Product Datasheet

TORAY
Innovation by Chemistry

TM800V Series

Low-Energy Sea Water Reverse Osmosis (RO) Membrane Element

Toray's reverse osmosis membrane technology applies decades of R&D and precision automated manufacturing under ISO 9001 for consistency in product quality. State-of-the-art cross-linked fully aromatic polyamide composite membranes produce high-quality permeate and robust membrane chemistry for improved performance and longer membrane life.

Product Specifications	Unit	TM810V	TM820V-400	TM820V-440
Size		4040	8040	8040
Membrane Area	ft^2 (m^2)	87 (8)	400 (37)	440 (41)
Nominal Salt Rejection	%	99.80	99.80	99.80
Minimum Salt Rejection	%	99.50	99.50	99.50
Product Flow Rate	gpd (m^3/d)	1,900 (7.2)	9,000 (34.1)	9,900 (37.5)
Min. Product Flow Rate	gpd (m^3/d)	1,550 (5.9)	7,500 (28.4)	8,250 (31.2)
Feed spacer thickness	mil	34	34	28

Test Conditions: Feed water pressure 800 psi (5.52 MPa); Feed water temperature 77 °F (25°C); Feed water concentration 32,000 mg/L as NaCl; Recovery rate 8%; Feed water pH 7

Typical Boron Rejection: 92% at pH 8 (5 mg/L Boron added to feed water)

Applications

Seawater desalination, High salinity feed water, Industrial wastewater, High recovery RO systems

C US

Products manufactured at our U.S. facility (TMUS) are certified to NSF/ANSI 61 for drinking water applications.

Feed Water → Permeate → Concentrated Brine

Flow direction →

Dimensions in. (mm)		
Size	4040	8040
A	4.0 (101)	7.9 (201)
B	40 (1,016)	40 (1,016)
C	0.75 (19)	1.125 (29)
D	1.05 (26)	

Figure 1: 4040 elements

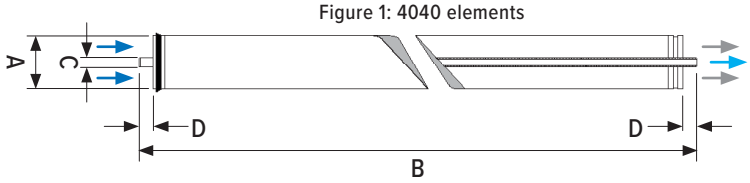
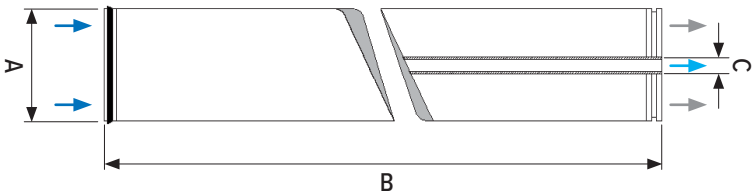


Figure 2: 8040 elements



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TM800V Series

Low-Energy Sea Water Reverse Osmosis (RO) Membrane Element

Operating Limits		Unit	Value
Maximum operating pressure[6]		psi (MPa)	1,200 (8.3)
Maximum feed water temperature		°F (°C)	113 (45)
Maximum feed water SDI_{15}			5
Feed water chlorine concentration		ppm	Not detectable
Feed water pH range	Continuous operation		2–11
	Chemical cleaning		1–12
Maximum pressure drop per element		psi (MPa)	15 (0.10)
Maximum pressure drop per vessel		psi (MPa)	50 (0.34)

Operating Information

1. Please consult the latest Toray technical bulletin, design guidelines, computer design program, or call an application specialist for the recommended design range. Not strictly following the operating limits stated in this bulletin will void and nullify the Limited Warranty.
2. All RO elements are wet tested treated with a 1 percent by weight sodium bisulfite storage solution. Afterward, the RO elements are vacuum packed in oxygen barrier bags or treated with a tested feed water solution, and then vacuum sealed in oxygen barrier bags with deoxidant inside. Toray recommends flushing Toray RO elements for 30 to 60 minutes once every two days with sufficient quality flushing water, such as pre-treated feed water, to prevent biological growth during system shutdown. Please refer to the Toray RO Handling Manual for suggested flushing water quality.
3. The presence of free chlorine and other oxidizing agents under certain conditions, such as heavy metals that act as oxidation catalysts in the feed water, will cause unexpected oxidation of the membrane. Toray strongly recommends removing these oxidizing agents contained in feed water before operating the RO system.
4. Permeate from the first hour of operation shall be discarded.
5. The customer is fully responsible for the effects of chemicals that are incompatible with the elements. Their use will void the element Limited Warranty.
6. Maximum operating pressure will vary depending on feed temperature. Please ask for detailed information from Toray if needed.

