PTFE MF Membrane Module for Water Treatment System
by Sumitomo Electric Industries, Ltd.

POREFLON™ Module

Ingenious Dynamics

SUMITOMO ELECTRIC

POREFLON™ Module

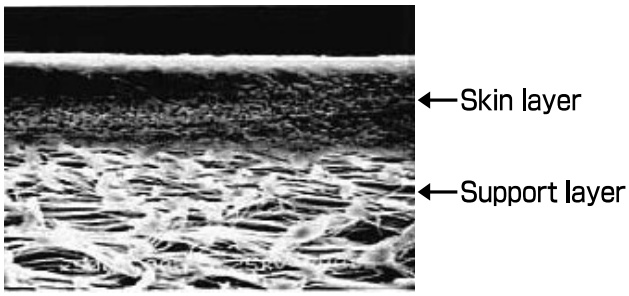
Using PTFE (polytetrafluoroethylene), which is high in chemical resistance, heat resistance and durability, we have developed a porous separation membrane making the best of our unique processing techniques and produced POREFLON™ Module as a MF membrane module for a water treatment system.

Features

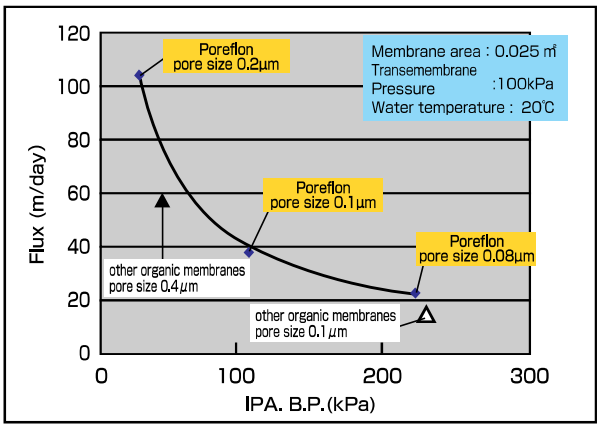
High flow rate! (Submerge / External pressure Types)

With a high porosity (percentage of void) between 75 and 85%, resistance during penetration can be reduced, demonstrating a high permeability. In addition, a double-layer PTFE structure consisting of a skin layer (filtration) and a support layer offers superior resistance to fouling.

<Cross section structure of membrane>

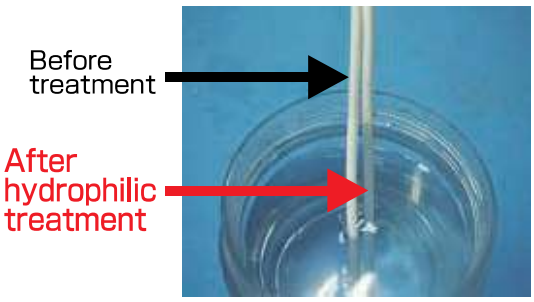


<Comparison of flow rate (pure water)>



Hydrophilic treatment allows easy transportation and installation! (Submerge / External pressure type)

As PTFE hollow fiber is subjected to hydrophilic treatment by means of hydrophilic macromolecule fixation, this product can be transported in dry condition. Moreover, hydrophilic treatment on the site is not required.
Hydrophilic property will be kept throughout dry storage after use; therefore there is no problem if you let water run through this product when it is reused.



In comparison with other organic membranes, it is higher in strength, contributing to prolonged operation!

〈Comparison of hollow fiber strength (nominal pore size: 0.45 μm) 〉

	Tensile strength (N/fiber)	Membrane thickness (mm)	Membrane external diameter (mm)	Membrane internal diameter (mm)
PTFE membrane (POREFLON™)	63	0.25	1.3	0.8
Other organic membrane	10	0.25	1.3	0.8

Membranes can be cleaned with various chemicals and exhibit high flow recovery!

PTFE's superior resistance to chemicals allows cleaning with high-concentration alkali and other chemicals.

〈Change after submerge in caustic soda, which is effective in washing off oil and silica〉
(Submerge conditions: NaOH 4% x 50℃ x 10 days)

	Tensile strength (N/fiber)		Adhesive strength (N/fiber)		Remarks
	Before soaking	After soaking	Before soaking	After soaking	
PTFE membrane (POREFLON™)	63	62	>60	>60	Hydrophilic property is kept

Measurement procedure: Tensile strength (hollow fiber): Measure breaking strength of a sample 100mm in length using a tensile tester.
Adhesive strength (sealed area): Fix the sealed area and pull the hollow fiber upward for measurement using a tensile tester.

