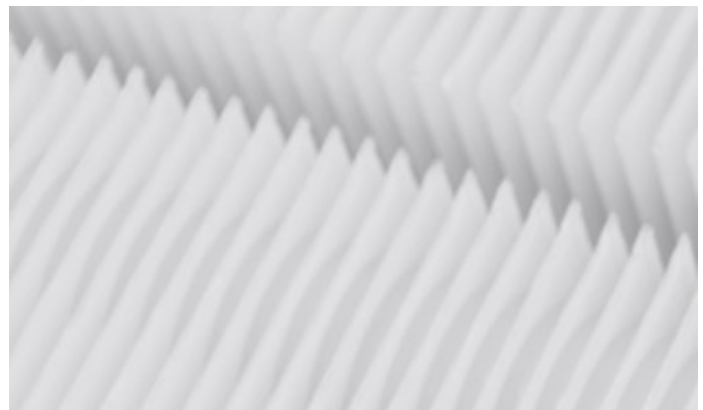




MICRODYN
BIO-CEL®
MBR Modules

Submerged MBR Modules for Biological Wastewater Treatment



MICRODYN BIO-CEL® MBR MODULES

It is becoming increasingly challenging for conventional wastewater treatment plants to keep up with tighter discharge regulations, urbanization, and increased demand for water recycling.

MICRODYN BIO-CEL® MBR is the cost-effective and scalable solution for meeting challenging effluent requirements for municipal and industrial wastewater treatment.

BIO-CEL MBR creates a cleaner, higher quality effluent than conventional wastewater treatment systems, while having a smaller overall footprint. The BIO-CEL MBR product portfolio allows customer-specific combinations of modules suitable for all plant sizes.

HIGH EFFLUENT QUALITY

The BIO-CEL MBR membrane serves as an effective physical barrier for the retention of solids and bacteria. The BIO-CEL MBR modules produce a high volume of superior quality effluent at a consistent flow rate. This is especially useful for water reuse applications.

RELIABILITY

The open design of the BIO-CEL MBR modules minimizes dead zones where braiding and sludge accumulate. The membrane stack can be accessed more easily, which improves cleaning capabilities and significantly reduces maintenance time.