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Product Datasheet

Innovation by Chemistry

TSW-LE Series

Super Low-Energy Sea Water Reverse Osmosis (RO) Membrane Element

Toray's reverse osmosis membrane technology applies decades of R&D and precision automated manufacturing under ISO 9001 for consistency in product quality. State-of-the-art cross-linked fully aromatic polyamide composite membranes produce high-quality permeate and robust membrane chemistry for improved performance and longer membrane life.

Product Specifications	Unit	TSW-400LE		TSW-440LE	
Membrane Area	ft^2 (m^2)	400 (37)		440 (41)	
Feed spacer thickness	mil	34		28	
Feed water pressure	psi (MPa)	600 (4.14)	800 (5.52) *	600 (4.14)	800 (5.52) *
Nominal Salt Rejection	%	99.6	99.8	99.6	99.8
Min. Salt Rejection	%	99.3	99.6	99.3	99.6
Product Flow Rate	gpd (m^3/d)	6,100 (23.0)	12,100 (45.8)	6,700 (25.3)	13,000 (49.2)
Min. Product Flow Rate	gpd (m^3/d)	5,200 (19.6)	10,300 (39.0)	5,700 (21.5)	11,000 (41.8)

*Referential performance at 800 psi (5.52 MPa)

Test Conditions: Feed water temperature 77 °F (25°C); Feed water concentration 32,000 mg/L as NaCl; Recovery rate 8%; Feed water pH 7

Typical Boron Rejection: 84% at pH 8 (5 mg/L Boron added to feed water); 90% at pH 8 (5 mg/L Boron added to feed water)*

Applications

Seawater desalination, High salinity feed water, Industrial wastewater, High recovery RO systems

Products manufactured at our U.S. facility (TMUS) are certified to NSF/ANSI 61 for drinking water applications.

Dimensions in. (mm)	
A	7.9 (201)
B	40 (1,016)
C	1.125 (29)

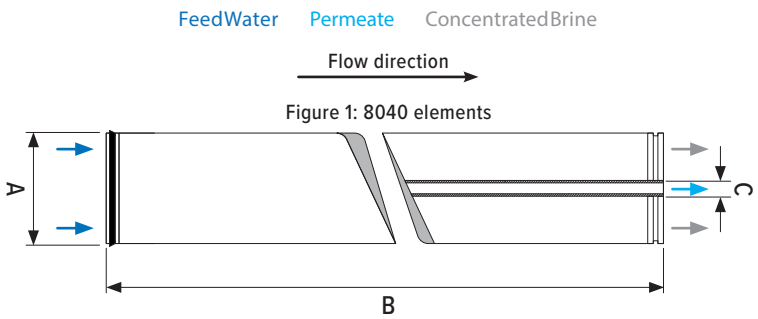

Figure 1: 8040 elements

Product Datasheet

TORAY
Innovation by Chemistry

TSW-LE Series

Super Low-Energy Sea Water Reverse Osmosis (RO) Membrane Element

Operating Limits		Unit	Value
Maximum operating pressure[6]		psi (MPa)	1,200 (8.3)
Maximum feed water temperature		°F (°C)	113 (45)
Maximum feed water SDI_{15}			5
Feed water chlorine concentration		ppm	Not detectable
Feed water pH range	Continuous operation		2–11
	Chemical cleaning		1–12
Maximum pressure drop per element		psi (MPa)	15 (0.10)
Maximum pressure drop per vessel		psi (MPa)	50 (0.34)

