



WASTEWATER TREATMENT SYSTEMS

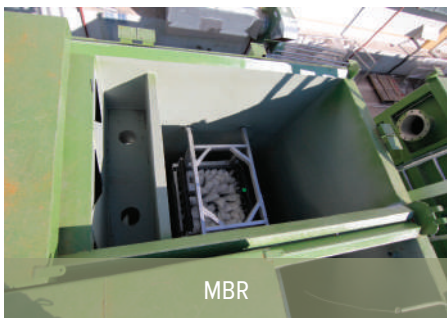
- Membrane Bioreactor Systems (MBR)
- Moving Bed Biofilm Reactor (MBBR)
- Sequencing Bath Reactor Systems (SBR)
- Grey Water Treatment Systems

AQUALINE

Pollet Water Group

MBR SYSTEMS

The MBR process is a suspended growth activated sludge system that utilises microporous membranes for solid /liquid separation in lieu of secondary clarifiers.



MBR



MBR PUMPS



MBR CONTAINER

MEMBRANE BIOREACTORS

Membrane Bioreactors are biological treatment plants which combines activated sludge process with submersed membrane filtration. Secondary settling tanks are replaced with membrane units. Complete solids removal, a significant bacteria removal capability, high rate and high efficiency organic removal and small footprint are the advantages of the MBR Systems.

The MBR process can be configured in many different ways depending on project specific nutrient removal objectives. Anoxic zones before or after the aerobic treatment may be used for denitrification, depending on the effluent nitrate and total nitrogen requirements. AQUALINE prefer submersed configuration because of less energy requirement and low fouling potential. In submersed configuration, a suction force is applied to draw the water through the membrane, while the sludge is retained on the membrane surface.

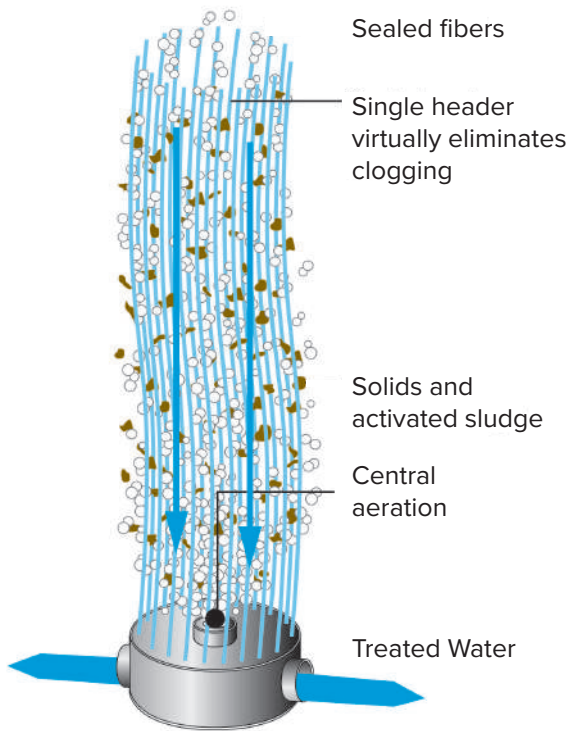
Membrane modules consist of hollow fibre bundles which are made of Polyvinylidene fluoride (PVDF). Aeration nozzles are located in the centre of the fibre bundle to scour the entire fibre length, minimizing power consumption. Single header design reduces energy, minimizes downtime, and increases the flux, all within a small footprint.

MBR treatment plants can be applied to wide capacity range. AQUALINE provides pre – engineered systems up to 1000 m³/day.

