

# NR-MBR

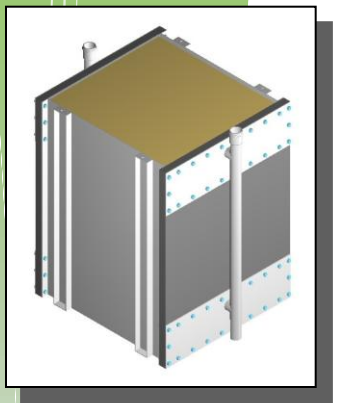
## Membrane Bio Reactor (MBR)



*Napier-Reid's NR-MBR system is designed for wastewater applications to provide superior effluent quality in compact layout resulting in reduced space, capital and operating cost.*



## MBR Process



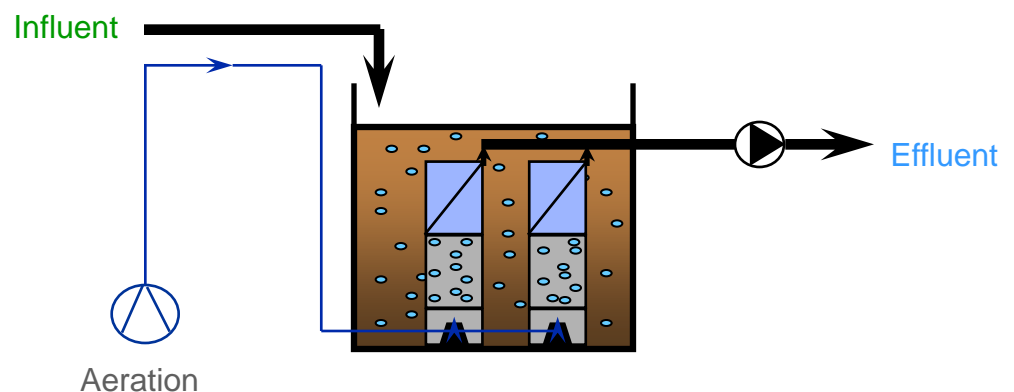
**NAPIER – REID's MBR** integrates biological degradation of waste products with membrane filtration by incorporating its superior submerged flat sheet membrane bioreactor technology.

The NR-MBR process involves a suspended growth activated sludge system that incorporates microporous flat sheet membranes in modules for solid/liquid separation. The flat sheet membranes are mounted vertically in modules and are submerged into the activated sludge tank. Vacuum is applied to the permeate manifold and this draws water from the reactor-side to the inside of the flat sheet membranes and out of the system. The MBR process eliminates the need of secondary clarifiers.

The membrane module consists of aeration system which creates medium size bubbles that shake the membranes and scour the outside of the flat sheet membranes, removing accumulated debris. A unique feature of the NR-MBR module is the equal distribution of the air beneath the flat sheet membrane modules. This helps to avoid sludging and reduces energy consumption. The membrane performance is further maintained by allowing the membranes to relax for a few minutes at regular interval i.e. the permeate pump is switched off for a short time while the air scour continues.

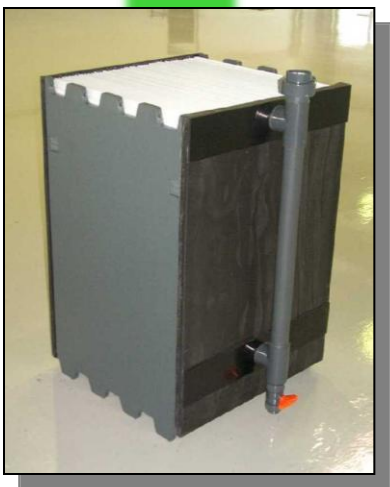
As the NR-MBR reactor can handle high MLSS, and a clarifier is not required, the NR-MBR is a very compact unit. It produces a MF/UF quality effluent. The NR-MBR systems can achieve effluent quality: SS < 1 mg/L, turbidity < 0.5 NTU and up to 4 log removal of virus. The NR-MBR flat sheet membranes have tiny pores which act as a positive barrier to bacteria, chlorine resistant pathogens such as cryptosporidium and giardia, germs and tiny particles.

