

Controlled by Liquiline Control

Automated phosphate removal in Stadtlohn wastewater treatment plant



The Stadtlohn WWTP is designed to handle wastewater from a population equivalent (PE) of 30,500. At present, a PE of approximately 21,000 is connected to the plant, roughly 15% of which is industrial wastewater. The plant's two intermittent basins are activated sequentially (in cascade formation). Commissioned in 1991, the facility has undergone extensive modernization works over recent years.

"At our WWTP, the Liquiline Control controls both phosphate precipitation and nitrogen reduction. We can always rely on this control system. Even in difficult inflow conditions, it works as specified, thus ensuring that the outlet parameters are always adhered to."

Ewald Rathmer
Plant Manager
WWTP Stadtlohn (Germany)



Ewald Rathmer, Plant Manager



WWTP in the town of Stadtlohn, North Rhine-Westphalia

The Stadtlohn WWTP regulates phosphate elimination using the Liquiline Control. This control system doses the precipitant into the clarifiers depending on the current concentration of phosphate in the wastewater.

The results

- Uniform phosphate concentration in outlet of only 0.5 - 0.6 mg/l.
- Optimized precipitant usage.
- High level of process transparency combined with ease of use.
- The switching of the basins from parallel to cascade operation during a plant upgrade posed no problem for the control system.

Customer requirements The customer required a control system that automated phosphate precipitation while also ensuring compliance with the phosphate limit value of the plant (1 mg/l), as stipulated by regulations. The phosphate concentration in the outlet had to be as constant as possible

during both peak- and low-load phases. The control system also had to be able to comply with much lower limit values, since a more stringent limit value of 0.3 mg/l is expected in the next few years. An additional requirement was the ability of the control system to function after the clarifiers were switched from parallel to sequential operation. Furthermore, the solution had to be easy to operate, to ensure that staff could make settings quickly and easily when on standby duty during the night and at weekends.

Our solution The WWTP operator opted for a complete solution comprised of several different components:

- State-of-the-art, low-maintenance phosphate analyzer.
- Programmable logic controller (PLC) with Liquiline Control software.
- Touchscreen display used to operate the system from the control room.
- Various services, such as consulting, design and configuration of the controller, process integration, system training.

Load-dependent precipitant dosage in Stadtlahn

The customer wanted phosphate measurement to take place at three measuring points (see infobox). A phosphate analyzer was therefore installed in a centrally located measuring container. The analyzer automatically analyzes samples from the measuring points every 10 minutes. The Liquiline Control uses the measured value from the inlet of the biological stage to adapt to the incoming load, thus balancing out peak- and low-load phases. Based on the measured value from the outlet of the biological stage, the Liquiline Control regulates precipitant dosage until such point as the desired residual outlet concentration of 0.5 - 0.6 mg/l has been reached. In this way, precipitant usage is optimized.

A high level of process transparency combined with ease of use

The control system is designed in such a way that it can be operated using just a few settings. The effect of each setting is always obvious, with the result that the process has become more transparent for staff.



Phosphate measuring points at Stadtlahn WWTP

- Inlet of biological stage: Measurement of incoming load.
- Outlet of biological stage: The effectiveness of phosphate precipitation is tested here.
- Outlet of WWTP: Final check to verify if limit value has been observed.



Precipitant tank at Stadtlahn WWTP: An iron(III) chloride (FeCl_3) precipitant is used in summer, while an iron-aluminum combination product is used in the winter months.

Low-maintenance phosphate analyzer

The Stadtlahn WWTP opted for the Liquiline System CA80PH analyzer, since it uses the molybdenum blue method. This method enables reliable measurement of the lowest phosphate concentrations. In addition, the state-of-the-art analyzer is very economical in terms of reagent consumption and is also both low-maintenance and easy to maintain.



Orthophosphate analyzer CA80PH

“One of the major advantages of the phosphate analyzer is that it calibrates itself and runs cleaning intervals independently. For us, this means that maintenance is kept to a minimum. In fact, we hardly need to look after the device at all.”

Markus Pries, Electrician, Stadtlahn WWTP

Additional services The customer worked with our wastewater technicians to define all of the

requirements for the phosphate control system, ensuring that the Liquiline Control was adapted to the individual circumstances in Stadtlahn. This also entailed creating a graphical representation of the plant layout on the touchscreen of the control monitor, making for clear and intuitive operation. In addition, our service team supported the customer throughout the commissioning phase and provided the staff with training on the system.

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