MEMBRANE MODÜL

MEMBRAN CHEMISTRY	Proprietary PVDF
MEMBRAN TYPE	Braided hollow fiber for outside in operation
FIBER SUPPORT CHEMISTRY	Polyester
NOMINAL PORE SIZE	0.03 µm
OUTSIDE FIBER DIAMETER	0.1 Inch (2.6 Mm)
MODULE FRAME MATERIAL	316 Stainless Steel
PERMEATE COLLECTION TUBE MATERIAL	ABS, PVC, PE Manifolds
STORAGE SOLUTION	Glycerin

MBR SYSTEMS



Threated water drawn through fibers under vacuum

AQUALINE offers tailor-made Membrane Bioreactors (MBR) to treat wastewater from different applications.

AQUALINE MBR SYSTEMS

Turnkey MBR system

- Standard pre-engineered design packages
- Efficient compact design, reduced footprint
- Robust, high-quality system and components
- Single-source supply
- Easily expandable
- Fast delivery and installation
- Meets or exceeds most regulatory effluent requirements

APPLICATIONS

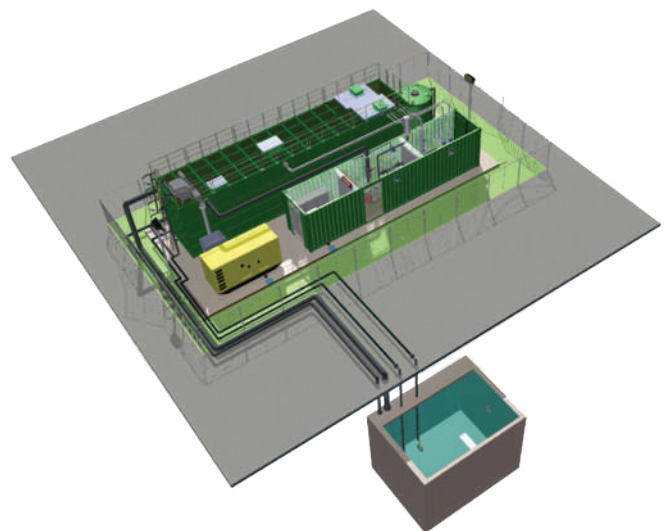
- Municipal wastewater
- Educational institutions and healthcare applications
- Hotels, Labour and refugee camps, parks and military bases
- Building complex (offices, shopping centers, small towns)
- Industrial wastewater, e.g. food and beverage applications.

ADVANTAGES

- Secondary clarifiers and tertiary filtration processes are eliminated, thereby reducing plant footprint.
- Unlike secondary clarifiers, the quality of solids separation is not dependent on the mixed liquor suspended solids concentration or characteristics.
- No reliance upon achieving good sludge settleability, hence quite amenable to remote operation.
- Can be designed with long sludge age, hence low sludge production.
- Produces a UF quality effluent suitable for reuse applications or as a high quality feed water source for Reverse Osmosis treatment.

PLANT DATA FOR DIFFERENT THROUGHPUTS

PRODUCT	CAPACITY m ³ /day	POPULATION (persons)	DIMENSIONS (approx.) L x W (m)
MW - M25	25	120	7 X 2
MW - M75	75	300	13 X 3
MW - M150	150	1000	14 X 5
MW - M300	300	2000	16 X 6
MW - M450	450	3000	18 X 7
MW - M600	600	4000	25 X 7
MW - M1000	1000	6600	30 X 7



