

TORAY

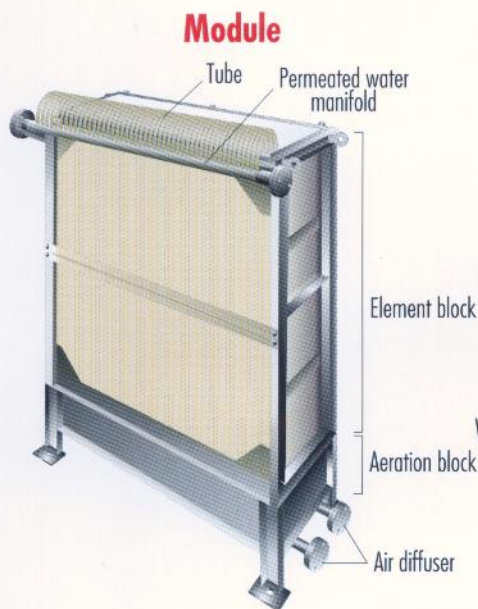
MEMBRAY™ TMR140 Series
Submerged Flat Sheet Membrane Module for MBR



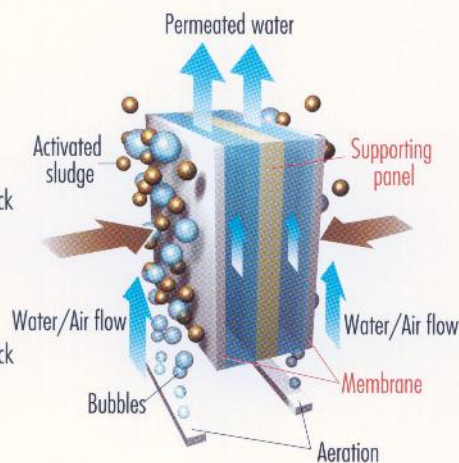
**MEMBRAY™ improves
MBR system performance.**

Toray Industries, Inc.

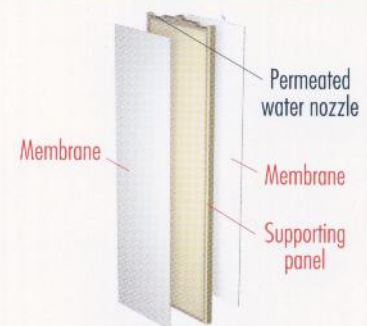
The "MEMBRAY" module configuration comprises an element block and an aeration block. The element block contains a number of membrane elements stacked at equal intervals, each of which has flat sheet membranes attached on both sides of a supporting panel. Each element is connected via a tube to a permeated water manifold. The aeration block consists of air diffusers used to supply air.



Conceptual drawing of filtration



Element



Specifications (TSP-50150)

Effective Membrane Area: 1.4m²

Dimensions (W x H x T): 515 x 1,608 x 13.5mm

Membrane: PVDF and PET non-woven fabric

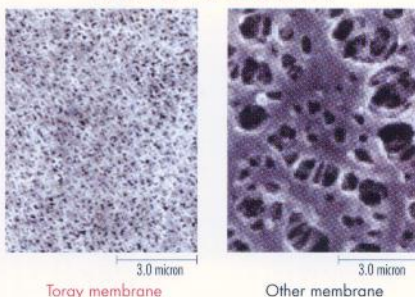
Supporting Panel: ABS resin

Why "MEMBRAY" performance ranks with the best.

Guaranteed high water permeability and high effluent quality

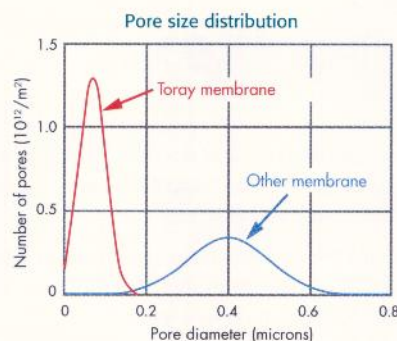
- Many 0.08 micron pores on the membrane surface effectively eliminate 0.1 micron+ particles to improve effluent quality.
- Uniform pore size results in consistently high permeability with minimal pore clogging.