—— Authorization of Every Kind ——

AMST

水道用膜モジュール規格認定書

膜モジュールの名称　ポアフロン®・モジュール
（加圧型MF膜モジュール）

膜モジュールの型式　OPMW-01A48 OPMW-01A24

認定依頼者　住友電工ファインポリマー株式会社

所在地　大阪府泉南郡熊取町朝代西一丁目950番地

当該膜モジュールは、水道用膜モジュール性能調査委員会において、水道用膜モジュール性能調査に関する規定に基づいて調査した結果、適合と認められますので同規定により認定します。

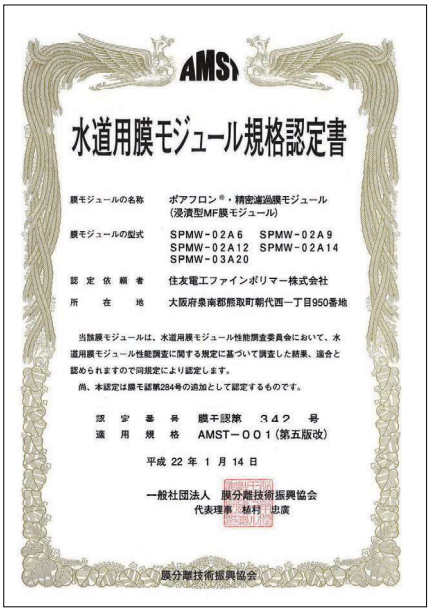
尚、本認定は膜モ認第278号の追加として認定するものです。

認定番号　膜モ認第　３４１　号
適用規格　AMST－００１（第五版改）

平成 22 年 1 月 14 日

一般社団法人　膜分離技術振興協会
代表理事　植村　忠廣

膜分離技術振興協会



AMST

水道用膜モジュール規格認定書

膜モジュールの名称　ポアフロン®・精密濾過膜モジュール
（浸漬型MF膜モジュール）

膜モジュールの型式　SPMW-02A6　SPMW-02A9
SPMW-02A12　SPMW-02A14
SPMW-03A20

認定依頼者　住友電工ファインポリマー株式会社

所在地　大阪府泉南郡熊取町朝代西一丁目950番地

当該膜モジュールは、水道用膜モジュール性能調査委員会において、水道用膜モジュール性能調査に関する規定に基づいて調査した結果、適合と認められますので同規定により認定します。

尚、本認定は膜モ認第284号の追加として認定するものです。

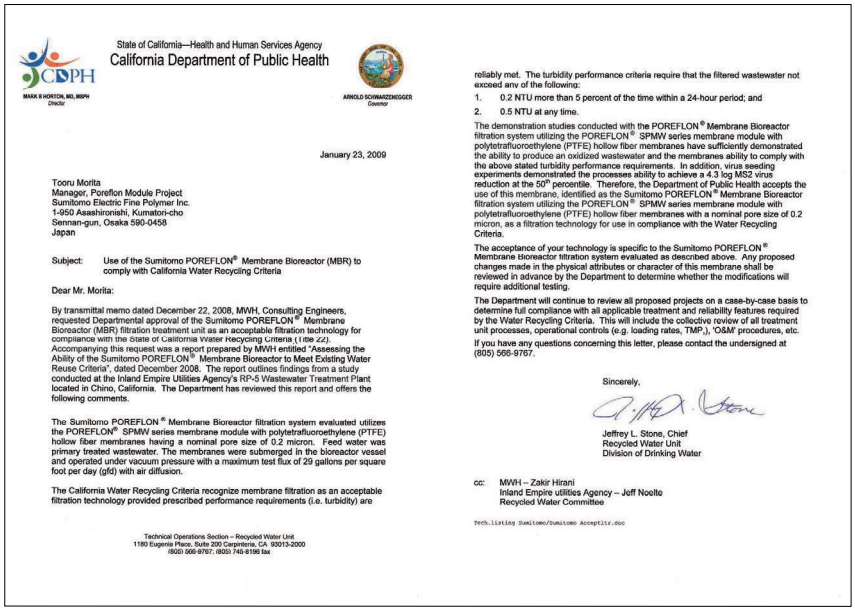
認定番号　膜モ認第　３４２　号
適用規格　AMST－００１（第五版改）

平成 22 年 1 月 14 日

一般社団法人　膜分離技術振興協会
代表理事　植村　忠廣

膜分離技術振興協会

Certification on Membrane Module Standards for Drinking Water Use (Japan)