MBBR SYSTEMS

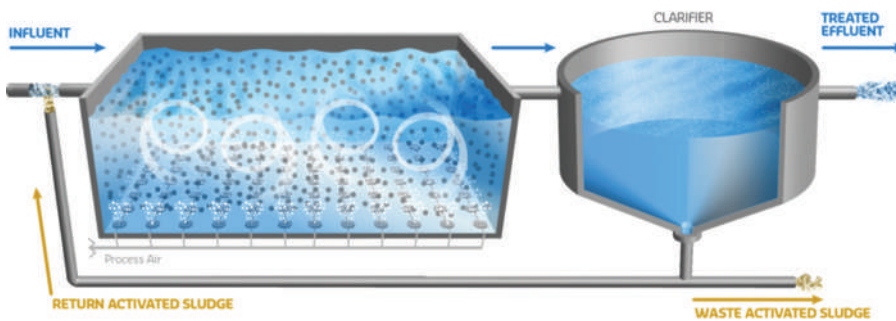
MOVING BED BIOFILM REACTOR



AQUALINE MBBR SYSTEMS

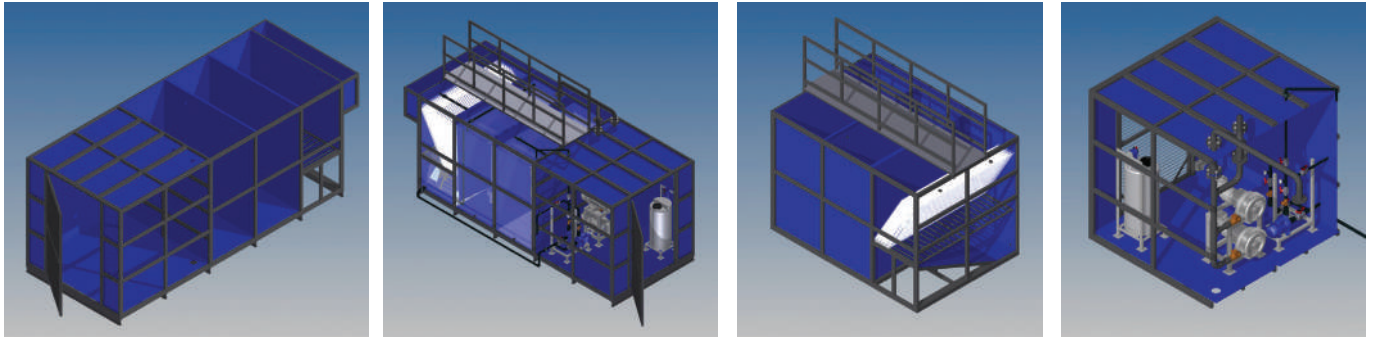
Aqualine MBBR systems can be used to treat wastewater from various sources (domestic, wineries, dairies etc.) in combination with other processes to achieve the appropriate treatment objectives: after anaerobic treatment for polishing BOD load; before activated sludge for high BOD/COD treatment, for upgrading - converting of existing plants (lagoons, oxidation ponds and activated sludge plants) or as post treatment to existing activated sludge for nitrogen removal to comply w/ new regulation limits.

Aqualine MBBR systems include the small carrier elements, which are less dense than water (0.93 - 0.95 SG), provide a large protected surface for bacteria culture and allow sites to retain active biomass within the bioreactor. Also due to the unique design of the biofilm carriers, the bacterial cultures are protected from operating excursions (pH, temperature, and toxic shocks) to yield a very robust system with variable load fluctuations.



Aqualine MBBR systems are applicable to wide range wastewater flows; from 20 m³/day to 10.000 m³/day.

MBBR SYSTEMS



DESIGN CONSIDERATIONS

- Requires primary treatment, FOG <100 mg/l
- Treatment design & configuration is arranged according to inlet & outlet parameters, including WW temp.
- Organic and hydraulic loading is variable, dependent on influent parameters and effluent requirements.
- Standard MBBR maximum media fill fraction in the reactor= 70 %
- Media retention screen(s) keeps media in tank

FEATURES AND ADVANTAGES

- Self-regulating biomass.
- Flexible design that allows for capacity increment.
- No operational adjustments, only equipment maintenance.
- Stable under large load variations.
- Smaller foot prints.
- Low investment cost.
- Single-pass treatment.
- Multiple applications.
- Extremely compact and simple biological treatment system.

