

NOx reduction by **böhler**

we offer :

analysis

pre test

construction

installation

support

basic

- Reaction mechanism:

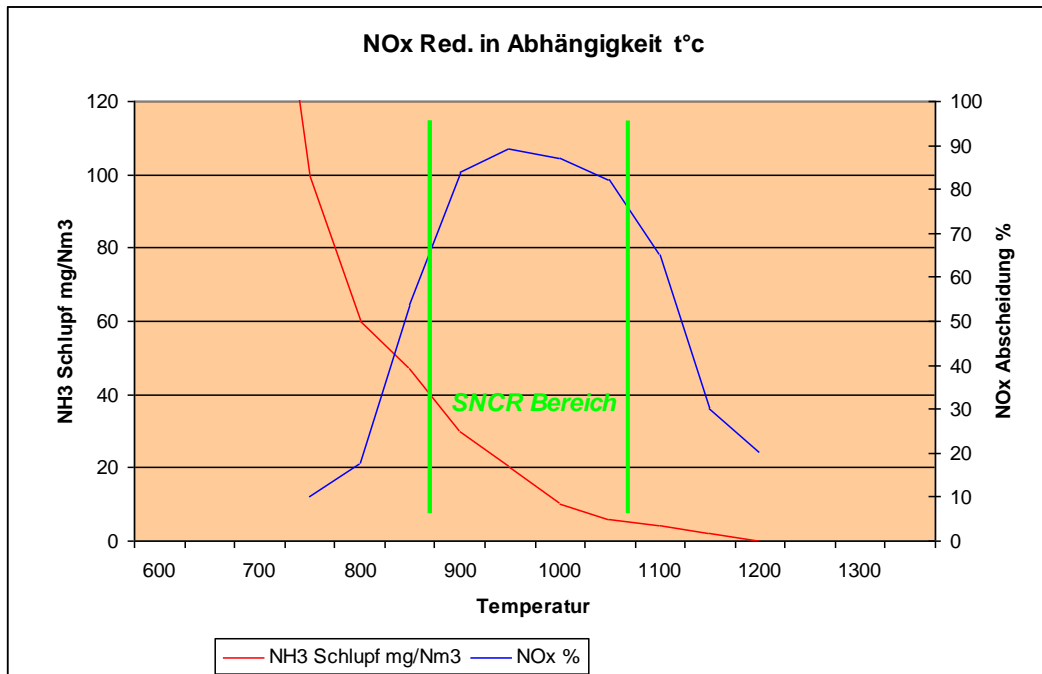
(simplified expression)



Optimum Temp.-window 900-1050°C



- Reaction possibility at high temperatures (starting above 1100°C)



range of temperature
higher in correlation to:
CO, O2, SO3, H2
lower in correlation to:
SO2 , NOx

analysis



- mobil equipment for pre-test and analysis



- mobile gas analysis with FT-IR

Volume; temperature; H₂O; CO₂; CO; NO;
NO₂; NH₃; HCN; Toluol; SO₂; CH₄; HCHO;
HCL; HF; ...

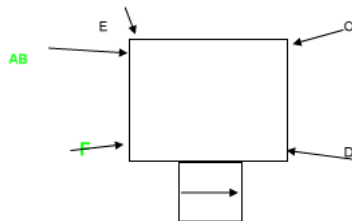


sample of a report of a pretest

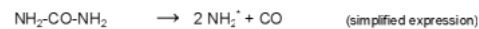
Test setup

In the temperature range between 950 to 1080 °C different injection points have been used. In the beginning single injection points have been injected with about 200 l of a 42% Urea-solution. In a second step 2 injection positions at a time have been injected with 200 and 300 l/h. During the injection the changes in NOx emission at the stack and at the kiln inlet have been evaluated and the efficiency of the NOx decomposition was calculated.

The used injection points have been limited by the amount of existing holes in the interesting part of the heat exchange tower. These test holes have often their limitations due to vicinity to walls or dust-rich areas. Also the mounting of the nozzles is not optimal due to the geometry of the holes. By injecting amounts higher than 200l/h per nozzle the efficiencies are often decreasing due to above mentioned reasons. All injection points on level 3



Reaction mechanism:

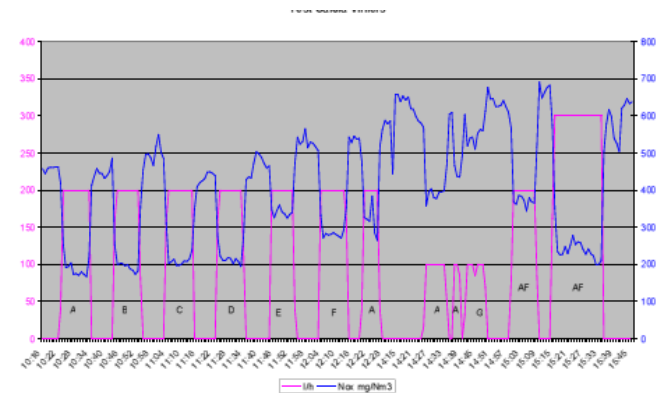


Reaction possibility at high temperatures (starting above 1050°C)



Test period

4th June 2009



Secondary effects:

Effect on CO-emission:

During the injection of the urea solution the CO content of the exhaust gas was measured at the stack continuously. Beside the change in NOx no injection induced change in CO could be detected with up to 300 l/h of urea solution.

Limit values:

These limit values are able to reach without significant slip of ammonia or change in the CO signal.

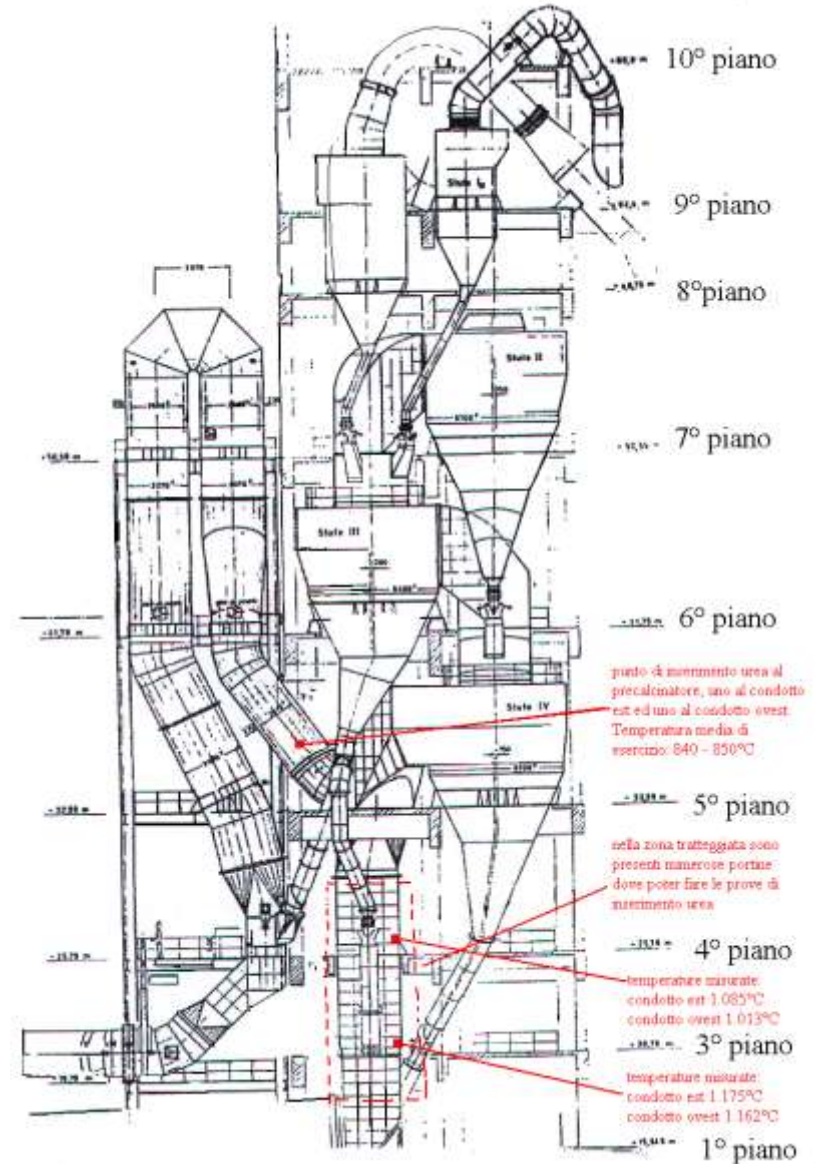
Limit value NOx 800 mg/Nm³ dry, 10%O₂:

The test system showed to be able to reach this limit value even starting at 1.200 mg/Nm³ NOx with injection of about 200 l of 40% urea solution.