LESS CLEANING TIME

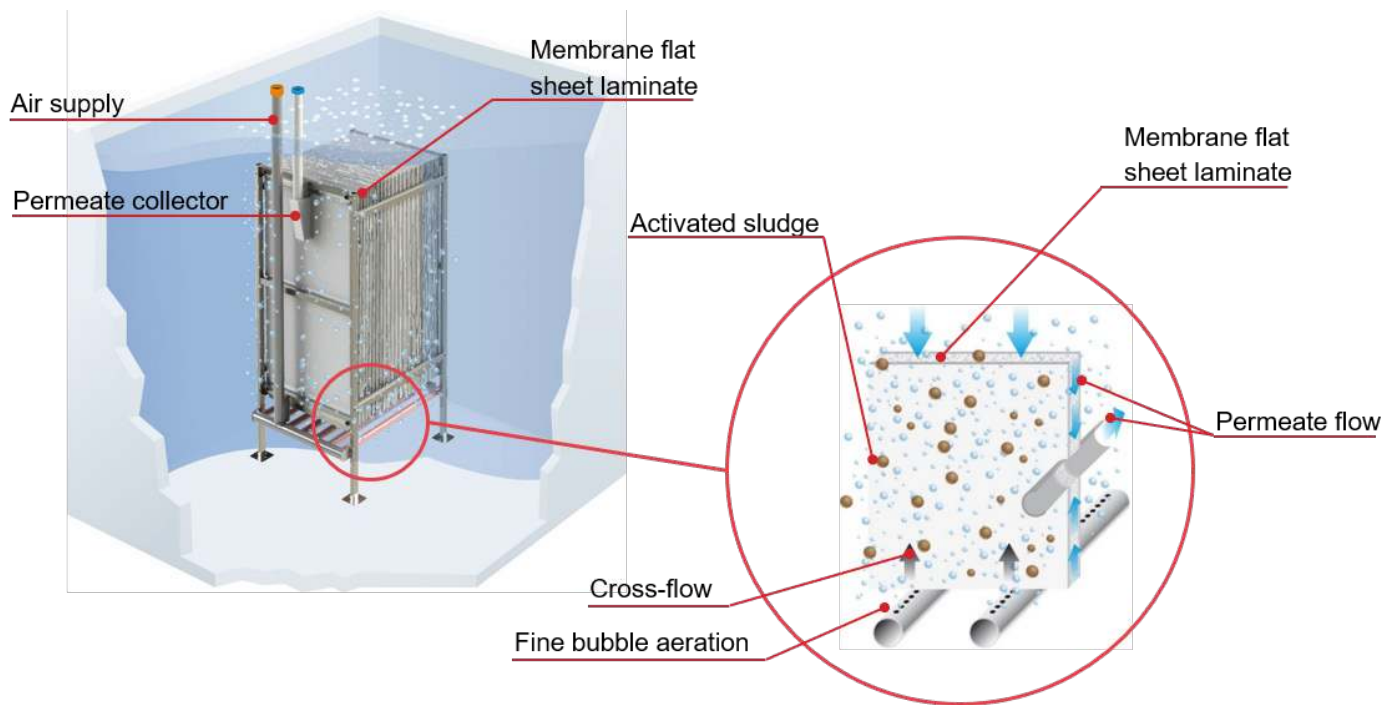
The patented BIO-CEL MBR membrane laminate combines the advantages of flat sheet and hollow fiber membranes, allowing for backwash capability and increased durability. Backwashing is an efficient cleaning method for removing sludge layers on the membrane and can be combined with chemical cleaning.

SELF-HEALING MEMBRANE LAMINATE

In the event of membrane damage, the spacer material seals off the damage using the biomass in the system.

FINE BUBBLE AERATION

The special diffusers create fine air bubbles that help save energy and generate a consistent crossflow between the membrane laminate sheets. The oxygen transfer is more efficient with fine than coarse bubble aeration systems.



OPERATION OF MICRODYN BIO-CEL® MBR MODULES

In a membrane bio-reactor (MBR) system, the biomass treats polluted water, while the membrane ensures the safe separation of the biomass from the cleaned wastewater. Traditionally, this separation process relied on solids settling in a secondary clarifier. In addition to better effluent quality, MBRs have the advantage to be operated with much higher MLSS (Mixed Liquor Suspended Solids) levels. Thus, an MBR plant requires less space than a conventional plant.

The key elements of an MBR system are the membrane and the

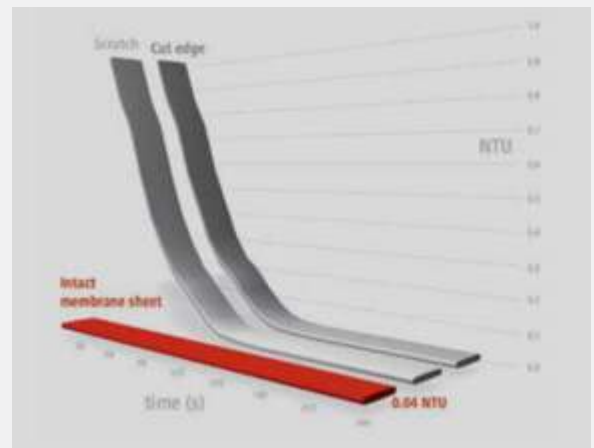
aeration. The membrane serves as a physical barrier for the retention of solids and bacteria. The aeration generates the crossflow, which transports the mixed liquor along the membrane surface. This crossflow prevents the accumulation of sludge on the membrane surface, resulting in a consistent and reliable operation.