INSTALLATION LIST

- Domestic/Resort
- Food Processing
- Landfill Leachate
- Marine
- Meat Processing
- Mining
- Petrochemical
- Pharmaceuticals
- Power Plant
- Pulp & Paper
- Vehicle Wash

PARAMETER	OXIDATION POND	EXTENDED AERATION	SBR	MBR	ANAEROIC / AEROBIC	MBBR
Area	High	High	Medium	Low	Medium	Low
Buffer Zone	High	High	Medium	Low	Medium	Low
Capital Cost	Low	Low	Medium	High	Medium	Low
O & M Cost	Low	High	Medium	Medium	Medium	Low
Replacement Cost	Low	Medium	Medium	High	Medium	Low
Operational Ease	Low	Low	High	High	High	Low

SBR SYSTEMS

Sequencing Bath Reactor (SBR)



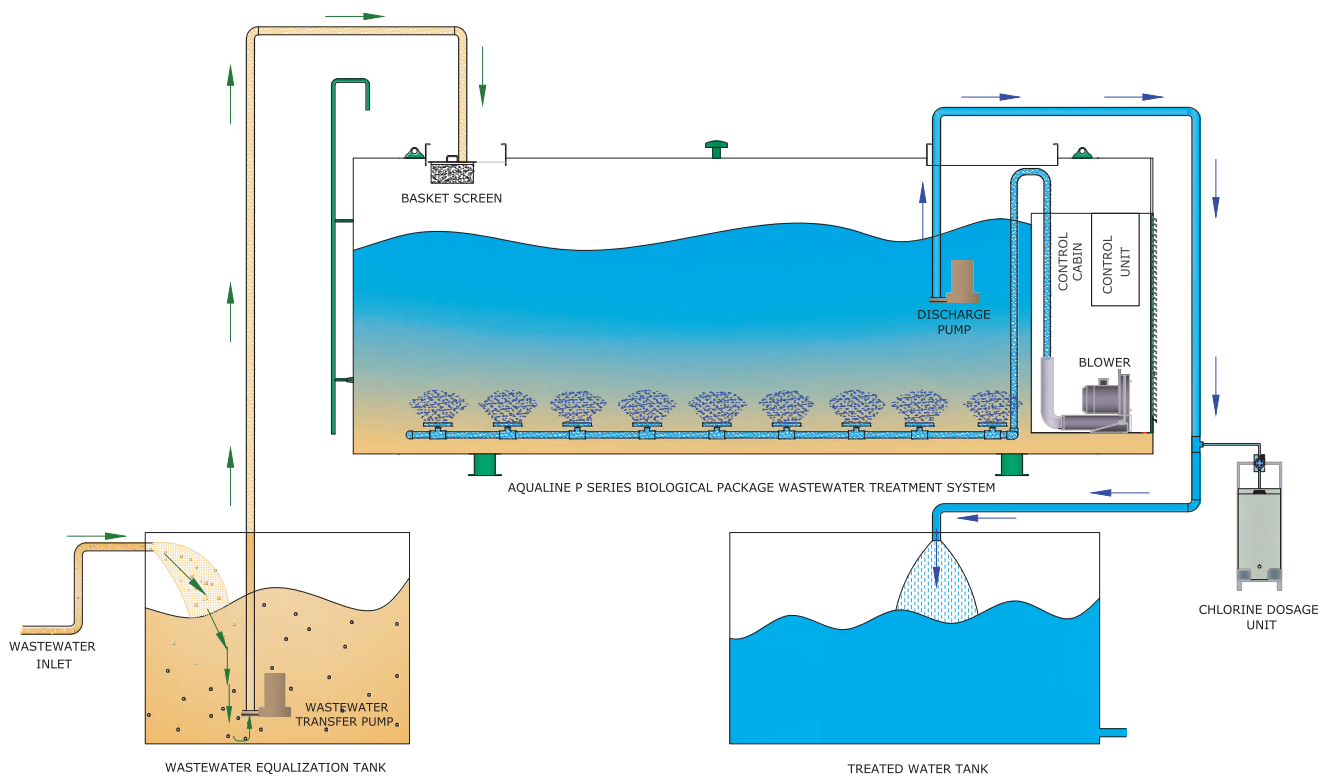
SBR SYSTEMS STANDARD FEATURES

Sequencing batch reactor (SBR) is a system which works with activated sludge principle and where aeration and sedimentation processes are occurred in the same tank as distinct from continuous systems.

