

waste activated sludge thickening with ZeeWeed* membranes

Application: Thickening of waste activated sludge

Benefits: Simple operation. Low capital costs. No polymer addition.

Used for: Conventional activated sludge or membrane bioreactor processes



the problem

Sludge—or waste solids—is a by-product of biological wastewater treatment plants that must be disposed of. Handling and disposing of sludge; however, is typically complicated and costly. Its management can involve processes such as thickening, digestion, dewatering, disposal, or beneficial use. The overall cost for sludge handling can comprise up to 50% of a wastewater treatment plant's total lifecycle cost.

Sludge thickening is the process of concentrating the solids content of the sludge by reducing its water content. Removing a portion of the water from the sludge helps to reduce the cost of digesting, storing, hauling and drying sludge. Sludge thickening is normally accomplished using gravity settlers, dissolved air flotation, centrifuges, gravity belts, and rotary drum thickeners. Some of these processes can occupy a significant amount of space within the wastewater treatment plant, require careful monitoring and control, and utilize large amounts of chemicals/polymers.

the solution

SUEZ ZeeWeed* membrane Sludge Thickeners are helping several activated sludge plants to minimize capital (i.e., reduce downstream tankage and equipment capacities) and chemical costs. The membrane sludge thickener utilizes ZeeWeed reinforced hollow fiber membrane technology, as an alternative to traditional sludge thickening technologies. With a nominal pore size of 0.04 microns, the ZeeWeed UF membrane is a complete, physical barrier to anything larger than the pore size, including virtually all suspended solids.

The ZeeWeed Membrane Sludge Thickener is designed to thicken waste activated sludge (WAS) from membrane bioreactors (MBR) or any other activated sludge process. The thickener increases the waste sludge solids concentration up to 3.0 – 4.5% dried solids (DS). This technology significantly reduces both operating and capital costs by eliminating the use of polymers and reducing the capacity of downstream tanks and equipment, if applicable.

Find a contact near you by visiting www.suezwatertechnologies.com and clicking on "Contact Us".

*Trademark of SUEZ; may be registered in one or more countries.

©2017 SUEZ. All rights reserved.

The ZeeWeed Membrane Sludge Thickener is comparable to conventional sludge thickening technologies such as dissolved-air flotation and rotary drum thickeners. It can be applied as a stand-alone modular sludge thickener (Z-MOD* type ST) in any biological wastewater treatment plant, or it can be easily integrated into the overall membrane filtration system of a ZeeWeed MBR plant as a dedicated membrane train.

the process

The ZeeWeed membrane sludge thickener incorporates the same components as a ZeeWeed MBR system, including; dedicated membrane tank(s), membranes, permeate (suction) pump(s), membrane aeration blower(s) and drain/transfer pump(s). Membrane aeration is provided by integral coarse bubble-diffusers on the membrane cassettes. Aeration is provided to scour the outside of the membranes. The scouring effect minimizes the accumulation of solids on the membrane surface. The aeration also provides oxygen to further stabilize the sludge and ensure that it remains aerobic.

During thickener operation, the membranes are periodically backpulsed or backwashed with permeate to maintain their permeability—a fully automated process typically occurring every twelve minutes and lasting 30 to 40 seconds. Depending on the application, membrane relaxation can be used in lieu of backpulsing.

The sludge thickening process involves filling the membrane tank with WAS from the main biological process. When the tank is full, the permeate pump is started. WAS is pumped to the thickener at the same rate as permeate is drawn from the system. Solids-liquid separation is achieved by the membranes, which are immersed directly into the sludge. The membranes are connected to the suction side of the permeate pump, which applies a slight vacuum that draws treated water from the sludge through the membrane pores, leaving the solids on its outside. Membrane aeration keeps the membrane tank fully mixed and ensures that solids are evenly distributed across the tank.

During the process, the solids in the membrane tank are concentrated as permeate is removed. The system continues to operate in this manner until the desired concentration of solids is reached—at which time, the WAS feed pump and permeate pump are stopped, and the thickened sludge is transferred from the tank.

case study

The Cauley Creek Water Reclamation Facility in Georgia installed the ZeeWeed membrane sludge thickener to minimize the aerobic digester tank volume and all downstream equipment capacity.

Their ZeeWeed Membrane Sludge Thickener was designed to handle a WAS flow of 100,000 gpd at 0.7 – 0.9% DS to produce 25,000 gpd of thickened sludge at 3 - 4.5% DS, which is then aerobically digested and dewatered with a centrifuge decanter.

