



APPLICATION NOTE

Chemical

Level measurement of hydrochloric acid (HCl) at a demineralisation plant

- Level monitoring of HCl for cation exchange regeneration
- Combined solution of a plastic tube and a guided radar (TDR) level transmitter
- Cost-effective level measurement with standard stainless steel rod
- Level transmitter measures through the tube; no special wetted material and sealing system required

1. Background

A manufacturer of aniline, nitric acid and special amines operates various production sites in Europe, one of which is located in the Czech Republic.

2. Measurement requirements

As demineralised water (DM water) is an important process medium in the production of these chemicals, the company runs its own demineralisation plant. During the demineralisation process, raw water passes through a two-step ion exchange system with corresponding acid cations and base anions to remove all mineral salts. When the ion exchange capacity in the exchangers is exhausted, the cation and anion resins need regeneration. This is done by supplying the ion exchangers with regenerators.

A highly effective acid for cation resin regeneration is hydrochloric acid (HCl). The chemical producer stores the HCl in a 1.5 m / 4.9 ft high tank that is connected to the cation exchange column. HCl shortage as well as tank overflow of this highly aggressive reagent must be always prevented. This makes level monitoring crucial to the efficiency of the demineralisation process as well as to plant and occupational safety.

The plant operator had so far used an ultrasonic level transmitter which, however, did not meet the expectation in terms of measurement accuracy. When the decision was made to overhaul parts of the plant, the company was also searching for an alternative level instrument for their HCl tank.

KROHNE

3. KROHNE solution

Given the corrosiveness of the medium and its dissociation behaviour, a careful consideration of the measuring principle as well as an appropriate selection of the wetted material was called for. The chemical company therefore contacted KROHNE for advice. As the customer requested a safe but preferably cost-effective level transmitter, KROHNE recommended equipping the HCl tank with a protective tube made from plastic at first. This allowed the installation of an OPTIFLEX 7200 guided radar (TDR) level transmitter with a stainless-steel single rod. The high dielectric constant of the acid allows the guided radar to measure reliably through the plastic tube while the antenna remains well protected from corrosion at all times.

Given the impact of the plastic tube on the frequency of the radar, KROHNE service engineers carried out an on-site calibration during commissioning to ensure that the desired accuracy as well as long-term stability of the measurement will be maintained. If requested by the customer, KROHNE could also have solved this application without plastic tube by providing the OPTIFLEX 7200 with a corrosion-resistant PTFE-coated rod or with a rugged, yet more expensive antenna made from alloy-22 in combination with a special sealing system.

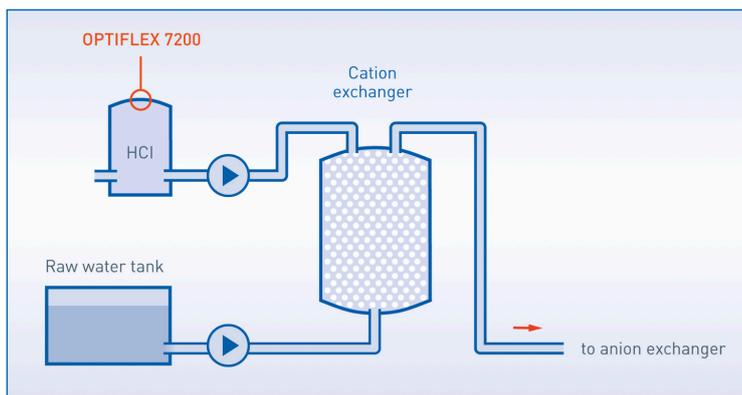


Level measurement of HCl with the OPTIFLEX 7200

4. Customer benefits

The customer benefits from accurate level monitoring. There is no dry-run or dangerous overflow of the HCl tank. In this way, the cation resins can be effectively reactivated for efficient raw water demineralisation while maintaining plant and occupational safety.

On customer's request, KROHNE provided a flexible and cost-effective solution with a plastic tube instead of a guided radar rod made of particularly acid-resistant wetted material. In this way, the customer stood to gain from a customised level solution at the price of a standard instrument.



Process scheme on cation exchange regeneration

The guided radar level transmitter is just one of several KROHNE process instruments that the chemical company has been using successfully for many years. These include various flowmeters, level switches, temperature transmitters or non-contact level radars used in a wide range of applications from water treatment to custody transfer to functional safety (SIL).

5. Product used

OPTIFLEX 7200

- Guided radar (TDR) level transmitter for advanced liquid applications
- Continuous level and interface measurement in process or storage tanks, reactors and pressure vessels
- Extensive choice of probes for harsh process conditions



Contact

Would you like further information about these or other applications?
Do you require technical advice for your application?
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