FE-SEM of membrane surface



Unique membrane structure

Numerous small-diameter pores are distributed evenly throughout the membrane surface with a narrow diameter distribution. This structure ensures higher treated water quality and minimizes membrane fouling and pore clogging for consistently high water permeability.



Better membrane materials

Using PVDF (polyvinylidene fluoride) for the functional layer of the membrane and PET (polyester) non-woven fabric as the base layer allows the membrane to exhibit superior physical strength and chemical stability.

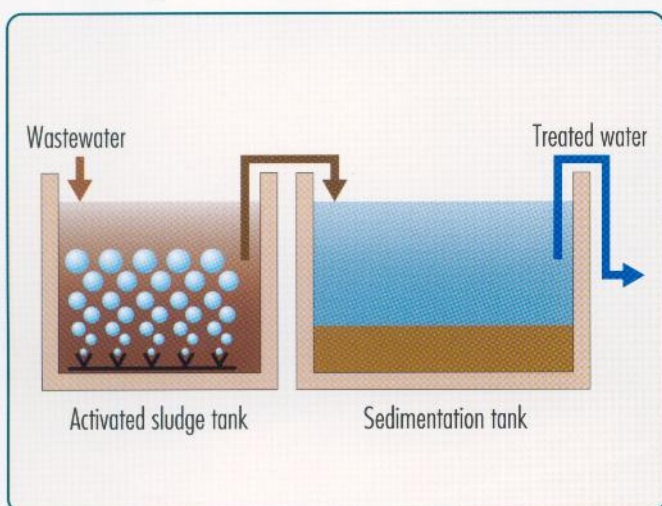
Flat sheet type membrane with modified surface nature

The membrane has a simple flat sheet configuration. This configuration and the modified membrane surface nature allow very effective cleaning by a stream of water generated upward as scouring air is diffused below it. This mechanism provides extremely stable filtration as the membrane does not allow sludge to adhere to its

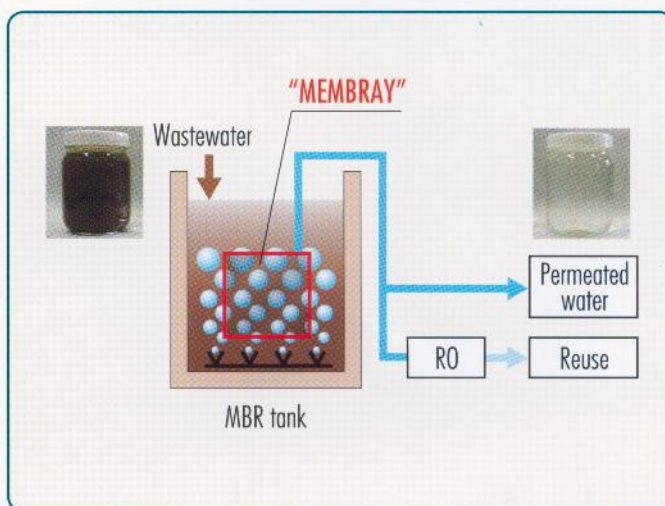
Toray's advanced membrane separation technology and nanotechnology create better MBR modules.

The "MEMBRAY" submerged flat sheet membrane module, when used as a component of a membrane bioreactor (MBR) system, effectively removes suspended solids. This innovative microfiltration module in a plate-and-frame configuration with flat sheet membranes was developed thanks to over 25 years of experience in high-quality membrane products and our non-compromise R&D, manufacturing and application expertise.

Conventional wastewater treatment system



MBR system using "MEMBRAY"



MBR with "MEMBRAY" Submerged Flat Sheet Membrane Module

MBR technology enhances wastewater treatment efficiency

- Using membranes to separate sludge ensures much higher quality for treated water free from suspended solids. Combination with RO membranes allows producing water quality as good as potable water.
- Membranes can retain activated sludge at high concentrations, allowing BOD as well as nitrogen to be removed more efficiently.
- Unique membrane configuration having an immense number of minuscule pores delivers stable high water permeability with minimal clogging and higher permeated water quality.

