

Membrane Bioreactor for Wastewater Treatment Systems



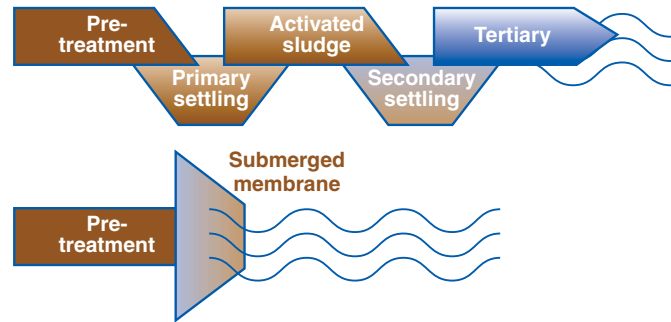
SANITHERM INC.

*Over Sixty Years of Excellence
in Water and Wastewater Treatment Solutions*

Membrane Bioreactor Treatment Technology: Revolutionizing Wastewater Treatment.

A membrane bioreactor (MBR) combines one of the oldest and most mature wastewater treatment technologies with the very newest. It can be likened to an activated sludge treatment plant combined with an extremely effective clarifier.

The basic operating theory behind membranes is conventional biological treatment combined with a semi-permeable barrier that precludes mixed liquor suspended solids (MLSS) from being discharged from the biological reactor. This semi-permeable barrier is generally an engineered plastic such as PVDF, PES or PVC, perforated with innumerable tiny holes – smaller than the size of the MLSS.



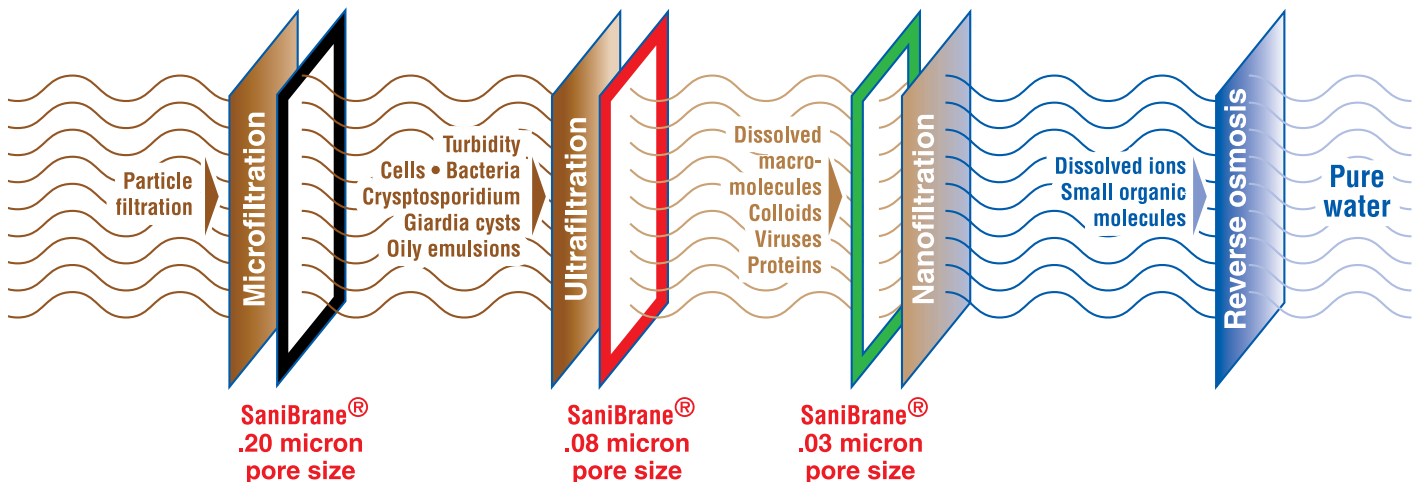
MBRs take fewer steps than conventional activated sludge plants to produce the required high quality effluent. That means there is less room for operator error and equipment malfunctions – saving you money and time.

Clear, treated liquid is drawn through the openings, either by gravity or by using a pump. Normally, such a semi-permeable barrier would plug immediately after being placed in the MLSS tank, but proper design prevents solids from accumulating on the membrane surface and “blinding” the holes.

There are two main wastewater membrane configurations, hollow-fibre and flat-plate. Hollow-fibre designs resemble spaghetti strands with hollow centres. Flat-plate designs consist of plates with membrane fabric on each side. SaniBrane® designs are strictly flat-plate, which allows optimum air-scouring to keep the membrane surfaces clean. This results in less maintenance and simpler piping, for example, no back pulsing.



The SaniBrane® system results in effluent that is often well above the standard required.



Sanitherm's experts select the most appropriate semi-permeable barrier for the application.

