APPLICATION NOTE

Chemical Industry

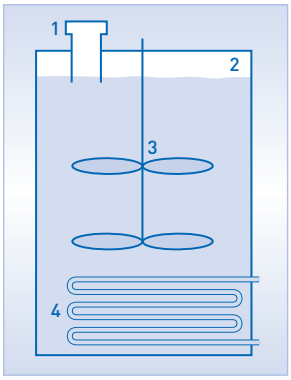
Non-contact Level measurement on asphalt paving mixture storage tanks

- Accurate level measurement of sticky, viscous products
- High reliability even with high temperatures, dense vapours and agitation
- Reduced maintenance due to non-contact measurement

1. Background

An American equipment supplier offers a complete range of liquid asphalt concrete (AC) storage tanks and accessories for polymer modified asphalts. Asphalt, also called bitumen, is a sticky, black and highly viscous liquid or semi-solid that is present in most crude petroleums. Liquid AC is hot and has a low dielectric constant, which decreases as the temperature goes up. In the past, a TDR guided radar system from a competitor had been used to determine the level in the tanks. The TDR cable needed frequent cleaning which was a safety hazard because the tanks were hot and could only be accessed by climbing. Another important disadvantage was that the measured values were unreliable during the filling and emptying process. Also, measurement accuracy for TDR is dependent on the coating thickness on the sensor. Other technologies such as differential pressure and laser had also been tested without success.

2. Measurement requirements



Each tank has the shape of an upright barrel with a diameter of about 3.5 m and a total height of approx.15 m. It has heating coils at the bottom and an agitator in the center. There is a 150 mm thick insulation all over the tank top which includes a nozzle (Ø 150 mm / 250 mm high). The measuring device is to be installed on the nozzle and give accurate and reliable measuring values despite condensation from the hot product, its high viscosity and low dielectric constant.

Inside of an asphalt storage tank:
1 Nozzle
2 Insulation
3 Agitator
4 Heating coils

KROHNE

3. KROHNE solution

OPTIWAVE 7300 C non-contact Radar (FMCW) Level Meters with DN 80 Horn Antenna. Connection type is 1½ NPT. The part of the nozzle that protrudes from the tank insulation has also been insulated. This not only minimizes condensation of the heavy asphalt vapors on the horn antenna but also prevents from crusting as bitumen tends to solidify at low temperatures.

4. Customer benefits

Using FMCW radar technology, the meters measure over a wide dynamic range. That is why neither the low reflective medium nor the moving surface during the filling and emptying of the tanks can affect the measurement. The requirements of the customer in terms of reliability and accuracy are fully met. Climbing on top of the tanks for periodic cleaning is no longer necessary. The non-contact radar device does not require any maintenance. This significantly reduces the expense and, adding the competitive price of the OPTIWAVE 7300 C, makes it a very cost effective solution for the customer.Being a 2-wire device, the installation of the meter needs less wiring and is very simple due to the wizard driven setup.

5. Product used

OPTIWAVE 7300 C

- Non-contact Radar (FMCW) Level Meter for liquids and pastes
- 2-wire loop powered for minimal wiring expense
- Maintenance-free
- Reliable and accurate (±3 mm up to 10 m) measurement even in tanks with agitated surfaces or internal objects
- Operates up to a process connection temperature of 200°C
- Measuring range up to 80 m
- Dielectric constant (ε_r value) ≥1.5
- Antennas can be extended to suit any nozzle length
- PACTware for routine checks & commissioning
- FMCW technology: optimized cost/performance ratio
- Ex approved for hazardous areas
- Optional antenna heating systems
- Wizard driven setup

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