

# Aqua-Aerobic® MBR

Membrane Bioreactor System



AQUA-AEROBIC SYSTEMS, INC.  
A Metawater Company

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## Membrane Bioreactor System

For over 40 years, Aqua-Aerobic Systems, Inc. has proven performance with solids/liquid separation technologies and has installed over 1,000 biological treatment systems since 1986. The Aqua-Aerobic® MBR membrane bioreactor system is a unique, time-managed process which uses sequential aeration to promote biological nutrient removal in a simplified unit process. The integration of submerged membranes provides direct filtration of high-level mixed liquor suspended solids (MLSS). This unit process places the Aqua-Aerobic MBR system in a unique class of high-quality, membrane-coupled biological reactors.

## System Features and Advantages

- Minimal pre-screening requirements
- Proven enhanced nutrient removal (ENR)
- Time-managed control offers operational flexibility with fewer tanks
- Separate nitrate recycle pumps are not needed
- Patented Aqua MixAir® system adjusts dissolved oxygen to match organic loading
- Integrated equalization of batch system minimizes membrane area
- Membrane treatment of known batch volume optimizes flux and minimizes air usage
- Controlled recycle from membrane tanks limits oxygen during anoxic phase
- Membrane fibers with integral air scour and no top header minimize sludging
- Lowest energy consumption among MBRs
- Rapid solution for augmenting plant capacity

## Typical Applications

- Municipal wastewater reclamation
- Impaired water bodies (TMDL limits)
- Groundwater re-injection
- Finished water ideal for further treatment by reverse osmosis
- Industrial reuse
- Retrofit and expansion of existing treatment works
- Planning for future requirements



## Aqua MixAir® System

The Aqua-Aerobic MBR system utilizes an Aqua MixAir system to provide biological treatment. The system can cyclically operate the aeration and mixing to promote anoxic/aerobic and anaerobic environments with low energy consumption. An AquaDDM® direct-drive mixer is combined with an Aqua-Jet® surface aerator or Aqua-Aerobic diffused aeration. In addition, the Aqua MixAir system can recover oxygen and alkalinity through denitrification, prevent nitrogen gas disruption in the settle phase, promote biological phosphorus removal, and control certain forms of filamentous bacteria.

## Installation Profile: Shepherdstown, WV

- 2.2 MGD Maximum Daily Flow
- Chose MBR system due to its low energy consumption and Aqua-Aerobic Systems' superior service and experience
- Plant meets low nitrogen and phosphorus requirements for discharge into a sensitive waterway
- Excellent effluent quality: less than 2 mg/l total nitrogen, 0.04 mg/l total phosphorus, non-detectable TSS\*
- Easily adaptable to handle future flow expansion

*\* Effluent quality data is from January 2015*

## Submerged Membranes

Direct filtration of MLSS from the biological process is achieved with advanced submerged membrane technology. The membranes provide a 0.03 micron filtration barrier to bacteria and suspended solids for reuse quality effluent. Braided membrane fibers offer exceptional mechanical strength and side baffles accelerate cross flow within the modules.

The membranes are Title 22 approved and have proven to offer the lowest energy consumption among membranes in MBR applications.

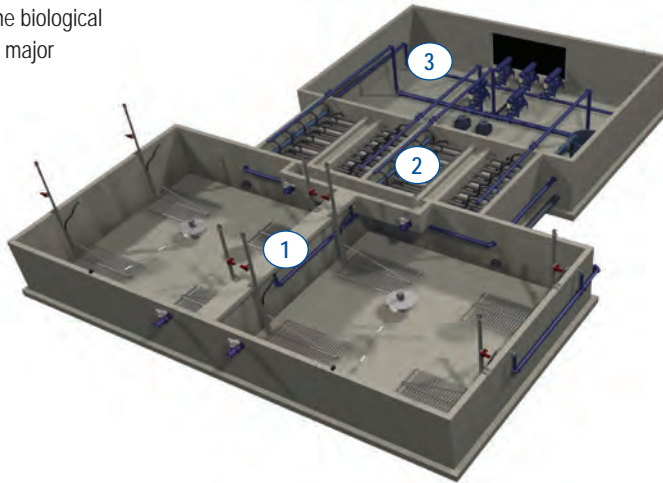


# Aqua-Aerobic<sup>®</sup> MBR

## Phases of Operation

The success of any membrane biological reactor (MBR) relies on three major components:

- 1) Biological Process
- 2) Membrane Filtration
- 3) Process Control



### 1 Biological Process



Screened influent enters the biological system and is treated via time-managed process control. The Aqua MixAir system conserves energy and assures a proper reactor environment. Efficient treatment can be performed in either a true-batch or a continuous-flow operational mode. Retrievable diffusers (shown above) are often used for easy access.

### 2 Membrane Filtration



Sludge from the biological process is continuously fed to the membrane tanks. The membranes are submerged directly in the biological solids and permeate is drawn equally from all membranes. Excess biological solids are returned back to the biological reactors, with a small portion wasted from the system.

### 3 Process Control



A simplified arrangement of pumps and blowers are used to draw effluent, recycle solids and provide air for biological treatment and membrane cleaning. Backwashing, air scour and chemical cleaning are performed automatically under plant operator supervision.

## IntelliPro<sup>®</sup> Process Monitoring and Control System

The IntelliPro system is a personal computer (PC) based program that interfaces with the AquaMB Process via a network connection to assist operators in optimizing the treatment process of the plant and further reducing operating costs.

### System Advantages

- Real-time, online monitoring and control
- "Active Control Mode" automatically receives, interprets and proactively adjusts in-basin instruments and process variables including biological nutrient removal, chemical addition and energy
- Reduces the operator's sampling time
- Real-time and historical graphical trending of process parameters
- BioAlert™ process notification provides corrective action to eliminate operational interruptions and upsets
- Assists in the optimization of enhanced nutrient removal
- Automatically regulates chemical addition to maximize nitrogen removal in the bioreactor and TSS/phosphorus reduction in the CMF and membranes.
- Online operation and maintenance support
- On-demand remote troubleshooting assistance



**Since 1969**, Aqua-Aerobic Systems, Inc. has led the industry by providing advanced solutions in water and wastewater treatment. As an applied engineering company serving both municipal and industrial customers, we work collaboratively with consulting engineers, owners, plant managers, and operators to design and manufacture the best treatment solution with the lowest lifecycle cost.

# Providing **TOTAL** Water Management Solutions

**Aeration & Mixing**

**Biological Processes**

**Filtration**

**Oxidation & Disinfection**

**Membranes**

**Controls & Monitoring Systems**

**Aftermarket Products and Services**

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