Description

Aquatec Maxcon is the exclusive agent for *Kubota membrane bioreactors (MBRs)* modules in Australia and New Zealand. Our company designed and constructed the first commercial scale MBR in Australasia for Townsville CitiWater at Picnic Bay, Magnetic Island. The project received an Engineering Excellence Award in 2003 demonstrating its state of the art technology and capability.

**Development**

The development of the submerged membrane bioreactor technology by Kubota was the result of a Japanese Government initiative to produce compact high quality effluent treatment plants. Kubota, since producing their first pilot plant in 1989 and first commercial plant in 1991, have installed over 1,700 plants treating a wide range of effluents including sewage, sludge liquors, industrial and food processing wastewater and grey water recycling for re-use.

The Kubota system utilises a flat sheet membrane panel arrangement. A series of these membranes are submerged directly within an activated sludge treatment tank, greatly simplifying the overall plant layout and provide a directly micro-filtered product water. By this configuration, the energy required for aeration of the treatment liquor also generates an upward cross flow over the membranes, keeping fouling of the filtration surface to a minimum.

The membrane bioreactor treatment produces a high quality disinfected effluent. The process requires no primary or secondary settlement stages and no additional tertiary treatment or UV stages to achieve disinfection suitable for many applications. Raw sewage only requires screening and degritting prior to entering the membrane bioreactor tank and subsequent
MBR technology is now being recognised for its clearly demonstrated benefits and reliability for producing high quality effluent. Aquatec Maxcon pioneered membrane treatment in Australia and New Zealand and to date have successfully designed, installed, and commissioned 29 MBR plates.

Robustness

In general the Kubota system is a much more robust solution than other MBRs which typically utilise hollow fibre technology. Unlike the hollow fibre technologies, the membranes are held rigidly in place. This has a number of benefits. Firstly, the flat sheets are not easily affected by ‘pinning’ and breakage stemming from the presence of hair and other fibrous materials, which the hollow fibre type membranes are known to be.

Secondly, because the membranes are not moving, they are not subject to the same wear. Previously, it was estimated that the membranes had an operational life of up to eight years. Now after years of research and having an installation at Porlock (England) operating since 1998, the number of membranes required to be replaced thus far suggests that we may well
have a membrane life of anything up to twelve (12) years. This is truly exceptional performance.

Thirdly, the robustness of the system allows for elevated levels of MLSS. We have had plants operate at MLSS levels exceeding 35,000mg/L and still maintain design flux. While we do not design for these levels, it is reassuring that the design maximum of 20,000mg/L is well within our operational range.

**Design**

**Compact Plant**

Aqua-MBR has a number of inherent advantages. The system does not require flocs to be formed to remove the solids by settlement and therefore the biomass can operate at very high levels of MLSS, generally in order of 10,000 –8,000mg/L. This high concentration enables a low tank volume and a long sludge age to be utilised, which reduces sludge production and allows for a small plant footprint. It allows for a 50% reduction in aeration tank volume.
Energy Saving Operation and Easy Maintenance Control

Gravity filtration is possible and only a little power expense is required, even of suction filtration. The submerged membrane can be easily and quickly installed and maintained only by ascending or descending the units along the guide rails. Membrane cleaning using chemicals is normally required twice a year.

Less Excess Sludge Production

The long sludge age process produces 35% less sludge than conventional treatment processes. Hence, less sludge handling and disposal cost. In addition, the sludge is highly stabilised.
Automatic Flushing

Automatic flushing valves will enable daily cleaning of the 'centipede' air diffuser.

The flushing valve will open for a short duration to allow sludge to be drawn into the diffuser, via the venturi effect, and then close again, to allow sludge to be discharged from the diffuser.

In this way, the system does not require flushing with wash water.

Technical

Magnetic Island Water Reclamation Plant Actual Performance Data

Parameter

Units
Membrane Bio Reactor

50%ile

90%ile

Max. Effluent

BODs

mg/L

1.5

4.5

9.0

Suspended

Solids

mg/L
Ammonia - N

mg/L

0.04

0.5

1.0

Total - N

mg/L

1.8
Membrane Bio Reactor

3.2

5.7

Total - P

mg/L

0.1

0.28

0.45

PH

7.4 - 8.0

range

Faecal Coliforms
No. per 100 mL

0

median

NR

Applications

Kubota MBR Applications:

- Suitable for Class A reuse.
- Suitable as a pre-treatment for Reverse Osmosis applications.
- Compact wastewater treatments for developments for Irrigation and non-potable reuse.
- Suitable treatment process to meet discharge requirements for marine life, bathing sites, etc.
- Retrofit into existing wastewater plants for increased plant capacity and better effluent quality.
- Industrial wastewater applications such as brewery, beverage pulp and paper, and food wastewater.

Services

Aquatec Maxcon has established and maintains a dedicated service department for scheduled maintainence and breakdown services.

Services Home Page

Images