CDPH
MARK B HORTON, MD, MSPH
Director

State of California—Health and Human Services Agency
California Department of Public Health

ARNOLD SCHWARZENEGGER
Governor

January 23, 2009

Tooru Morita
Manager, Porefon Module Project
Sumitomo Electric Fine Polymer Inc.
1-950 Asashironishi, Kumatori-cho
Sennan-gun, Osaka 590-0458
Japan

Subject: Use of the Sumitomo POREFLON® Membrane Bioreactor (MBR) to comply with California Water Recycling Criteria

Dear Mr. Morita:

By transmittal memo dated December 22, 2008, MWH, Consulting Engineers, requested Departmental approval of the Sumitomo POREFLON® Membrane Bioreactor (MBR) filtration treatment unit as an acceptable filtration technology for compliance with the State of California Water Recycling Criteria (Title 22). Accompanying this request was a report prepared by MWH entitled "Assessing the Ability of the Sumitomo POREFLON® Membrane Bioreactor to Meet Existing Water Reuse Criteria", dated December 2008. The report outlines findings from a study conducted at the Inland Empire Utilities Agency's RP-5 Wastewater Treatment Plant located in Chino, California. The Department has reviewed this report and offers the following comments.

The Sumitomo POREFLON® Membrane Bioreactor filtration system evaluated utilizes the POREFLON® SPMW series membrane module with polytetrafluoroethylene (PTFE) hollow fiber membranes having a nominal pore size of 0.2 micron. Feed water was primary treated wastewater. The membranes were submerged in the bioreactor vessel and operated under vacuum pressure with a maximum test flux of 29 gallons per square foot per day (gfd) with air diffusion.

The California Water Recycling Criteria recognize membrane filtration as an acceptable filtration technology provided prescribed performance requirements (i.e. turbidity) are reliably met. The turbidity performance criteria require that the filtered wastewater not exceed any of the following:

1. 0.2 NTU more than 5 percent of the time within a 24-hour period; and
2. 0.5 NTU at any time.

The demonstration studies conducted with the POREFLON® Membrane Bioreactor filtration system utilizing the POREFLON® SPMW series membrane module with polytetrafluoroethylene (PTFE) hollow fiber membranes have sufficiently demonstrated the ability to produce an oxidized wastewater and the membranes ability to comply with the above stated turbidity performance requirements. In addition, virus seeding experiments demonstrated the processes ability to achieve a 4.3 log MS2 virus reduction at the 50th percentile. Therefore, the Department of Public Health accepts the use of this membrane, identified as the Sumitomo POREFLON® Membrane Bioreactor filtration system utilizing the POREFLON® SPMW series membrane module with polytetrafluoroethylene (PTFE) hollow fiber membranes with a nominal pore size of 0.2 micron, as a filtration technology for use in compliance with the Water Recycling Criteria.

The acceptance of your technology is specific to the Sumitomo POREFLON® Membrane Bioreactor filtration system evaluated as described above. Any proposed changes made in the physical attributes or character of this membrane shall be reviewed in advance by the Department to determine whether the modifications will require additional testing.

The Department will continue to review all proposed projects on a case-by-case basis to determine full compliance with all applicable treatment and reliability features required by the Water Recycling Criteria. This will include the collective review of all treatment unit processes, operational controls (e.g. loading rates, TMP,), O&M procedures, etc.

If you have any questions concerning this letter, please contact the undersigned at (805) 566-9767.