Wastewater is fed to reactor tank, purified and discharged. SBR systems consist of 5 steps; 1-filling, 2- aeration, 3- sedimentation, 4-discharge, 5- discharge of excessive sludge (if needed). SBR systems function as a balance tank and comply with fluctuating pollution load and quantity of raw water. It occupies less area than classic continuous systems. If necessary, duration and application frequency of 5 steps mentioned above can easily be set for removal of nitrogen and phosphorus. This system does not require a secondary settling sedimentation tank, which classic systems require, since sedimentation is carried out in the same tank. Therefore, it is economic. A reactor can be produced not only as modular type but also from reinforced concrete and so it can be applied in all required capacities.

- A SBR unit includes;
 1. reactor,
 2. basket filter,
 3. blower,
 4. chlorine dosage pump,
 5. submersible wastewater lift pump,
 6. submersible discharge pump and air diffusers.
- Reactor body is made from epoxy coated ST-37 carbon steel substance and it can be in a prismatic or cylindrical shape. Production can be made for special applications and the used substance or geometry of reactor can be variable.
- Control system is controlled by smart relay in standard ones; however, control systems with PLC- touch operator panel can also be made optionally. Special price should be demanded for remote control- SCADA.

SBR SYSTEMS



MODEL	EQUIVALENT PEOPLE	FLOWRATE (m ³ /day)	PRISMATIC SYSTEM MEASURES			WALL THICKNESS
			WIDTH (mm)	LENGTH (mm)	HEIGHT (mm)	EPOXY COATED REACTOR (mm)
AQUALINE SBR 25	25	5	1750	1750	2450	3
AQUALINE SBR 50	50	10	1750	2500	2450	3
AQUALINE SBR 100	100	20	2150	3500	2450	3
AQUALINE SBR 150	150	30	2150	4000	2450	3
AQUALINE SBR 200	200	40	2150	5250	2450	3
AQUALINE SBR 300	300	60	2150	7000	2450	3
AQUALINE SBR 400	400	80	2150	7750	2700	3
AQUALINE SBR 500	500	100	2150	8500	2700	3
AQUALINE SBR 600	600	120	2150	9250	2700	3
AQUALINE SBR 700	700	140	2150	9250	3000	3
AQUALINE SBR 800	800	160	2150	10500	3000	4
AQUALINE SBR 1000	1000	200	2150	11250	3000	4

GREY WATER TREATMENT SYSTEMS

- WITH UF SYSTEMS
- WITH MBR SYSTEMS



GREYLINE GREY WATER TREATMENT SYSTEMS WITH UF SYSTEMS

Actually, there is no universally accepted definition of grey waters. Due to low level of contamination and easily biodegradable behaviour, the water comes from wash basins, bath and showers In houses, are accepted as grey water.

UF systems with a combination of multimedia filters, activated carbon filters or with a combination of aerated basins filled with biological media and UV or chlorine systems (at the end) can be used to treat this kind of water.

Treated grey water can be used as a flush water in toilets, in car washing and gardening.



GREY WATER AQUALINE UF SYSTEMS

MODEL	MODUL QTY	TOTAL MEMBRANE AREA (m ²)	INLET FLOW m ³ /saat @ 2,5 bar	NET PERMEATE FLOW m ³ /saat @ 2,5 bar
GAUF16	1	6	0.28	0.25
GAUF26	2	12	0.55	0.5
GAUF36	3	18	0.83	0.75

GREY WATER TREATMENT SYSTEMS



Greyline Standart Series has a capacity ranging from 2 m³/day to 100 m³/day. For larger capacities, please consult with our engineers.