Unlike submerged hollow fiber membrane systems, the membrane module of NR-MBR uses a single header design with flat sheet membranes that are fixed at both the ends. The plate design eliminates clogging with hair and fibrous materials that is very common in hollow fiber membrane design.



## Advantage of

### Napier-Reid's MBR



#### Process:

- Flexibility to control the biological process, due to total separation and control of hydraulic retention time (HRT) and sludge retention time (SRT).
- Reduced reactor volume as biomass concentration is greater than in conventional systems.
- Ability to absorb variation and fluctuation in hydraulic and organic load.
- Reduction of nutrients like nitrogen and phosphorus by control of the process.
- The membrane can retain soluble material with high molecular weight, improving its biodegradation in the bioreactor.
- Low sludge production compared to other aerobic processes.
- Good effluent quality. Effluent free of suspended solids and many pathogens. Water is suitable for reuse.
- Meets stringent effluent requirements which is not possible with conventional plants.
- Easy to retrofit and upgrade existing WWTP with least modifications.
- Easy to extend treatment capacity of plants because of modular technology.
- Process designed after years of R&D and cooperation of European researchers and engineers.

#### Equipment:

- Specially designed PVDF flat sheet membranes for high flux rate even at low transmembrane pressure (TMP) and longer life.
- Strong PVC membrane module housing reduces weight and makes it easy to handle and install.
- Revolutionary design enables to quickly drain the membrane module when taking it out of the reactor.
- High quality permeate and recirculation pumps, aeration system, control valves and instrumentation for smooth and trouble free operation.

#### Operation & Maintenance:

- Dynamic cross-flow filtration reduces clogging of the membranes.
- Easy to install and operate. No multiple tubing needs to be connected to a manifold.
- Bulking and floating sludge problems are avoided.
- Higher reliability because of very stable operation.
- Low maintenance, membrane needs to be cleaned only two to three times a year. Cleaning time takes only a few hours.
- Process and reactor designed to reduce fouling, hence lower cleaning cycles and replacement of the membranes, leading to reduced operating costs.
- Single header and centrally located air nozzles reduce aeration by up to 50%, results in energy savings.

#### Space Requirement:

- Settling tank / Clarifier is not needed.
- Reduced plant space requirement as footprint is smaller than 50% of conventional plants. Also this allows for expanded capacity within existing buildings.

## Application of

### Napier-Reid's MBR

**Municipal Wastewater**

**Domestic Wastewater**

**Industrial Wastewater**

**Wastewater Reuse**

**RO Pretreatment**

## Datasheet – Membrane Modules

### General Information

Flat Sheet Membrane Data	Material	Polyvinylidene fluoride (PVDF)
	Pore size	0.2 micron
Range of use	Differential pressure, operation	20 – 400 mbar
	pH application range	2 – 11
	Temperature range	up to 60 deg.C
Flux Rate		15 – 35 L/m2/h
Filtration area	Per module	70 m <sup>2</sup>
Filtration module	Module enclosure	PVC

## About Napier - Reid

*Over 60 years of excellence in water & wastewater treatment*

Napier-Reid is located in the greater Toronto area in the Province of Ontario, Canada. We supply engineering services and process equipment for water and wastewater treatment.

We have the technology, resources and experience to design, manufacture and implement innovative water and wastewater treatment solutions worldwide. We have completed over 3000 projects since our inception in 1950. This stands as a testament of our ongoing commitment of providing the highest quality service, products and after sales support in the industry. Our capabilities include engineering, manufacturing, installation and field support. We have in-house personnel for complete mechanical, electrical and instrumentation process and control system design. As a manufacturer, our designs focus on cost-effective solutions, simplicity of installation and ease of maintenance.

Napier-Reid has developed an excellent team with many years of experience. We have a well-deserved reputation for innovation, service and integrity. A significant portion of Napier-Reid's revenue comes from export to regions such as the Caribbean, Central America, South America, Middle East, Eastern Europe, Africa, and Asia. Some of these projects are financed by Canadian government or International financing institutes. As a Canadian manufacturer, we are eligible for Canadian governmental funding and EDC export credit. We have the capability to handle a large range of projects, from engineering, equipment supply, installation, start-up, to turnkey projects. Let Napier-Reid be your solution for water and wastewater purification.



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