



## APPLICATION NOTE Chemical

### Level measurement of ferrous chloride and hydrochloric acid

- Automated inventory management of highly corrosive liquids
- Remote control of cylindrical tanks using TDR technology
- Application parameters requiring wetted parts made of Hastelloy and PVDF

#### 1. Background

A chemical company operates a production site for ferrous chloride ( $\text{FeCl}_2$ ) and hydrochloric acid (HCl). These derivatives are mainly produced through electrolysis and are then delivered to the paper, mining or waste water industry. Hydrochloric acid, a clear, colorless and highly pungent solution, and ferrous chloride, a yellow-brown liquid, are both very corrosive. In order to store them, the chemical company uses cylindrical tanks (approx. 1700 mm / 5.5 ft in height) made of acid- and chloride-resistant materials.

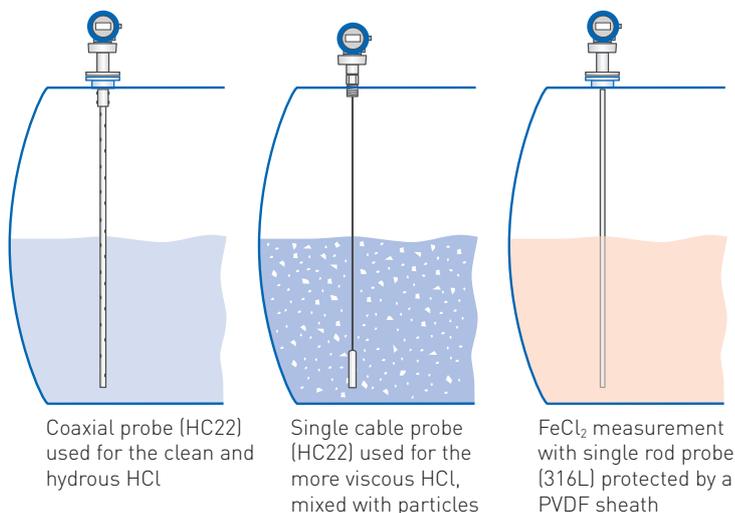
#### 2. Measurement requirements

The company recently started implementing an automated inventory system. Hence, the customer was aiming for remote monitoring in order to replace the manual stock control. Being highly corrosive substances, HCl and  $\text{FeCl}_2$  must be handled with great care. Overfill protection is therefore a safety issue for the customer.

Depending on the ultimate use for these chemicals, the product quality can vary significantly with some of them being clean and hydrous whilst others are more viscous and contain particles. These parameters had to be taken into account when the company started searching for a technical solution to measure the level in the tanks.

## 3. KROHNE solution

The chemical company found the OPTIFLEX 2200 C to be the right meter to master level measurement of HCl and FeCl<sub>2</sub>. KROHNE supplied 3 units of the 2-wire guided radar (TDR) level meter which were installed with horizontal housing position on top of the cylindrical tanks. For the first tank containing hydrous and clean HCl, an OPTIFLEX 2200 C with a 1600 mm / 5.25 ft coaxial probe made of resistant Hastelloy C22 was used. This probe fits well with the parameters of the medium and allows for level measurement with close to no dead zone. For the process connection a DN 50 / 2" flange made of Hastelloy C22 was selected. The tank holding the more viscous HCl, a comparatively unclean and thick liquid, required a single cable probe (1600 mm / 5.25 ft) also made of Hastelloy C22. Unlike coaxial probes that would face issues with the particles in the HCl, the single cable probe ensures stable level measurement in this application. It was chosen with a G½ threaded connection made of Hastelloy C22. The FeCl<sub>2</sub> tank was equipped with a 316L single rod probe protected by a PVDF (Polyvinylidene fluoride) sheath which also covers the DN 50 / 2" flange connection. All devices were fitted with Kalrez gaskets to withstand the aggressive liquids. The readings of the OPTIFLEX 2200 C are transferred to a control room.



## 4. Customer benefits

The customer is now able to remotely monitor the liquids stored in the 3 tanks. The OPTIFLEX 2200 C provide all necessary data for reliable stock inventory of the chemicals. They ensure the tanks never run dry, preventing process interruptions due to uncoordinated stocking procedures. The KROHNE device also helps the company keep filling processes under control. Overfilling is no longer an issue as the OPTIFLEX 2200 C triggers an alarm when a certain limit is exceeded. This way, the customer not only improves its processes but also makes sure that the safety of the plant and its employees is sustained. The chemical company also benefitted from the experience KROHNE offers in level measurement. By advising the customer on the best adapted construction material and probes, the requirements of this application were met fully.

## 5. Product used

### OPTIFLEX 2200 C/F

- 2-wire loop-powered HART® TDR level meter for liquids and solids
- Horizontal and vertical housing position to suit every installation
- The remote converter can be installed up to 100 m / 328 ft from the probe
- Measuring range up to 40 m / 131 ft
- SIL2-compliant according to IEC 61508 for safety-related systems
- ±3 mm / ±0.12" standard accuracy
- Up to a flange temperature of 200 °C / 390 °F and 40 bar / 580 psig



### Contact

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