

Xylem provides sustainable, compact UV disinfection solution to German water treatment plant

Xylem's certified Wedeco Quadron systems provided for chlorine dioxide to ultraviolet (UV) disinfection conversion.

The challenge:

Operational since 1886, the drinking water treatment plant located in Witten, Germany originally consisted of a few wells near the Ruhr River. Since then it has been transformed into a modern water production treatment plant under the stewardship of the Verbund-Wasserwerk Witten GmbH supplying drinking water to approximately 95,000 inhabitants of the city of Witten, and a further 5,000 inhabitants in the nearby town of Wetter-Wengern. The vast majority of the water comes from the Ruhr River as artificially enriched groundwater. The risk of contaminants from surface water, especially of microbiological nature, requires an intensive, multi-step treatment process.

The process begins with filtration by adding powdered activated carbon, as required, to water from the river. Subsequently the filtrate undergoes a slow sand filtration process into the groundwater layer. The enriched groundwater is pumped on strippers for mechanical ventilation with air and deacidification as the first steps of the drinking water treatment. The addition of flocculants when necessary, a modern multi-layer filtration and a final disinfection, conclude the treatment.

Dipl. Geol. Klaus Döhmen, VWW Verbund-Wasserwerk Witten GmbH, head of production and treatment, explained, "In 2012, we decided to move from traditional chlorine dioxide disinfection to the sustainable option of UV disinfection, a physical process that does not involve the use of chemicals and does not create any disinfection by-products. The inactivation of bacteria, viruses and parasites, including those which are chlorine resistant, with UV light is a tried and tested disinfection method. The UV light changes the hereditary information (DNA) of the targeted pathogens, thereby preventing further cell division. More than 99.99 percent of all pathogens can thus be rendered harmless in a matter of seconds. Because of restricted space we had to rule out low pressure UV reactors - we needed a compact solution."

"Xylem clearly demonstrated its ability to tailor solutions to our needs by drawing on their strong engineering capabilities and broad expertise in the area of UV treatment."



Verbund-Wasserwerk Witten supplies 100,000 Witten and Wetter-Wengern inhabitants with pure drinking water. The picture shows a central part of the treatment plant in a historical building.



Close-up of the Xylem Wedeco Quadron 1200 medium-pressure UV system.

Verbund-Wasserwerk Witten GmbH
UV design peak flow capacity: 1000 m³/h (6.4 MGD)
Ultraviolet Transmittance (UVT): 90%
Minimum UV Dose: 40 mJ/cm² (DVGW)
Xylem scope: 2 Quadron 1200 UV disinfection systems

The Xylem solution:

Xylem was commissioned to deliver two Wedeco Quadron 1200 medium-pressure UV systems. The systems were installed in spring 2013 and, following a two-month trial period, they were placed in fully automatic operation.

Klaus Döhmen said, "We were looking for a partner who could provide us with a compact solution which was compatible with our existing automation and control system and could handle a high throughput of 1,000 m³/h per UV reactor. One system acts as a back-up and, in the event that the water quality decreases, both systems are operated simultaneously to fulfil the disinfection requirements. Everything has to work automatically, aligned with our electronic controlling system with predetermined technical conditions."

Due to the space limitations, the UV systems were installed above the existing water main piping. As Xylem's patented Wedeco OptiCone flow diverter guarantees the perfect flow to the UV lamps regardless of the supply pattern, it was capable of handling this irregularity.

"Two other factors in choosing this technology were Wedeco's OptiDose control feature and the wide ranging intelligent dose control of 30-100 percent power input which ensures adequate disinfection while minimizing energy consumption in all operating conditions. This feature was of particular importance to us due to the seasonal variations in the water quality of the river. That's also the reason why the UV transmittance (UVT) is monitored and recorded using not only a manual UVT monitor but also an online UVT spectrophotometer. The one sensor-per lamp monitoring system further ensures that the correct UV dose is always applied," added Klaus Döhmen.

An automatic cleaning function with a chemical-free mechanical wiper system supports optimum operating conditions and reduces maintenance costs. UV lamps and sensors are accessible from one side and can be replaced quickly and easily without having to empty the reactor. A service hatch enables internal system maintenance to be carried out without the need to remove the system from the pipe work.

The result:

Xylem's Wedeco Quadron systems have facilitated the water treatment plant's smooth transition to UV disinfection, providing a reliable and sustainable alternative to chlorine dioxide disinfection. The two medium-pressure UV systems are the first of the new Quadron 1200 series with DVGW certification to be installed in Germany.

"The flexibility offered by Xylem was a key factor when choosing to install the Wedeco solution; we were looking for a reliable, sustainable and cost-effective alternative to chemicals."



UV reactors were retrofitted and installed above the mains pipe.



UV lamps and sensors are accessible from one side and can be replaced quickly and easily without having to empty the reactor.