



APPLICATION NOTE

Water & Wastewater

Dosing of aluminium sulphate in potable water treatment

- Automated control loop for efficient coagulation and sedimentation
- Combined flowmeter solution allows a precise dosing ratio of coagulant to infeed water volume
- Cost savings due to a reduced consumption of chemicals and shorter retention times
- Increased process stability and water treatment safety

1. Background

A water purveyor in the Shoalhaven region, New South Wales/Australia, operates a water treatment plant that draws raw water from a dam to be treated for consumption. The treated water either feeds into the local potable water network or circulates back into the dam. A combination of coagulation and disinfection is used to prepare the water for feeding into the potable network.

2. Measurement requirements

Aluminium sulphate is used as a coagulant in water treatment to remove particulates like dissolved organic carbon which may be suspended in the medium. After coagulation the alum acts as a flocculant allowing particles to cling together forming larger particles which in turn fall from suspension and settle in the bottom of sedimentation tanks. Clean water is taken from the top via a fall and finally moved to the disinfection stage of the plant.

Highly accurate dosing is required for several reasons, the main being that there is a toxicity risk if incorrect dosing volumes occur at the high end or inefficient flocculation at the lower end. The client had previously tried a flow switch array to achieve an on/off dosing technique. However, this did not prove efficient and wastage of the aluminium sulphate occurred as well as increased retention times based on conductivity and turbidity results upstream. The operator was therefore searching for a much more reliable and accurate solution to achieve a precise ratio of aluminium sulphate to supply water entering the plant.

3. KROHNE solution

The water purveyor decided on a combined solution of the OPTIFLUX 2300 W and OPTIFLUX 7300 C electromagnetic flowmeters (EMF). These allow continuous flow measurement of infeed water and coagulant to implement a reliable control loop via the plant's DCS.

The OPTIFLUX 2300 W was chosen for volume flow measurement of supply water to the plant. The EMF is particularly suitable for water applications with high accuracy requirements. It was mounted into the DN450 pipeline at the plant inlet. The wall-mounted signal converter (W) of the OPTIFLUX 2300 was remotely installed from the sensor so as to allow the readings to be checked locally in an easy-to-access on-site area.

For aluminium sulphate dosing, KROHNE recommended using the OPTIFLUX 7300 C. The KROHNE flowmeter was installed as a cost-saving sandwich version into the DN40 dosing line. Unlike conventional EMF, its electrodes have no direct contact with the corrosive process liquid. The electrodes of the flowmeter are designed as large-area capacitor plates, mounted behind the ceramic liner. The non-contacting capacitive signal pickup between medium and electrodes enables reliable and long-term stable measurement. This makes the flowmeter ideally suited for applications involving oxidizing and toxic chemicals such as aluminium sulphate. The leak-tight, vacuum and temperature resistant ceramic tube offers additional safety and reliability. The OPTIFLUX 7300 C also features advanced filtering technology, enabling highly accurate flow measurement unaffected by the use of a diaphragm dosing pump as well as pulsating flow resulting from it, which the client had initially deemed problematic.



Infeed water measurement with the OPTIFLUX 2300 W



Flow measurement of aluminium sulphate with the OPTIFLUX 7300 C

4. Customer benefits

The combined solution of OPTIFLUX 2300 W and OPTIFLUX 7300 C allowed the customer to establish an automated control loop to achieve efficient and reliable coagulation and sedimentation results. Based on the totalised flow, accurate supply of aluminium sulphate is fed into the sedimentation tanks to remove significant organic compounds from the water entering the plant. The coagulant is thus always applied in the right ratio to feedwater, i.e. only in quantities really needed. This translates into long term cost savings for the operator due to a reduced use of chemicals. The ideal dosing ratio results into optimisation of retention times which in turn saves the water purveyor a lot of time and effort. The increase in overall reliability and process stability also improves water treatment safety. Overdosing is effectively prevented and so are potentially toxic high alum levels.

5. Products used

OPTIFLUX 2300 W

- Electromagnetic flowmeter for advanced water and wastewater applications
- High accuracy (max. measuring error: $\pm 0.2\%$ of measured value)

OPTIFLUX 7300 C

- Electromagnetic flowmeter for advanced applications with toxic, corrosive, abrasive and low conductivity liquids ($\geq 0.05 \mu\text{S}/\text{cm}$)
- Ceramic measuring tube with non-wetted electrodes

Contact

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