VEOLIA

ZeeWeed* membranes for municipal wastewater treatment

WATER TECHNOLOGIES

ZeeWeed membrane bioreactors (MBR) produce effluent for discharge or reuse that far exceeds the world's most stringent regulations

Simple and reliable ZeeWeed MBR technology

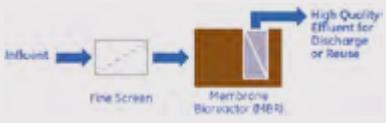
MBR systems are increasingly being specified as the best available technology for virtually all wastewater treatment applications—from greenfield plants, to retrofits, to water reclamation projects. MBR systems offer economic and operational advantages over conventional wastewater treatment plants including extremely compact footprints, simplified operation and consistently higher quality effluent—all at comparable lifecycle costs.

Hundreds of municipalities have discovered that with ZeeWeed MBR, you don't have to worry whether your system will meet current or future discharge and reuse regulations. The physical barrier of the UF membrane ensures a crystal clear effluent at all times that exceeds the world's most stringent regulations, including California's Title 22 reuse and the European Bathing Water Quality standards.

Veolia brings over 25 years of experience to MBR systems—setting the industry standards for research and development, membrane manufacturing, system design and support. Our successful global track record with small, medium and large MBR projects ensures that you get the best value for your money with smart design features that provide trouble-free performance.

Conventional multi-step tertiary treatment process

ZeeWeed MBR Treatment Process



ZeeWeed MBR Features & Benefits

- Physical UF barrier produces high quality effluent suitable for direct non-potable reuse
- Unmatched fiber ruggedness ensures long membrane life
- "Self-healing" fibers eliminate catastrophic membrane failures
- Multiple effective cleaning techniques maintains long-term, peak system performance and provides a simple, rapid method of recovery in the event of an upset
- Hollow fibers provide a greater filtration surface area that reduces plant footprint
- Automated in-situ cleaning simplifies operation and maintenance
- Compact design minimizes land acquisition and construction costs
- Proven system performance in hundreds of municipal and industrial applications provides you with peace of mind

Forsyth County, GA - 1 MGD (3,800 m^3/d)‡

Traverse City, MI - 7 MGD (26,500 m^3/d)‡

Brescia, Italy - 11 MGD (41,640 m^3/d)‡

‡ Average Daily Flow

Reinforced membranes are the key to MBR

ZeeWeed membranes are built tough to ensure a long operating life. The reinforced, hollow fiber design is the key to reliable long-term membrane performance as it offers a large filtration surface area and can withstand the challenging high solids environment in an MBR. ZeeWeed is an ultrafiltration (UF) membrane and produces high quality effluent from the moment you start the system.

Enhanced nutrient removal (ENR) and biological nutrient removal (BNR) of nitrogen and phosphorus

ENR and BNR effluent standards are among the most stringent in North America and demand the best available technology to ensure compliance at all times. ZeeWeed MBR systems are extremely flexible and process configurations can be tailored to meet specific wastewater characteristics, discharge requirements and plant retrofit applications. ZeeWeed UF membranes allow the biological reactor to operate at MLSS concentrations of up to 12,000 mg/L. This optimizes nitrification and denitrification, while extending the sludge retention times to ensure complete nitrification and conversion of organic nitrogen compounds.

Reusing the majority of their existing infrastructure, the city of Woodstock, GA converted a 0.5 MGD (1,893 m^3/d) SBR into a 2.5 MGD (9,464 m^3/d) ZeeWeed MBR designed to achieve nitrification, denitrification and biological phosphorous removal.

