The MemTriq®Marine

Oil Water Separation at the Royal Dutch Navy

Triqua has built a membrane filtration system for the pretreatment of bilge water. Nearly all the mineral oil is removed. The remainder and the dissolved COD is treated with a Membrane bioreactor. Compared to the conventional oil-water separation techniques the membrane filtration has a higher removal efficiency and is more compact.

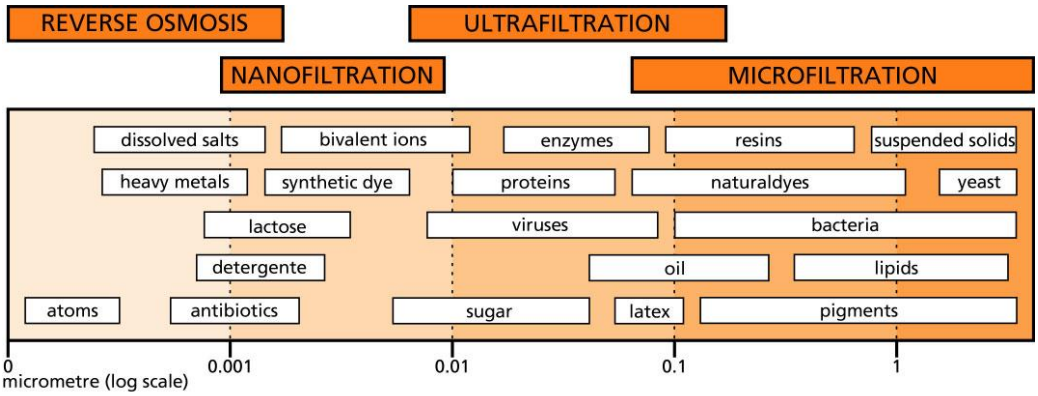

Figure 1: Types of membrane filtration.

Membrane filtration

Membrane filtration is based on the principle of separation by difference in particle and pore size. Particles with a larger size than the pores of the membrane will be retained and particles with a smaller size will pass the membranes. In figure 1 the different types of membrane filtration are defined. As driving force a pressure gradient is needed to perform the filtration process.

Advantages of membrane filtration:

- High reliability and simple operation
- No need for extra chemicals
- High removal efficiency
- Strong volume reduction of mineral oil
- Low emission of off gas
- Completely closed system

Membrane filtration of bilge water

Bilge water contains a lot of mineral oil fractions. Before treating the bilge water with a biological wastewater treatment the water needs to be pretreated in order to remove the mineral oil. Membrane filtration can be an excellent alternative for flocculation/flotation units.

Figure 3: Membrane filtration at the Royal Dutch Navy

Bilge water treatment at the Royal Dutch Navy

At the Royal Dutch Navy the bilge water is pretreated with membrane filtration. A concentration factor of 300 can be obtained with membrane filtration. This means that for every 300 m3 of treated water, just 1 m3 of concentrate with contaminating oil fractions is produced. Even with this high concentration factor, the membrane filtration operates at a steady filtration capacity. In figure 2 the relation between concentration factor and membrane flux is presented.

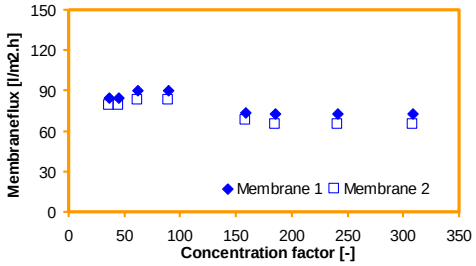

Figure 2: Concentration factor and membrane flux.

Nearly all mineral oil can be removed by membrane filtration. Results are shown in table 1. The effluent is treated in the existing biological treatment system, a MemTriq® installation.

		In	Out
COD	[mg/l]	10,500	9,000
Mineral Oil	[mg/l]	3,600	1
Cadmium	[ppb]	61	<5
Copper	[mg/l]	4.1	<0.1
Zink	[mg/l]	41	<0.1

Table 1: Average results of membrane filtration.

For further information:

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