

MBR

Membrane Bioreactor System



System Overview

The Membrane Bioreactor (MBR) system is a compact, modular, and energy-efficient wastewater treatment unit designed for industrial and municipal applications with variable and challenging wastewater characteristics. It combines advanced activated sludge processes with Polyvinylidene Fluoride (PVDF) ultrafiltration membranes to separate solids and liquids at a 0.01 micron scale. This eliminates the need for secondary clarification and produces treated effluent that meets or exceeds regulatory standards for discharge and non-potable reuse.

The system's biological treatment process incorporates anoxic and aerobic zones, enabling effective removal of biological oxygen demand (BOD), chemical oxygen demand (COD), total suspended solids (TSS), ammonia, nitrates, and phosphates. Integrated membrane filtration acts as a physical barrier to suspended solids, bacteria, and viruses, which may reduce or eliminate the need for chemical disinfection, depending on local regulatory requirements.

Designed for rapid deployment and continuous operation in space-constrained environments, the MBR system supports long sludge retention times (SRT), ensures stable performance under variable flow and load conditions, and facilitates water reuse with minimal environmental impact.



Key Features and Benefits



High-Quality Effluent

Removes solids, bacteria, and viruses using ultrafiltration, producing clear water suitable for non-potable reuse.



Versatile Application

Treats a wide range of industrial and municipal wastewater, including high-strength and variable influent.



Compact & Scalable

Modular design fits tight spaces and scales easily to meet changing capacity needs.



Low Sludge Production

Reduces sludge generation with long retention times, lowering disposal costs and environmental impact.



Efficient Operation

Automated controls and real-time monitoring minimize manual oversight and improve process reliability.



Sustainable Performance

Delivers high-efficiency treatment while meeting discharge and reuse standards with minimal chemical use.



Technical Specifications

System Performance

- Technology: Membrane Bioreactor (MBR)
- Energy Consumption: 0.83 kWh/m³
- Hydraulic Retention Time (HRT): 6–12 hours
- Sludge Retention Time (SRT): 20–30 days
- Membrane Flux: 15–25 L/m²·h
- Recovery Rate: 95–98%
- Permeate Quality: Turbidity < 0.2 NTU, E. coli: Not Detectable (ND)/100 mL
- Influent BOD/COD/TSS: 300–350 mg/L / 600–650 mg/L / 150–200 mg/L
- Effluent BOD/COD/TSS: < 10 mg/L / < 50 mg/L / < 30 mg/L
- Peak Flow Handling Capacity: Up to 150% of design flow”
- Start-up Time: 2–3 weeks

Membrane Characteristics

- Membrane Type: PVDF, Flat Sheet, 11 m²/module
- Configuration: Flat sheet or hollow fiber
- Pore Size: 0.1–0.4 microns (µm)
- Cleaning Frequency: Backwash daily; CIP every 3–6 months
- Expected Membrane Life: 5–8 years
- MLSS Concentration: 8,000–15,000 ppm

Automation & Control

- SCADA/PLC Integration: Yes, via Modbus/RS485 or Ethernet
- Remote Monitoring: Optional (GSM/Cloud-enabled)
- Sensor Types: DO, pH, ORP, turbidity, ammonia, temperature
- Alarm & Safety: Configurable alarms with SMS/email notification

Pumps & Blowers

- Pump Type: Submersible or horizontal centrifugal
- Pump Efficiency: 60–75%
- Air Blower Capacity: 0.17 Nm³/min per 10 m³/day
- Backwash Capacity: 1.0 m³/h per 10 m³/day of treatment capacity
- Redundancy: Duty + Standby configuration

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Electrical & Power

- Power Supply: 380–480V, 3-phase, 50/60 Hz
- Standby Power: Compatible with diesel generator or UPS

