APPLICATION REPORT Chemical

Level measurement of hydrofluoric acid in a receiver tank

- Storage of extremely caustic medium for manufacturing CFC substitutes
- Simple mechanical level monitoring to protect against emptying and overflowing
- High process stability thanks to closed, seal-free design of measuring device

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1. Background

Solvay Fluor GmbH, a subsidiary of the international chemical manufacturer Solvay, produces specialist fluorine products at its site in Frankfurt. Fluorine compounds are used in refrigeration technology in particular, where they are replacing chlorofluorocarbons (CFCs). Hydrofluoric acid is a major raw material used in the manufacture of refrigerants.

2. Measurement requirements

The toxic and highly caustic acid is pumped from a receiver tank to the refrigerant production plant. The receiver is fitted with a level control to ensure a continuous feed of hydrofluoric acid to the production plant.

Medium:	Hydrofluoric acid
Density:	970 kg/m³ / 8.09 lb/gal (US)
Temperature:	+20...+25 °C / +68...+77 °F
Pressure:	0.6 barg / 8.7 psig

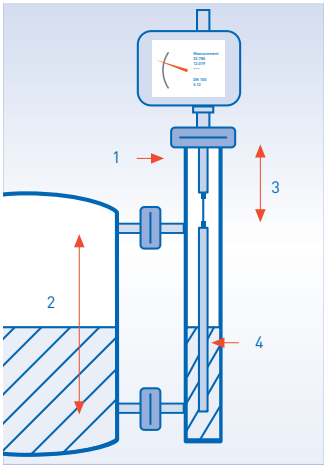
In the past Solvay used a displacer level transmitter at this measuring point, however, this was replaced a few years ago by level transmitters with guided radar. But these competitor devices were unable to withstand the aggressiveness of the hydrofluoric acid, which kept diffusing through the gasket of the measuring devices. The failure of the measurement constituted a significant safety risk for the customer. Furthermore, the production process had to be repeatedly interrupted to replace the faulty measuring devices. The recurrent plant downtime incurred high costs on every occasion. Solvay, therefore, decided to revert back to a level transmitter with a closed design.

KROHNE

3. KROHNE solution

KROHNE recommended the BW 25, a level transmitter that works according to the mechanical displacement principle. The measuring device was fitted to the receiver tank in a bypass using a flange connection (DN 80) for the measurement. Because of the dissociation behaviour of the hydrofluoric acid and the concentration of the medium, it was decided to use a displacement rod and measuring device spring made of stainless steel (1.4404 / 316L).

The measurement involves immersing the displacement rod (1000 mm / 3.28 ft) attached to a measuring spring in the hydrofluoric acid. It experiences a lift proportional to the mass of the displaced liquid. Every time the weight of the rod changes, the length of the spring also changes. This can then be used to determine the fill level. The linear expansion of the spring is sent to the display via a magnetic coupling. The measured values are then sent to the customer's PMS via the integrated two-wire current output (4...20 mA / HART®).



1 Measuring spring;
2 Measuring range;
3 Non-measurement range;
4 Displacement rod (1000 mm / 3.28 ft)

4. Customer benefits

The BW 25 level transmitter proved to be the most suitable measuring device for Solvay in this application. As the displacer is a closed measuring solution, featuring a design that does not require any gaskets, the known isolation problems do not occur. It is not technically possible for the hydrofluoric acid to diffuse into the housing. The display housing is separated from the pressurized parts. Cost-intensive plant downtimes caused by faulty measuring devices and repeated installation and removal operations are a thing of the past.

Thanks to the electronic transmission of the measured values, Solvay can reliably monitor the set limit values via a PMS. This prevents the tank from running empty or overflowing and ensures a high level of plant safety. The chemical manufacturer is benefiting from a tried and tested measuring device that KROHNE has continuously developed over decades to the present standard. As the BW 25 is still a suitable device for applications with very aggressive media in particular, it will remain a firm part of the KROHNE product portfolio for level measurement, alongside the non-mechanical measuring devices.

5. Product used

BW 25

- Displacer level transmitter for liquids
- Rugged design for extreme operating conditions
- High resistance to pressure and temperature (up to 400 barg / 5800 psig and +400 °C / +752 °F)
- Pressure-proof isolation of the measuring and display room
- Possible to measure interfaces
- Displacement rods from 0.3...6 m / 0.98...29.5 ft
- Quick retrofitting of display modules without interrupting the process
- Two-wire, 4...20 mA/HART®

Contact

Would you like further information about these or other applications?
Do you require technical advice or a quote for your application?
application@krohne.com

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www.krohne.com