Plants Custom-Designed to Meet Your Unique Requirements

SaniBrane® MBR technology is suitable for a wide variety of applications in both industrial and municipal environments. Sanitherm's range of configurations and housing systems will fit your needs perfectly, regardless of the remoteness of your location or the severity of the climate at your site.

Sanitherm's wastewater treatment plants are currently in use worldwide, in municipalities, rural gas stations, remote resorts, golf courses, schools, construction camps and oil and gas exploration camps. They are also suitable for cruise ships and offshore oil drilling facilities – anywhere needing reliable waste treatment with a small footprint.

Sanitherm's design team will work with you to determine the most suitable size and configuration for your project, based on population and environmental considerations. Then Sanitherm will build and install your system. Once in place, you will find it versatile and easy to operate.

SaniBrane® Container Systems

Sanitherm is at the forefront of addressing wastewater challenges in remote areas. The SaniBrane® Container System is suitable if you have limited land mass, a small population and need a complete, compact and self-contained wastewater treatment system.

The plant is built in a shipping container, which makes shipping easy to any location in the world. A 15 m³/d plant weighs approximately 15,000 pounds or 6,800 kg, which means that it's transportable with a heavy-lift helicopter. On-site, it has a small footprint.

A SaniBrane® container system can be set-up and operating in just a few hours – no building required. All you need is the sewage inlet connection, the treated effluent connection and the power connection. The system is very low-maintenance and you will find that in most cases the effluent is of higher quality than required.

Several standard sizes are available, all complete with flow equalization, treatment tankage, heat, lights and controls. A long list of available options will ensure compatibility with your specific requirements. For example:

- Inlet screens
- Effluent discharge pump chamber
- Effluent disinfection
- Larger heaters (standard is 5kW)
- Air conditioning

Let Sanitherm custom-build a compact and cost-effective wastewater treatment solution for your site.



Clients for this efficient plant include mines, oil fields, industrial camps, remote municipalities, resorts, rural rest stops and . . .



Standard sizes include:

- 4,000 gpd (15m³/d), built inside a 40-ft "hi-cube" container
- 8,000 gpd (30m³/d), inside a 48-ft container
- 12,000 gpd (45m³/d), inside two 40-ft "hi-cube" containers
- 16,000 gpd (60m³/d), inside two 48-ft containers
- Custom containers



If a helicopter can get there, so can a SaniBrane® Container System.

SaniBrane® Concrete Tank Systems

With large volumes to treat, customers may prefer the SaniBrane® Concrete Tank option. These permanent tanks are ideal for in-ground installations. They are space-saving, as you can build offices or equipment rooms above them. They can also be built in stages: pour the tanks now, install equipment as it is required.

Sanitherm can help you design an MBR to treat flows of 1 MGD (3800 m³/d) and greater. Sanitherm's packages can include all of the



A concrete tank is ideal for isolated municipalities.

ancillary equipment required, including screens, aeration blowers, permeate pumps, mixers and supplemental aeration from your preferred manufacturers. Similarly, you can incorporate

process controls, starters and other electrical components using major suppliers such as Allen-Bradley, Siemens, IDEC, Mitsubishi or any other

that you prefer. The plant controls can be simple or as comprehensive as you need.

Sanitherm also supplies miscellaneous fabricated components such as access stairways, grating and handrails.

Because of the modular design of the SaniBrane® membrane units, which do not require chemical dip tanks or back-pulse piping, plants are simple to build and expand. In-situ chemical cleaning reduces the long-term maintenance costs. Sanitherm has been designing plants since 1946 and troubleshooting sewage treatment plants in some of the most remote parts of the globe since the early 1990s. Sanitherm can offer your team real-world, practical experience.



Installing the MBR units.

SaniBrane® Pre-Fabricated Steel Plants

To minimize site labour, time and expense, a Sanitherm pre-engineered steel plant is the recommended solution. They handle large volumes, are portable, self-contained and pre-piped. Sanitherm has built hundreds of pre-fabricated treatment plants utilizing professionally-engineered tankage, fabricated to ASME, CWB and AWS standards.

Standard plants are built within a 12-ft (3.66-m) width and height envelope, as shipping

requirements are also considered during design. Transporting via cargo plane, container ship or helicopter is feasible. To

ensure minimum delay when reassembling on site, external piping is factory-installed and then removed for transport.

SaniBrane® pre-fabricated steel plants can be installed on-grade, on concrete pads or compacted gravel bases or they can be buried to suit your specific site conditions. Depending on the local climate, the plants can be totally free-standing or they can be housed within pre-engineered or site-built buildings.

Safe service access is assured with industrial-grade stairways, handrailing and grating over all tanks.