Sincerely,

Jeffrey L. Stone, Chief
Recycled Water Unit
Division of Drinking Water

cc: MWH – Zakir Hirani
Inland Empire utilities Agency – Jeff Noelte
Recycled Water Committee

Tech.Listing Sumitomo/Sumitomo Acceptltr.doc

Technical Operations Section – Recycled Water Unit
1180 Eugenia Place, Suite 200 Carpinteria, CA 93013-2000
(805) 566-9767, (805) 745-8196 fax

Authorization of MBR by California Department of Public Health "Title 22" (USA)

Product Line-up and Recommended Uses

Submerge Type

Recommended application
1. Membrane Bioreactor (MBR)
2. Treatment of wastewater with high turbidity
3. Treatment of wastewater with insoluble oil
4. Water purification system combined with powdered activated carbon

External Pressure Dead-end Filtration Type

Recommended application
1. Industrial wastewater treatment
2. Treatment of wastewater with insoluble oil
3. Water purification system (Water supply)

Standard Specification List (all filtration membranes are made of PTFE)

Model No.			Submerge Type				External pressure dead-end filtration type			
			SPMW				OPMW			
			-13B6	-13B12	-12B6	-12B12	-01B25	-01B50	-02B25	-02B50
			for municipal wastewater treatment		for industrial wastewater treatment		for high suspended solid water		for low suspended solid water	
Membrane	Nominal pore size	μm	0.2	0.2	0.1	0.1	0.08	0.08	0.1	0.1
	Diameter	mm	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
	Membrane area	㎡	6	12	6	12	25	50	25	50
	Hydrophilic treatment		Hydrophilic				Hydrophilic			
Material	Cap		ABS resin (Joint nut : SUS303)				ABS resin			
	Potting		Polyurethane resin		Heat- & chemical-resistant epoxy resin		Heat- & chemical-resistant epoxy resin			
	Supporting bar		SUS304				PVC resin			
	Outer casing		(Nothing)				ABS resin			
Dimensions	Length	mm	1300	2410	1300	2410	1330	2300	1330	2300
	Bottom section	mm	154×164				Diameter: 212			
Operating condition	Filtration method		Suction dead-end filtration				External pressure dead-end filtration			
	Trans membrane pressure	Filtration	>−60 kPa		>−60 kPa		<100 kPa			
		Backwash	<100 kPa		<100 kPa		<200 kPa			
	Maximum temperature limit	℃	50				50*			

* If operating temperature is over 50 degrees centigrade, please feel free to ask us.

*POREFLON™ Module and related technical information may be subject to control such as the Export Trade Control Ordinance. Please note that you are responsible for taking the necessary procedure including application for an export permission in cases where this product is applicable to the products subject to control.

SUMITOMO ELECTRIC INDUSTRIES, LTD.

New Business Development Unit
Water Processing Division Sales Department
5-33, Kitahama 4 chome, Chuo-ku, Osaka 541-0041, Japan Tel: +(81)-6-6220-4337 Fax: +(81)-6-6220-4104
http://global-sei.com/

CAT.NO.07-001K〒R4E
2014.03 SBC

Submerge Type POREFLON™ Module for MBR

Features

Stable Flux

The use of PTFE membrane with high durability provided by hydrophilic treatment combined with an asymmetric (dual) structure offers superior resistance to fouling.

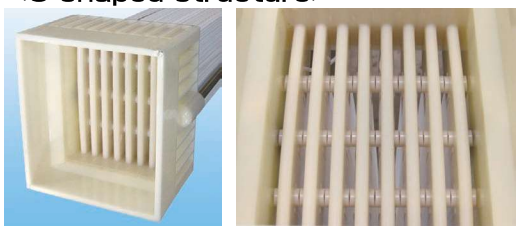
Oil and silica can be washed off.

PTFE membrane allows cleaning with strong alkali.

