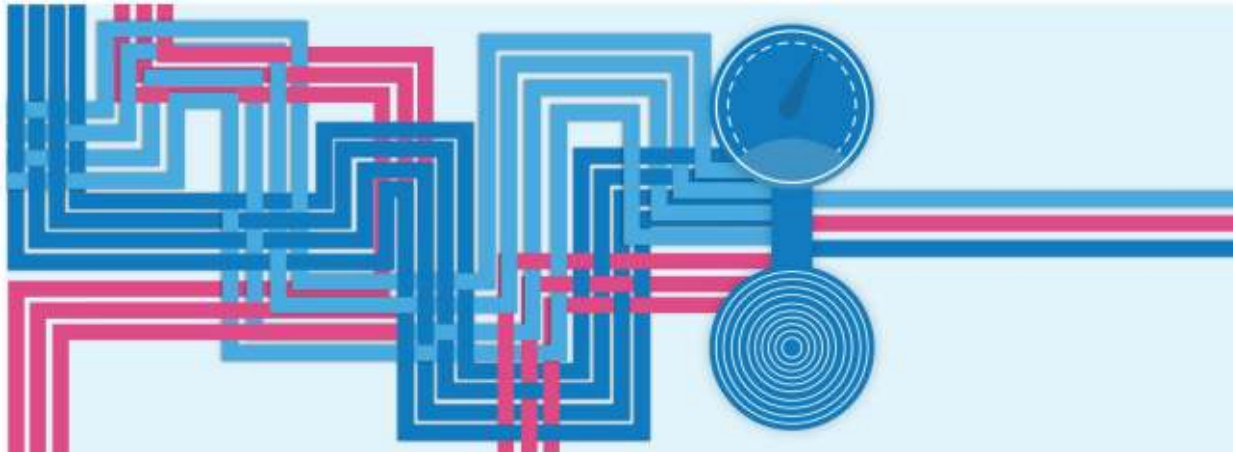


UREA Diaphragm Seal Case study:

- World Record - On Stream Time Badotherm Zirconium EXT Diaphragm Seal in high pressure, high temperature carbamate gas line

March 2019

Background

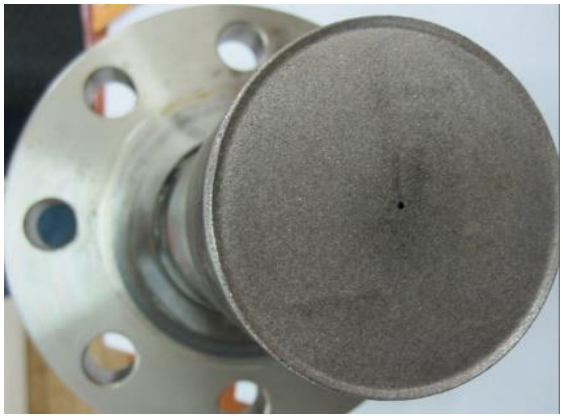
Customer Quote: *"With the Badotherm zirconium remote seals, we measure the pressure of the high pressure carbamate gas already for more than four years without any issues"*

A urea plant (identity confidential) has installed in a high pressure and high temperature carbamate gas line a BADOTHERM EXT Full Zirconium diaphragm seal pressure measurement. The material of construction of the pipeline is duplex 22.05, the pipeline is electrically traced and operates at 150 bar and 190°C. The nozzle for the pressure measurement is located in the top of a horizontal part of the pipeline. One can state these are really extreme process conditions, with typically heavy corrosion problems due to ammonium carbamate.

Quote: *"Now it is possible to measure the synthesis pressure very close the safety valve and achieve higher conversion figures in the reactor"*

Issue

Until now it was not possible to measure the synthesis pressure in the high pressure carbamate gas line close to the synthesis safety valve. Various corrosion phenomena like for example condensation corrosion caused that the lifetime of such a diaphragm pressure measurement was limited to maximum one year. The solution was to measure the pressure at a location with less corrosive circumstances. But these locations were far from the safety valve and the operator had to assume a rather big operating margin in the operating pressure in the synthesis section. This did lead to lower conversion figures in the reactor.

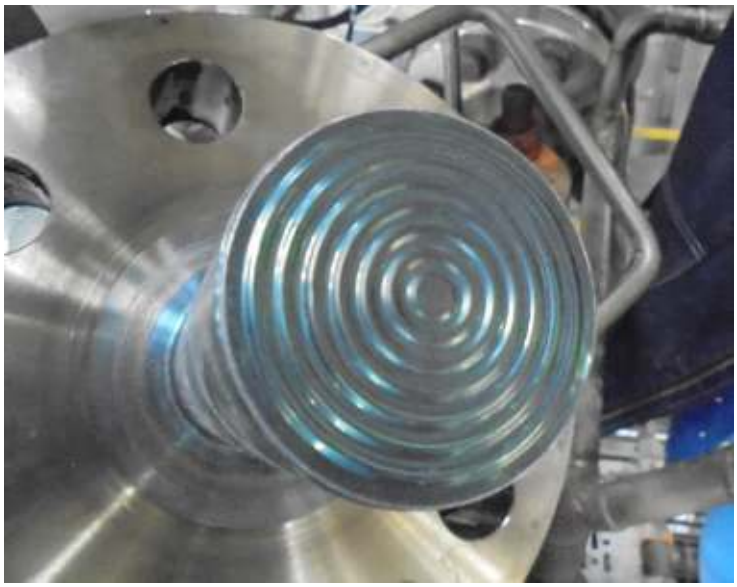


Solution

The Badotherm zirconium seal EXT installed in 2014. The Badotherm Solution offers the right choice of materials and maximum fabrication quality.

Result

Since November 2014 the pressure measurement works without any issues. In 2017 a calibration was done. All was in perfect condition. This means as per February 2019, the pressure measurement is in operation without any issues for more than four years already. This is a World Record On Stream Time in the urea industry!



Now it has been proven it is possible to avoid any unplanned shut down caused by diaphragm pressure and level measurements and operate in the synthesis pressure more close to the safety valve set pressure realizing higher synthesis conversion figures.

Other similar applications are:

- Measure the Synthesis Pressure in the high pressure carbamate gas line close to the safety valve in any urea plant
- Measure the Synthesis Pressure at any other location in the synthesis section of any urea plant like ammonia feed, CO2 feed, air supply, etc.
- Measure the Liquid Level in the High Pressure Scrubber of a STAMICARBON urea plant.
- Now it becomes attractive to check the feasibility to measure also other liquid level applications like the high pressure separator in a SAIPEM urea plant.

Contact details

Mr. Sander Posthumus
E: sales@badotherm.com
T: +31 (78) 6545800
I: www.badotherm.com