CODE	CAPACITY (m ³ /day)	MEMBRANE AREA (m ²)
GL 100-20-14	100	280
GL 80-20-12	80	240
GL 65-20-10	65	200
GL 50-20-8	50	160
GL 40-20-6	40	120
GL 30-15-6	30	90
GL 20-15-4	20	60
GL 10-15-2	10	30
GL 7-20-1	7	20
GL 5-15-1	5	15
GL 2-10-1	2	10

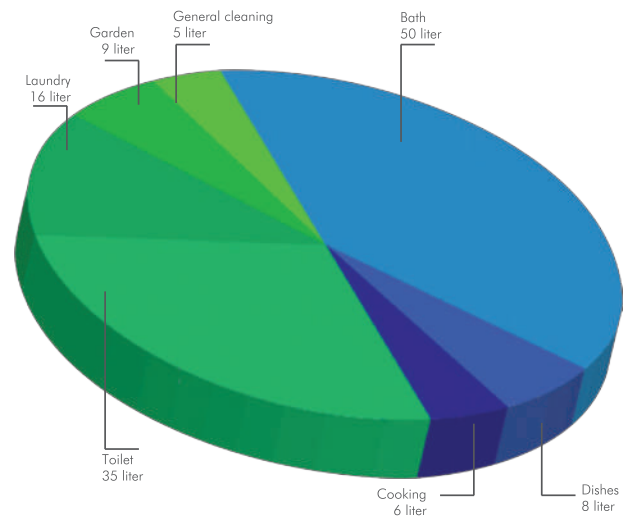
Note: Flux: 15 L-m²/hour
For tank sizes, please contact with your local representative office

GREYLINE GREY WATER TREATMENT SYSTEMS WITH MBR SYSTEMS

Wastewaters nowadays are divided into two categories; black water and grey water. Due to low nutrients level, the greywater treatment will be less costly to treat and also no need to supplementary disinfection after treatment.

Greywater is generated from wash hand basins, showers and baths, which can be recycled on-site for uses such as WC flushing and also can be used for water gardening and car washing.

Greyline Grey water treatment plants technology is based on Aqualine PTFE MBR systems. They are generally ready-to-use systems but tailor-made design can also be done for end-users or system suppliers.



How much drinking water quality there is need actually?

■ Drinking water quality is not necessary
 ■ Drinking water quality is necessary

DESIGN SPECIFICATIONS

- Given product water flow is for well water including 15 NTU inlet turbidity, 3 mg/L DOC. For different turbidity values; required feed water pump capacity and product water capacity can change. Service and backwash periods will be arranged in field according to raw water quality.
- Chemical dosage pumps are selected according to 250 mg/l CaCO₃ inlet alkalinity, 1000 us/cm inlet conductivity, 20 DegC water temperature, pH between 2,5 - 12.
- Required minimum feed water flow and pressure are given in table.
- Compact system frame is St-37 epoxy painted carbon steel for UF160, 260, 360 .
- T-rack UF system and syrface piping frame is St-37 epoxy painted carbon steel for UF470, 670, 870, 1070 ,1270 , 1470 ,1670, 1870.
- <300 micron pre-filter should be used before PAUF series. This filter is customer scope. (for PAUF160, 260 and 360; washable cartridge filter is included.)
- Frame is AISI304 stainless steel for GAUF series.
- It is assumed that UF product water tank will be used for CEB/BW tank. Required minimum tank volume is stated in table for each model.
- CEB/BW pumps are included in price. CEB/BW tank is not included in price.
- Piping material is PN10 PVC.
- Automatic valves are electrical actuated.
- Inline type product water flowmeter.
- Glycerin type manometers.
- SEKO chemical dosage pumps
- PLC + touchscreen for PAUF and GAUF series.
- Ehen manual CIP system is needed; please ask price.
- For grey water treatment; only GAUF series will not be enough; please ask offer.

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