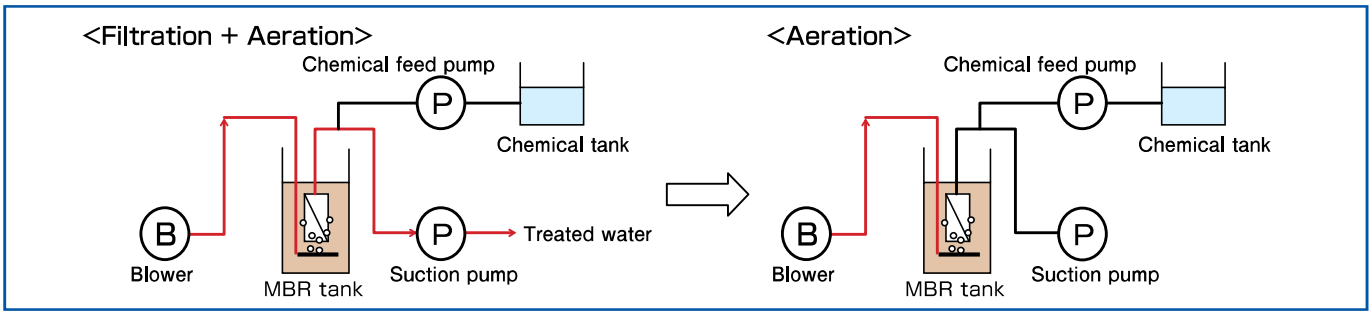
Low operational costs

Our original **"U-shaped structure"** employed at the end bottom prevents active sludge accumulation and allows efficient air diffusion.

<U-shaped structure>



Standard operating conditions



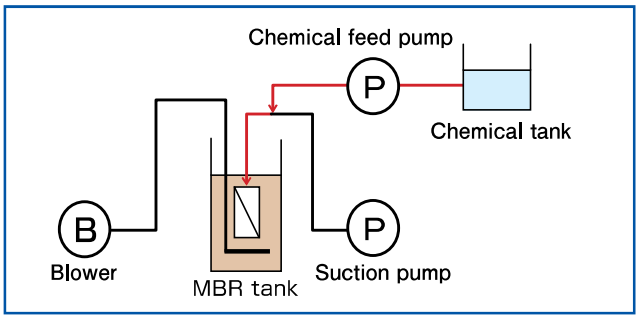
Example of filtration operating conditions

Assumed water quality:
BOD 200 – 300 mg/L
COD_{Mn} 100 mg/L

MLSS : 10,000 mg/L
Designed Flux : 0.5 – 0.8 m/d
Filtration time : Filtration + Aeration : 9min → Aeration : 1min
Aeration flow rate : 30 – 60 L/min/1module
(Normally, no backwash is carried out.)

Standard chemical cleaning conditions

Inline cleaning (Low concentration cleaning)



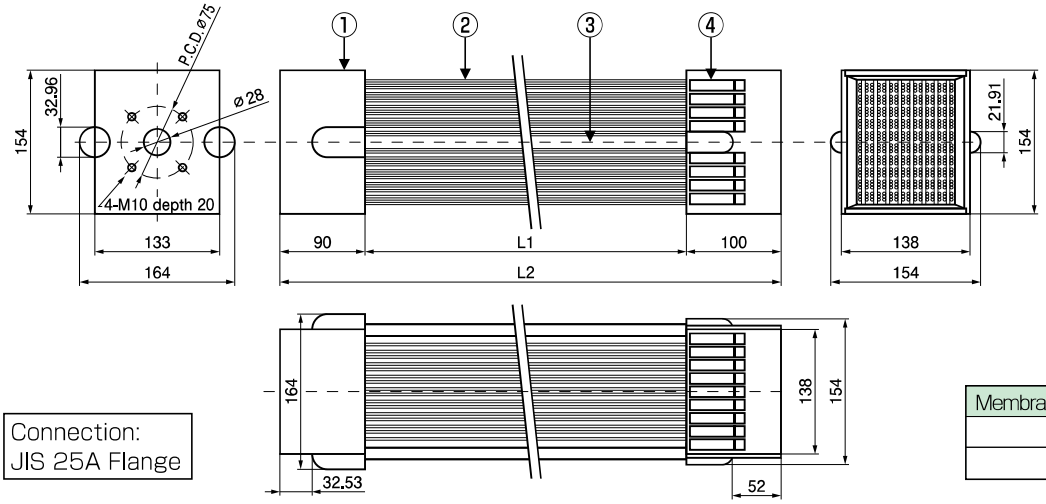
	Chemical concentration	Chemical dosage	Cleaning duration	Cleaning guideline
Target: Organic matter	100–500mg/L NaOH + 300–3,000 mg/L NaClO (mixture)	2L/㎡ + All pipes	30 min – 2 hours	Every 1–2 weeks or TMP 40kPa
Target: Inorganic matter	300–3,000 mg/L HCl, H_2SO_4, Citric acid, Oxalic acid			

Out-of-tank cleaning (High concentration cleaning)