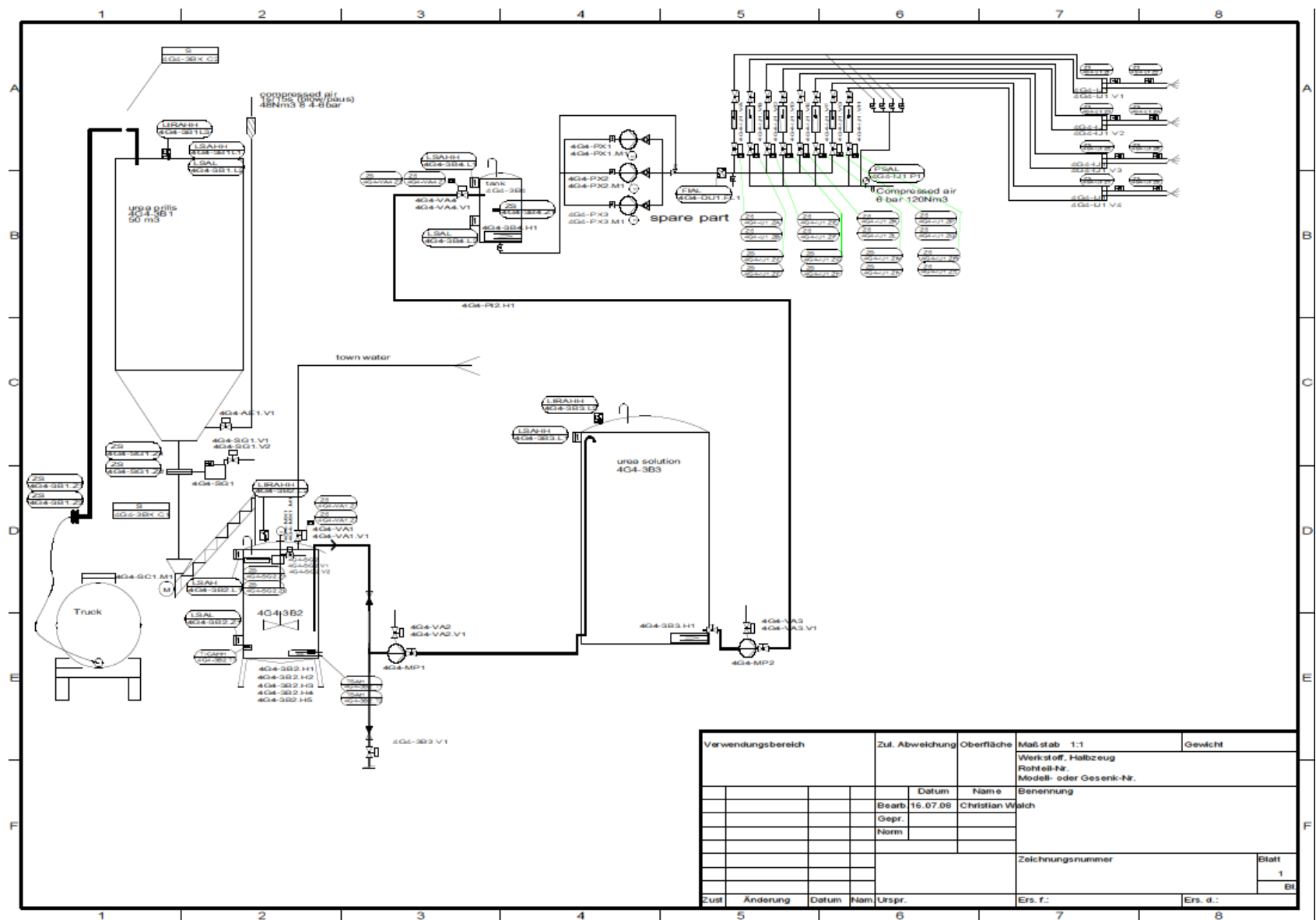
Recommendation for the final installation:

- 3 nozzles in the range of the injection points A and B and F for the final installation. The storage tank for urea solution should have a size of at least 50 m³, depending on delivery conditions.

definition of injection points



system



Verwendungsbereich	Zul. Abweichung	Oberfläche	Maßstab 1:1	Gewicht
			Werkstoff, Halbzeug Rohteil-Nr. Modell- oder Gesenk-Nr.	
	Datum	Name	Benennung	
	Bearb 16.07.08	Christian Walch		
	Gepr.			
	Norm			
			Zeichnungsnummer	
				Blatt 1 B1
Zust	Änderung	Datum	Nam	Urspr.
				Ers. f.:
				Ers. d.:

preparation- and storage of urea solution



preparation- and storage of urea solution



pellets silo



silo output



mixing



urea solution tank

tubing and wiring



360° Panorama of a container installation



injection



SNCR installations by **böhler**

