

MBR

as unit operation
of a

Liquid Waste Processing Plant

Realization: 2016

Ingenieurbüro für Verfahrenstechnik

A-8042 Graz

Eisteichgasse 20/9. Stock/Tür 36

Tel. +43 / 316 / 38 10 38-0, Fax: -9

office@envicare.at

www.envicare.at

your reference:

our reference: BM/Akq

File: MBR-liquid waste_2018-10-24.docx

Number of pages: 2

Graz, 25. October 2018

Introduction

The technology of membrane bioreactors (MBR) is used successfully in industrial wastewater treatment. Also, in communal wastewater treatment the use of membrane technology is increasing.

MBR-Plant for the treatment of liquid waste

On a waste treatment plant liquid waste (e.g. oil-water-mixtures, emulsions) is processed and in the first treatment steps evaporator distillate and outflow of flotation plants is generated. This wastewater contains organic compounds. The MBR concept is used as subsequent cleaning stage to reach indirect discharge quality.

The central part of the MBR wastewater treatment is the membrane bioreactor with hollow fiber membranes, which are combined into modules.



The biological treatment takes place in the MBR tank. Due to the membrane, all biomass in the form of activated sludge is held back and therefore, the sludge age can be freely chosen. Aeration on the bottom of the tank ensures aerobic degradation of organic substances, as well as prevents sludge particles from clogging the membrane.

Below some key data to the MBR plant is presented:

- Membrane area 400 m²
- COD-degradation > 90%
- Elimination of Filterable Solids > 99%
- Reduction of Hydrocarbon Index > 90%
- Dry substance 6 - 18 g/l

Fluctuating amounts and quality of wastewater can be handled effectively by adaptation of the dry substance content.



Possible changes in sludge quality as well as high hydraulic loads do not cause a loss of biomass due to wash out.

The reduced space requirements in comparison to conventional activated sludge processes with a final sedimentation basin is an additional advantage especially for existing industrial plants with limited space.

Summary

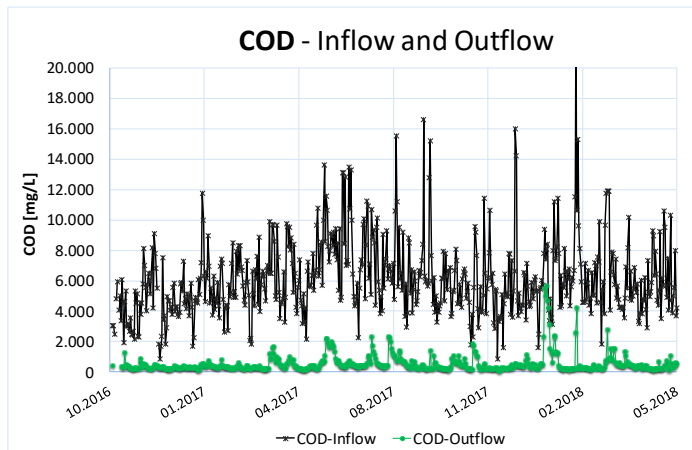
The experiences gained by application of MBR as treatment stage in liquid waste processing show that the technology is reliable and robust over a long period of time. The main advantages include cost-effective construction works due to reduced space requirements and an unnecessary final sedimentation basin. Additionally, the freely selectable sludge age allows for high degradation rates, since the sludge is retained to 100%.

EnviCare® supports you in process concept design, authority proceedings, order placing, contraction, construction supervision and installation of plants.

We take care of your environment.

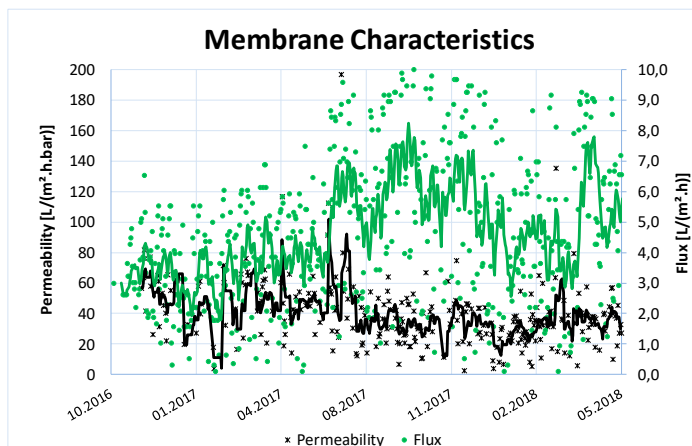
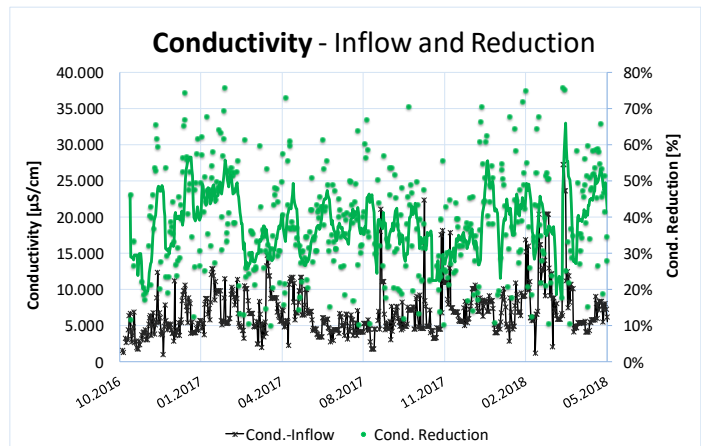
Characteristic data and trends

	Design	Maximum	Effluent
Inflow [m^3/d]	60	120	60
Temperature [$^{\circ}C$]	32	44	--
Filterable Solids [mg/L]	300	500	< 5
COD [mg/l]	8.000	24.400	550
COD [kg/d]	480	1.000	33
COD Volumetric Load [$kg/(m^2.d)$]	4,0	10,1	--
COD Sludge Load [$kg/(kg.d)$]	0,34	0,70	--
Hydrocarbon Index [mg/L]	150	250	< 10



The COD inflow in the MBR from the liquid waste processing shows high variations up to 16.000 mg/L over time. Nevertheless, from the start a high COD degradation rate can be shown and the effluent limit is fulfilled.

The conductivity in the inflow ranges from 1.000 $\mu S/cm$ up to 27.000 $\mu S/cm$. Through the biological treatment a reduction in conductivity between 20 and 60% can be achieved.



Flux and permeability are typical values for membrane characteristic. The diagram shows that both values remain stable within a certain range over a long period of time.