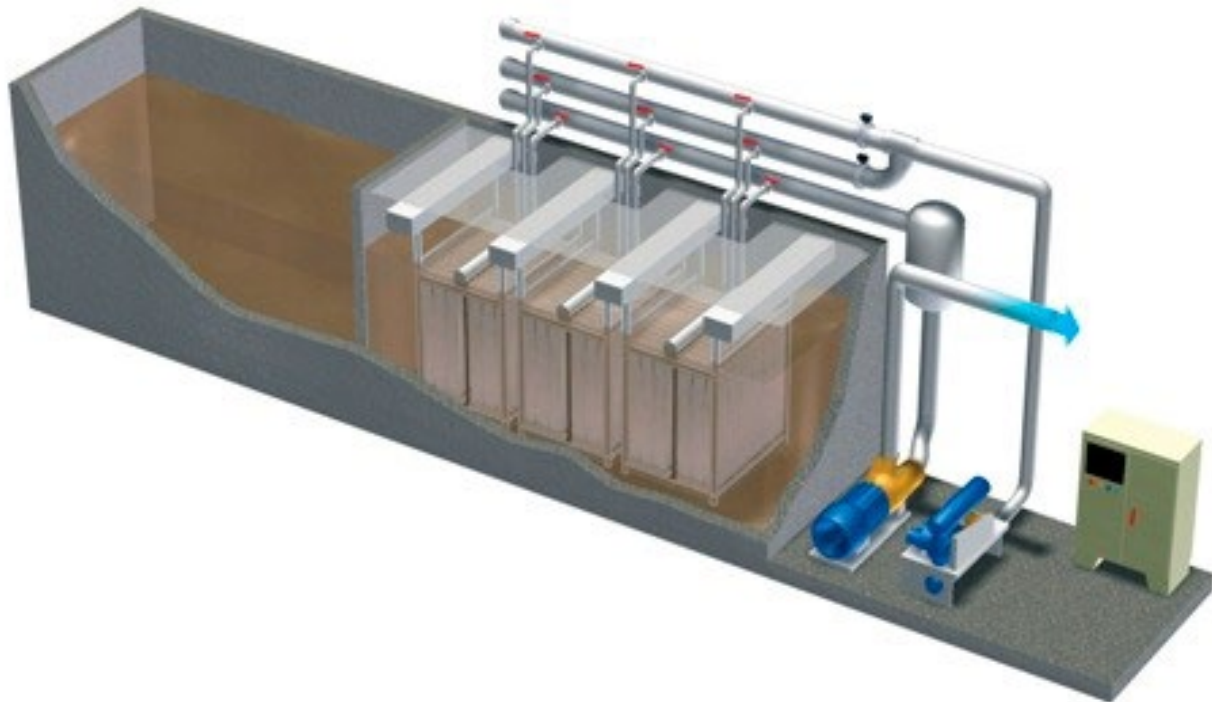
Environmental Tolerance

- Operating Temperature Range: 5°C to 45°C
- Ambient Humidity: Up to 90% RH, non-condensing
- Seismic/Wind Design: Compliant with local building codes
- Noise Emission: < 75 dB(A) at 1 meter

Maintenance & Support

- Service Intervals: Monthly inspection, quarterly full service
- Spare Parts Kit: Membranes, seals, sensor parts
- Parts Availability: Stock or 2–4 weeks lead time
- Warranty Period: 24 months, extendable

Typical Arrangement of the System



System Capacity Range*

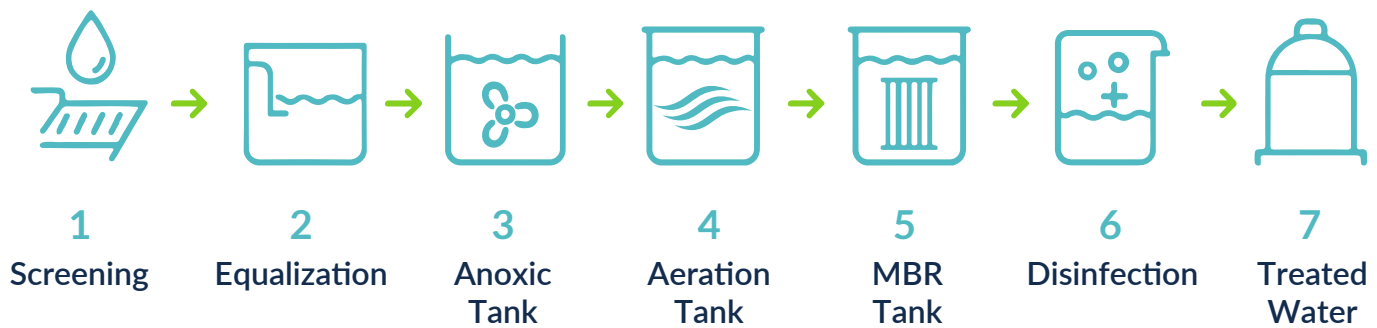
MBR System Capacity and Footprint

Model	Flow Capacity	Estimated Footprint (m ²)
MBR-40	40 m ³ /day	21.0 m ²
MBR-80	80 m ³ /day	42.0 m ²
MBR-120	120 m ³ /day	60.0 m ²
MBR-200	200 m ³ /day	100.0 m ²
MBR-250	250 m ³ /day	118.75 m ²
MBR-300	300 m ³ /day	142.5 m ²
MBR-400	400 m ³ /day	180.5 m ²
MBR-500	500 m ³ /day	214.34 m ²
MBR-600	600 m ³ /day	244.35 m ²
MBR-800	800 m ³ /day	294.04 m ²
MBR-1000	1000 m ³ /day	331.71 m ²
MBR-2000	2000 m ³ /day	397.21 m ²

*Custom configurations available upon request

MEMBRANE BIOREACTOR (MBR)

PROCESS FLOW DIAGRAM



STAGE	DESCRIPTION
1 Screening	Raw sewage passes through a bar screen to remove large solids and protect downstream components.
2 Equalization Tank	Flow is balanced in an equalization tank to stabilize volume and pollutant load before biological treatment.
3 Anoxic Tank	Wastewater enters an anoxic zone for denitrification, where submersible mixers promote nitrate removal.
4 Aeration Tank	Air is diffused to support aerobic microbes that degrade organic pollutants.
5 MBR Tank	Wastewater flows through PVDF membrane modules, combining biological treatment with filtration.
6 Disinfection	Treated water is disinfected using chlorine before entering the final tank.
7 Treated Water / Reuse	Final effluent is stored and suitable for non-potable reuse such as irrigation or flushing.



Discover how the MBR system delivers sustainable, high-quality wastewater treatment.

Contact us today.



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