	Chemical concentration	Immersion duration	Cleaning guideline
Target: Organic matter	0.5–4wt% NaOH + 300–3,000 mg/L NaClO (mixture)	6–12 hours	Every 6 months
Target: Inorganic matter	0.3–3 wt% HCl, H_2SO_4, Citric acid, Oxalic acid		

* Cleaning conditions vary depending on raw water quality

Submerge Type Standard Model Outline Drawing

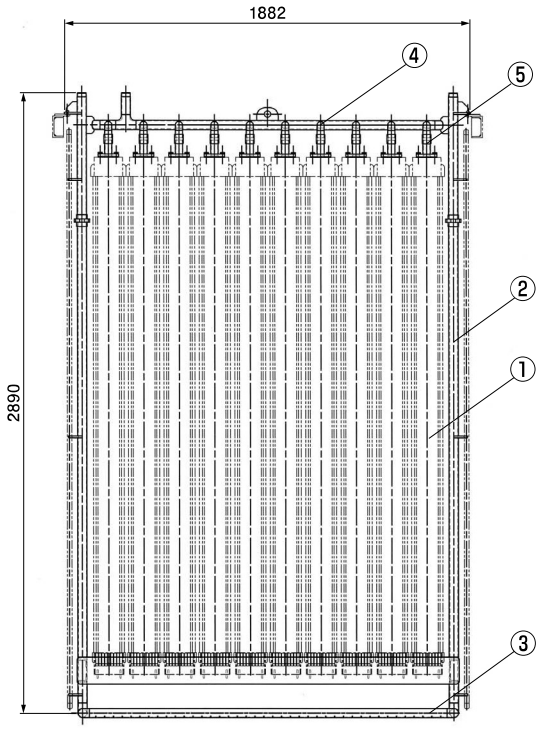


1	Cap	ABS
2	Hollow fiber membrane	PTFE
3	Supporting bar	SUS
4	Skirt	ABS

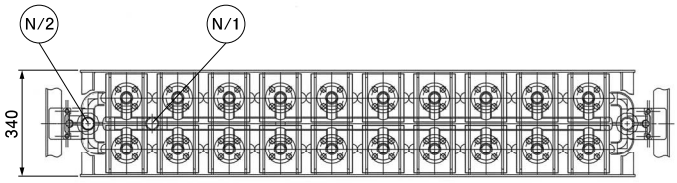
Connection:
JIS 25A Flange

Membrane area(㎡)	L1 (mm)	L2(mm)
6	1,110	1,300
12	2,220	2,410

Module Unit Drawing (Assembly Example on Membrane Area 240m²)

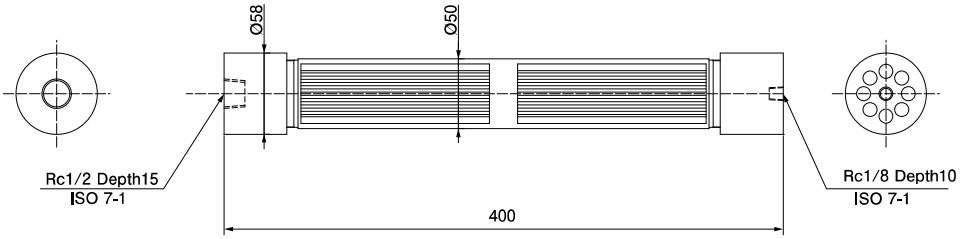


1	Membrane module element	PTFE
2	Air introduction pipe for aeration	SUS304 (SUS316)
3	Aeration piping	PVC
4	Suction header of permeate	SUS304 (SUS316)
5	Suction piping	SUS304 (SUS316)



N—1	Suction joint of permeate	50A
N—2	Aeration inlet	40A

Mini module for evaluation



Membrane area : 0.1m²

*POREFLON™ Module and related technical information may be subject to control such as the Export Trade Control Ordinance. Please note that you are responsible for taking the necessary procedure including application for an export permission in cases where this product is applicable to the products subject to control.

SUMITOMO ELECTRIC INDUSTRIES, LTD.

New Business Development Unit
Water Processing Division Sales Department
5-33, Kitahama 4 chome, Chuo-ku, Osaka 541-0041, Japan Tel: +(81)-6-6220-4337 Fax: +(81)-6-6220-4104
http://global-sei.com/