The treated water is collected in a permeate channel and can be safely discharged. The permeate from MICRODYN BIO-CEL® MBR modules may be fed directly to a reverse osmosis (RO) process. MICRODYN RO membranes are suitable for this application.

MEMBRANE FLAT SHEET LAMINATE WITH SELF-HEALING EFFECT

The integrity of the membrane plays a significant role in MBR wastewater treatment. The BIO-CEL MBR membrane is laminated on both sides onto a special spacer material. Subsequently, the laminate sheets are cut and welded on the sides. The result is a 2 mm thick laminate suitable for the MBR application.

In the event that the membrane is damaged, the spacer material seals off the damage using the biomass in the system. Solids and bacteria can still be rejected by the membrane laminate. Laboratory tests have shown that the membrane laminate “heals” itself in less than two minutes, even under the most adverse conditions.



MICRODYN BIO-CEL[®] MBR

Module Configurations

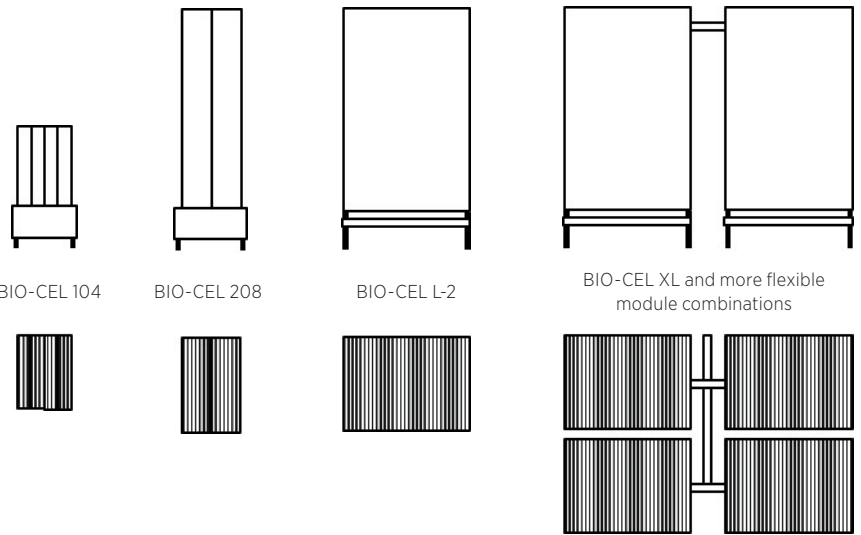
MEMBRANE MATERIAL

- **Polymer:** PES
- **Membrane Type:** Ultrafiltration
- **Support Layer:** Polyester
- **Drainage:** Polyester

MODULE CONFIGURATIONS

MICRODYN BIO-CEL[®] MBR modules consist of one or more membrane cassettes. With this modular configuration, BIO-CEL MBR is a scalable solution for both small and large wastewater treatment plants.

EXAMPLES OF AVAILABLE MODULE CONFIGURATIONS



AVAILABLE MODULE TYPES

Module Type	Membrane Area [m ²]	Membrane Area [ft ²]	No. of Cassettes	Dimensions [mm]	Dimensions [ft]	Housing Material
XS	10	108	1	280 x 747 x 1515	0.9 x 2.5 x 5	PVC
52	52	560	2	1024 x 702 x 1563	3.4 x 2.3 x 5.1	PVC
104	104	1120	4	1600 x 702 x 1563	5.3 x 2.3 x 5.1	PVC
208	208	2239	2	998 x 1152 x 2763	3.3 x 3.8 x 9	PVC
416	416	4478	4	1810 x 1152 x 2763	5.9 x 3.8 x 9.1	PVC
L-2	480	5167	1	1524 x 1080 x 2435	5 x 3.5 x 8	Stainless Steel
XL-2	1920	20667	4	3200 x 2750 x 2750	10.5 x 9 x 9	Stainless Steel

Note: nominal values

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