Direct sludge filtration: sustainable municipal wastewater treatment

Harry Futselaar, Patrick van Lierop, Rob Borgerink

ABSTRACT

After the successes of ultrafiltration (UF) capillary membranes in well water, surface water, seawater and wastewater effluent polishing, a new membrane concept is introduced that is capable to treat sludge from the biological reactor directly. The technology is called “direct sludge filtration” and is simple, clean and maintenance poor. Based on the successful 0.8 and 1.5 mm hydrophilic polyethersulfone (PES) UF membranes, a unique 3.0 mm capillary PES UF membrane has been developed. Using this membrane it is possible to filter water with suspended solid levels up to 15,000 mg/l (15 g/l). The new membrane is mounted in a complete new system layout for a significant reduction in footprint, building time and process complexity. This plug-and-play compact package design offers a flat slab erection without a lot of civil works reducing capital expenses importantly and is very suitable for (decentralized) wastewater treatment. In this paper, two examples of membrane bioreactor system (MBR) projects in the Netherlands will be discussed showing how an existing conventional activated sludge system has been upgraded successfully by integrating MBR systems. It will be shown that these combinations offer a cost-effective solution for purification of municipal wastewater into high quality effluent suitable for safe discharge into the environment and for durable urban water chain management.

Keywords: Direct sludge filtration; Municipal wastewater; Urban water reuse; Membrane bioreactor; Airlift; Ultrafiltration