Gwinnett County, GA
50 MGD (189,000 m^3/d)‡

Bedok, Singapore
11 MGD (41,635 m^3/d)‡

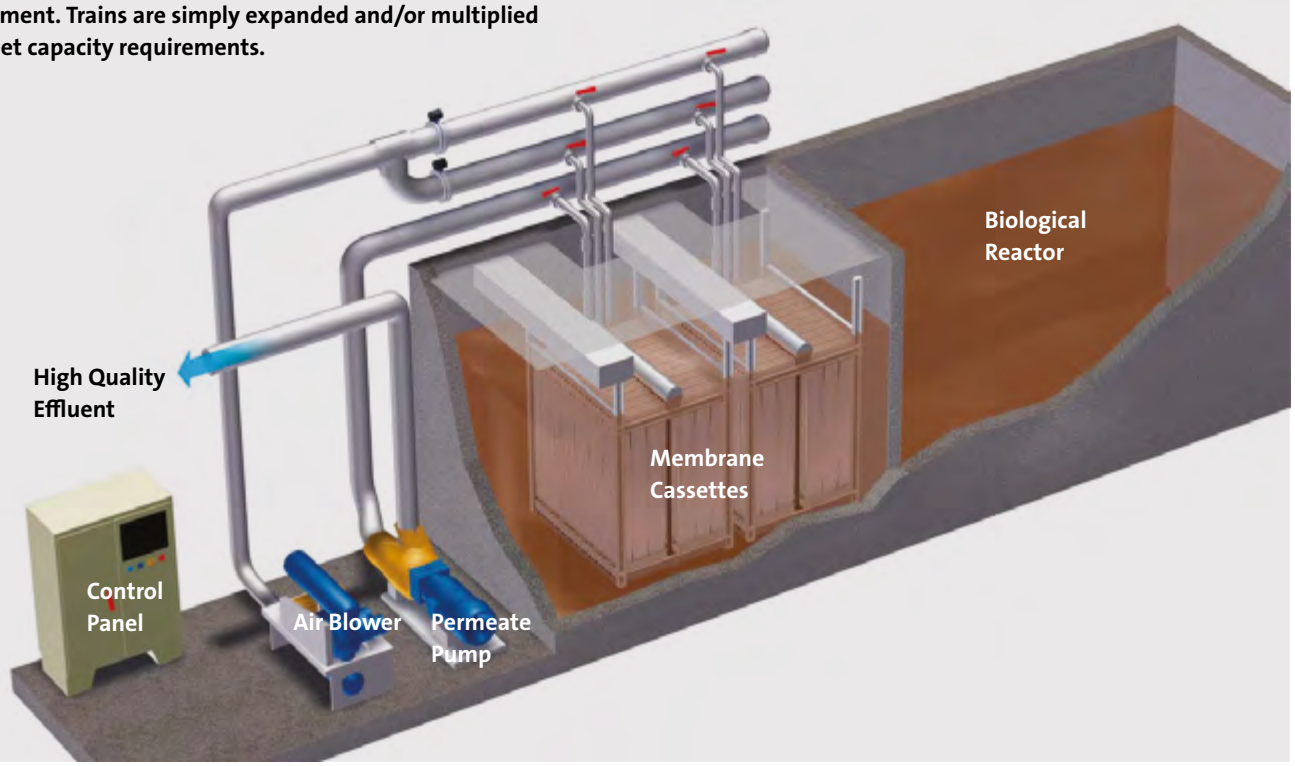
‡ Average Daily Flow

Achievable ZeeWeed MBR Treatment Results

BOD5	< 2 mg/L
TSS	< 1 mg/L
NH3-N	< 0.5 mg/L
Total Nitrogen	< 3 mg/L§
Total Phosphorous	< 0.05 mg/L§
Turbidity	< 0.1 NTU
Fecal Coliform	< 2.2 CFU/100 mL†
SD	< 2

§ With appropriate biological design and chemical addition
† After Disinfection

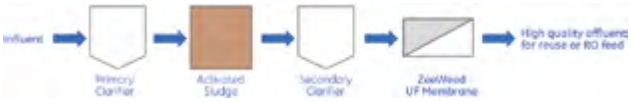
ZeeWeed MBR is a simple process. A basic production train consists of a biological reactor, membrane basin, permeate pump, air blower and automated control equipment. Trains are simply expanded and/or multiplied to meet capacity requirements.



ZeeWeed tertiary filtration for beneficial water reuse

ZeeWeed tertiary UF systems are designed to operate downstream of a conventional activated sludge process, where no further biological treatment is necessary, but where high quality water is required. The system features a small footprint that can be placed virtually anywhere or can even be used to retrofit existing granular filter media.

Tertiary Treatment Process



ZeeWeed tertiary filtration features & benefits

- Physical ultrafiltration (UF) barrier - Produces high quality effluent suitable for direct non-potable reuse
- Produces ideal reverse osmosis (RO) feedwater - Allows the RO to operate at peak performance, reduces cleaning and fouling
- Eliminates plant upsets and turbidity spikes - Tolerates variable water quality and produces high quality effluent at all times
- Modular design allows for simple and efficient sand filter retrofits - Reduced capital costs through use of existing infrastructure
- Lowers chemical requirements - Pretreatment and cleaning chemical usage can be dramatically reduced
- Compact design - Small plant footprint reduces capital costs
- Greater level of automation - Reduces operating costs

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