Smaller footprint

- The module can be submerged directly in an activated sludge tank for combining biological treatment and membrane separation. It eliminates the sedimentation or sludge concentration process.
- More effective biological treatment allows activated sludge tank size to be reduced.



Fewer chemical cleaning requirements and coarse screen pretreatment

- The plate-and-frame configuration that employs flat sheet membranes is inherently stronger against fouling than the hollow fiber membrane configuration. Therefore, it results in fewer chemical cleaning requirements.
- Reduced module fouling from human hair and other obstructive substances allows coarse screening as a pretreatment process.

Energy efficient

- "MEMBRAY" consumes less energy compared to hollow fiber membrane due to more effective scouring aeration and lower trans membrane pressure.

MEMBRAY™ Specifications

Type No.			TMR140-050S	TMR140-100S	TMR140-200W	TMR140-200D
Standard Flow Rate		m ³ /day* gal/day*	52 13,800	105 27,700	210 55,500	210 55,500
Number of Membrane Elements			50	100	200	200
Total Membrane Area		m ² sq.ft.	70 750	140 1,510	280 3,010	280 3,010
Dimensions	Width	mm inch	810 31.9	810 31.9	840 33.1	810 31.9
	Length	mm inch	950 37.4	1,620 63.8	3,260 128.3	1,620 63.8
	Height	mm inch	2,100 82.7	2,100 82.7	2,100 82.7	4,160 163.8
Weight (dry)	Module	kg lb.	400 882	695 1,532	1,430 3,153	1,365 3,009
Materials	Diffuser, Frame, Permeated Water Manifold		304 stainless steel (316 stainless steel is available as option)			

* These are reference values with typical municipal wastewater, not guaranteed values.
• Specifications subject to change without notice due to technical modifications or production changes.

Toray satisfies global water treatment needs.

ASIA (JAPAN)

Toray Industries, Inc. Head Office (2nd Head Office)
MF & UF Membrane Products Dept., Water Treatment Division
Toray Building, 8-1, Mihama 1-chome, Urayasu,
Chiba 279-8555, Japan
Tel: +81-47-350-6223 Fax: +81-47-350-6066
URL: <http://www.toray.com/>

NORTH AMERICA

Toray Membrane USA, Inc.
12140 Community Road, Suite B, Poway, CA 92064, U.S.A.
Tel: +1-858-679-0770
Fax: +1-858-486-3063

EUROPE

Toray Membrane Europe AG
Grabenackerstrasse 8, Munchenstein 1 CH-4142,
Switzerland (P.O. Box 815)
Tel: +41-61-415-8710 Fax: +41-61-415-8720

MIDDLE EAST

Toray Membrane Europe AG (Middle East Branch Office)
Jebel Ali Free Zone - South FZS2AC07
Dubai, United Arab Emirates
Tel: +971-4-881-53-39 Fax: +971-4-881-56-20



ASIA (SINGAPORE)

Toray Industries (Singapore) Pte. Ltd.
111 Somerset Road, #14-01 Devonshire Wing,
Singapore Power Building, Singapore 238164
Tel: +65-6226-0525 Fax: +65-6226-0509

ASIA (CHINA)

Toray Industries (China) Co., Ltd.
10th Floor, HSBC TOWER, 1000 Lujiazui Ring Road,
Pudong New Area, Shanghai 200120, China
Tel: +86-21-6841-1470 Fax: +86-21-6841-2454

ASIA (KOREA)

Toray International (Korea), Inc.
10F, LG Mapo Bldg. 275, Gongdeok-dong, Mapo-gu
Seoul, 121-721, Republic of Korea
Tel: +82-2-3273-8974 Fax: +82-2-3273-8360

About Toray

Established in 1926, Toray is a worldwide leader in chemical manufacturing and related products. Leveraging decades of experience in synthetic fibers and textiles, Toray has expanded into many other fields such as carbon fiber and its composites, plastics, fine chemicals and innovative water treatment technologies.

Toray is committed to achieving sustainable growth and environmental preservation, while meeting the diverse needs of its customers worldwide. Toray constantly strives to contribute to the countries and communities in which it operates, not only through superior products and services, but by acting as a concerned corporate citizen. In this way, Toray seeks to play its part in building a better society for all the people of the world.