

Elimination of pathogens, microplastics and trace elements with membrane bioreactor plants of the Erftverband

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For many years, the Erftverband has successfully operated the membrane bioreactor plants WWTP Rödingen (3,000 e.p.) in Titz, the Nordkanal WWTP (80,000 e.p., $Q = 45,000 \text{ m}^3/\text{d}$) in Kaarst and the Glessen WWTP (9,000 e.p.) in Bergheim.

Measures undertaken by the Erftverband to optimize operations at the Nordkanal plant resulted in a reduction in the specific energy requirement of $1.1 \text{ kWh} / \text{m}^3$, to an annual average of $0.6 \text{ kWh} / \text{m}^3$. With the additional sewage sludge digestion facility currently under construction at this plant, the energy requirement will be further reduced by about $0.2 \text{ kWh} / \text{m}^3$. At this level, energy consumption will be only a bit higher than at conventional WWTPs. Given the complete retention of flocs, particles, pathogenic germs and microplastics in just one process step and the operationally proven membrane life of more than twelve years, the membrane bioreactor process has become a serious, economical and innovative alternative to conventional waste water treatment processes.

A satisfactory elimination of trace substances is not guaranteed with membrane filtration alone. However, it is expected that membrane filtration provides optimal preliminary treatment with regard to adsorptive, energetic and economic factors before elimination of trace substances is carried out in additional treatment steps. It is expected, that this hypothesis will be confirmed in a study in which a subsequent activated carbon adsorption will be installed at the Glessen membrane bioreactor plant.

In a separate study, the Erftverband is currently conducting field tests on the Nordkanal membrane bioreactor plant with powdered activated carbon which is fed directly into a chamber of the four-way membrane bioreactor. The membrane filtration, integrated in the bioreactor, ensures complete retention of the powdered carbon which is load of adsorbed contaminants,, so that no further separation step is required.