



APPLICATION REPORT Water & Wastewater

Flow monitoring in a sludge treatment wetland test facility

- Increasing the dewatering efficiency of sludge treatment wetland methods
- Reliable total flow measurement of filtrate from sludge dewatering
- Installation of more than 90 ultra-compact electromagnetic flowmeters



1. Background

Fors A/S supplies several municipalities in Zealand, Denmark, with drinking water and district heating. The utility company is also specialised in waste recycling and wastewater treatment. In a partnership with utility provider Kalundborg Forsyning A/S and WSP, an engineering professional services firm, Fors A/S operates Denmark's largest test facility for sludge treatment at the Kalundborg wastewater treatment plant (WWTP).

2. Measurement requirements

The sludge treatment wetland method offers an efficient and sustainable way of reducing wastewater sludge from the WWTP treatment processes. This is done by adding it to test basins planted with certain plant species where the sludge is dewatered and mineralised. The plants improve the dewatering, the aeration and the mineralisation of the sludge, allowing clean water, the filtrate from the sludge dewatering, to be regained without the addition of chemicals. The mineralised sludge can be excavated from the basins in the end and recycled as a fertiliser in agriculture.

To make use of the full potential of sludge dewatering, the mineralisation and the sludge reduction, in-depth knowledge about all essential process parameters is necessary. The Kalundborg test facility was set up to identify the most favourable parameters for sludge treatment such as the best temperature condition for sludge reduction and quality, the optimum sludge loading strategy or the most suitable plants for sludge treatment.

The test facility is in a large greenhouse, comprising 85 intermediate bulk containers (IBC) with a capacity of 1000 l each. The IBCs are cut open on top, being half filled with soil as well as different plants. The water drained from the process is collected in plastic barrels and sampled for further analysis of the chemical extraction yield. The WWTP operator was searching for a cost-effective, lightweight, and compact flowmeter to determine the total amount of wastewater running from the plant beds into the barrels.



3. KROHNE solution

Having considered and evaluated the compact utility flowmeters of leading suppliers, the WWTP decided on KROHNE's AF-E 400. The electromagnetic flowmeter (EMF) best met the customer's requirements in terms of price/performance ratio as well as service and consulting on-site. The cost-effective EMF is ultra-compact, lightweight and has the highest accuracy in its class along the entire flow range.

The flowmeters continuously measure the volume flow rate (l/min), which is transmitted to the customer's PLC by a 4...20 mA signal output. This is utilised by the operator to determine the totalised flow, which is the measured value of interest in this application. In addition, the actual flow rate, the totalised flow and the process temperature are always clearly visible on the display of the AF-E 400 and can be easily double checked on-site if needed.

KROHNE supplied over 90 units of the AF-E 400. Most of the devices were installed with DN15 measuring tube, a smaller part was also provided in size DN25. Given the plastic piping of the IBC drainpipes, all KROHNE flowmeters were equipped with grounding clamps to ensure safe and reliable grounding.



Flow measurement of filtrate water from sludge treatment wetland



AF-E 400 mounted in plastic pipe



Test facility for sludge treatment and dewatering equipped with KROHNE flowmeters

4. Customer benefits

The AF-E 400 helps the utility company determine the yield of sludge dewatering. By reliably and accurately measuring the total volume flow rate of the drained water, the KROHNE flowmeter provides essential readings to assess the dewatering performance and to improve the output of the sludge treatment.

Given the cost-effective price point of the AF-E 400, the customer was able to remain well within budget. The WWTP operator was able to fit the whole test plant with a considerably larger number of ultracompact flowmeters than would have been possible with conventionally available EMF. The utility also benefited from the comprehensive service and support by Fagerberg, KROHNE's local representative. Through a global network of regional offices and sales representatives, KROHNE offers technical advice, delivery and service for the AF-E 400 and other process instruments worldwide.



Display of AF-E 400

5. Product used

AF-E 400

- Electromagnetic flowmeter for utilities and industrial automation
- Flow measurement of conductive liquids, e.g. treated wastewater, cold/hot water, coolants, etc.
- Best-in class temperature range, accuracy, pressure drop and flow range
- Ultra-compact design for parallel installation and tight spaces
- 4...20mA, pulse, frequency, Modbus, IO-Link



Contact

Would you like further information about these or other applications?
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