Typical installations include remote industrial sites as well as residential subdivisions. By reducing the installation time, the sites can be populated sooner and the subdivision lots can be sold more quickly.



Municipal application: at a residential subdivision.



Industrial application: at a diamond mine. Right: prefab plants are easy to ship.



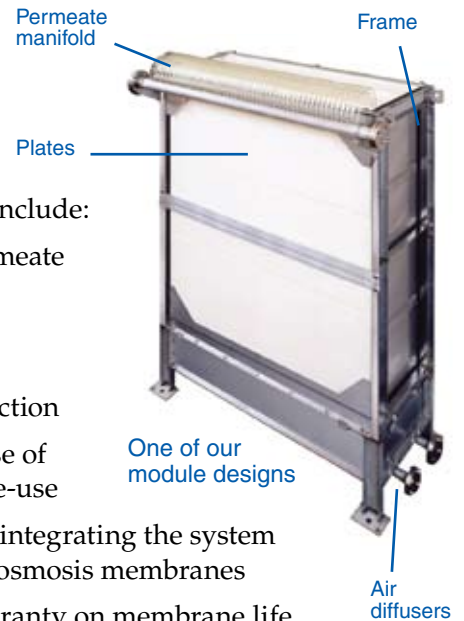
The SaniBrane® MBR: a Flat-Plate Design

SaniBrane® flat-plate MBR designs allow optimum air-scouring to keep the membrane surfaces clean.

The reliable air scouring and consistent, long-term flux rates make these membranes suitable for treating domestic sewage in both industrial and municipal environments.



A SaniBrane® module being installed in a concrete tank.



Other benefits include:

- excellent permeate water quality
- considerable reduction in sludge production
- improved ease of wastewater re-use
- the option of integrating the system with reverse osmosis membranes
- two-year warranty on membrane life
- ability to operate with gravity flow (i.e., no pump required)
- significantly less operator intervention than is required with hollow-fibre membranes
- open-top flow-through design ensures effective scouring and MLSS mixing

TYPICAL APPLICATIONS

SaniBrane® Projects	Design Flow	Mod-ules	MLSS	BOD	TSS	Fecal Coliform	Comments
Snap Lake NWT, Canada	5,300 gpd (20 m ³ /day)	1	12,000 – 18,000 (Design Range)	< 5 mg/L (detection limit)	< 2 mg/L	< 15 F.C./100 ml	Industrial camp
Attawapiskat ONT, Canada	48,750 gpd (184.5m ³ /d)	3	12,000 – 18,000 (Design Range)	10 mg/L	10 mg/L	100 F.C./100 ml	650 man industrial camp
“Mountain Lodge” BC, Canada	5000 gpd (19m ³ /day)	1	–	< 5 mg/L (detection limit)	< 1 mg/L	< 1 F.C./100 ml	Ultraviolet treatment following SaniBrane®
Gulf Islands BC, Canada	13,250 gpd (50m ³ /day)	2	36,000	< 5 mg/L (detection limit)	< 1 mg/L	Not required	Sludge thickening: activated sludge
“Gateway” BC, Canada	59,000 gpd (224m ³ /day)	4	12,000 – 18,000 (Design Range)	< 5 mg/L	< 2 mg/L	< 1 F.C./100 ml	Residential retrofit of existing EA plant, steel tankage
Fort McMurray AB, Canada	323,650 gpd 1225m ³ /day	18	12,000 – 15,000	< 5 mg/L	< 2 mg/L	Not required	Construction camp with full redundant treatment train (36 modules ttl.)
Sooke BC, Canada	63,400 gpd (240m ³ /day)	4	12,000 – 18,000	< 5 mg/L	< 2 mg/L	Not required	Residential retro-fit of existing EA plant, concrete tankage
“Bayview” BC, Canada	40,000 gpd (150m ³ /day)	3	12,000 – 18,000	< 5 mg/L	< 2 mg/L	< 1 F.C./100 ml	Residential – steel tankage
“Woodland” BC, Canada	59,000 gpd (224m ³ /day)	4	12,000 – 18,000	–	–	–	Residential – steel tankage under construction



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Sanitherm has earned a worldwide reputation for quality equipment and service and continues to acquire new and proven technologies capable of meeting the toughest of regulations.

Sanitherm's experienced team will work with you to create a custom design to suit your requirements. With Sanitherm, you are assured a wastewater treatment system that is operator-friendly, economical, reliable and effective.

Sanitherm has designed, manufactured and installed hundreds of SaniBrane® systems, giving Sanitherm the experience necessary to provide you:

- Standard systems that are pre-plumbed, pre-wired and tested
- Custom designs to suit your requirements
- Designs and systems that are operator-friendly and economical

Please call for details on how Sanitherm can design, build and install a wastewater treatment system that is tailored to your needs and budget.

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