than before. This is reflected in longer cleaning cycles and lower compressed air consumption, which are two additional benefits associated with the use of these Gore filter bags.

NOx emissions reliably below limits

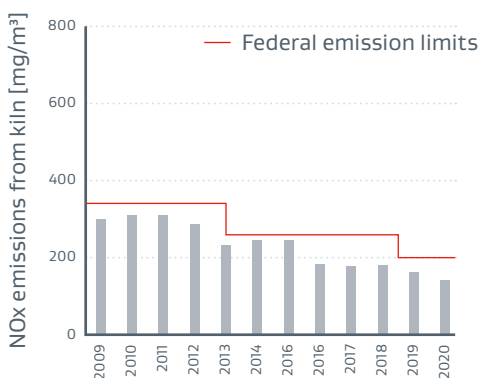


Figure 1:
Annual Average Values 2009–2020

NH₃ Emissions below 3 mg/Nm³

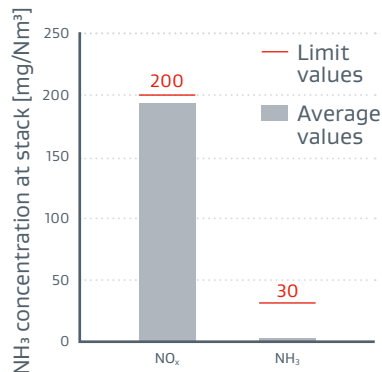


Figure 2:
NO_x and NH₃ values in 2021

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