Operating Information

1. Please consult the latest Toray technical bulletin, design guidelines, computer design program, or call an application specialist for the recommended design range. Not strictly following the operating limits stated in this bulletin will void and nullify the Limited Warranty.
2. All RO elements are wet tested treated with a 1 percent by weight sodium bisulfite storage solution. Afterward, the RO elements are vacuum packed in oxygen barrier bags or treated with a tested feed water solution, and then vacuum sealed in oxygen barrier bags with deoxidant inside. Toray recommends flushing Toray RO elements for 30 to 60 minutes once every two days with sufficient quality flushing water, such as pre-treated feed water, to prevent biological growth during system shutdown. Please refer to the Toray RO Handling Manual for suggested flushing water quality.
3. The presence of free chlorine and other oxidizing agents under certain conditions, such as heavy metals that act as oxidation catalysts in the feed water, will cause unexpected oxidation of the membrane. Toray strongly recommends removing these oxidizing agents contained in feed water before operating the RO system.
4. Permeate from the first hour of operation shall be discarded.
5. The customer is fully responsible for the effects of chemicals that are incompatible with the elements. Their use will void the element Limited Warranty.
6. Maximum operating pressure will vary depending on feed temperature. Please ask for detailed information from Toray if needed.

Toray RO membrane TSW-LE series is only applicable for selected projects.

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Product Datasheet

TORAY
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TM800K Series

Highest Rejection Sea Water Reverse Osmosis (RO) Membrane Element

Toray's reverse osmosis membrane technology applies decades of R&D and precision automated manufacturing under ISO 9001 for consistency in product quality. State-of-the-art cross-linked fully aromatic polyamide composite membranes produce high-quality permeate and robust membrane chemistry for improved performance and longer membrane life.

Product Specifications	Unit	TM820K-400	TM820K-440
Membrane Area	ft^2 (m^2)	400 (37)	440 (41)
Nominal Salt Rejection	%	99.86	99.86
Minimum Salt Rejection	%	99.50	99.50
Product Flow Rate	gpd (m^3/d)	5,800 (21.9)	6,400 (24.2)
Min. Product Flow Rate	gpd (m^3/d)	4,600 (17.4)	5,100 (19.3)
Feed spacer thickness	mil	34	28

C SA US

Products manufactured at our U.S. facility (TMUS) are certified to NSF/ANSI 61 for drinking water applications.

Test Conditions: Feed water pressure 800 psi (5.52 MPa); Feed water temperature 77 °F (25°C); Feed water concentration 32,000 mg/L as NaCl; Recovery rate 8%; Feed water pH 7

Typical Boron Rejection: 96% at pH 8 (5 mg/L Boron added to feed water)

Applications

Seawater desalination, High salinity feed water, Industrial wastewater, High recovery RO systems

Dimensions in. (mm)	
A	7.9 (201)
B	40 (1,016)
C	1.125 (29)

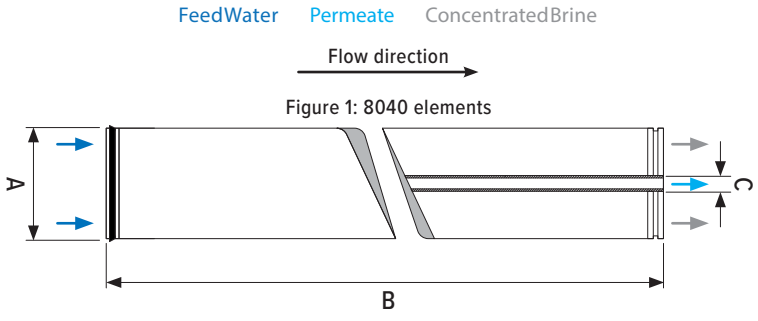

Figure 1: 8040 elements

Product Datasheet

TORAY
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TM800K Series

Highest Rejection Sea Water Reverse Osmosis (RO) Membrane Element

Operating Limits		Unit	Value
Maximum operating pressure[6]		psi (MPa)	1,200 (8.3)
Maximum feed water temperature		°F (°C)	113 (45)
Maximum feed water SDI_{15}			5
Feed water chlorine concentration		ppm	Not detectable
Feed water pH range	Continuous operation		2–11
	Chemical cleaning		1–12
Maximum pressure drop per element		psi (MPa)	15 (0.10)
Maximum pressure drop per vessel		psi (MPa)	50 (0.34)

Operating Information

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3. The presence of free chlorine and other oxidizing agents under certain conditions, such as heavy metals that act as oxidation catalysts in the feed water, will cause unexpected oxidation of the membrane. Toray strongly recommends removing these oxidizing agents contained in feed water before operating the RO system.
4. Permeate from the first hour of operation shall be discarded.
5. The customer is fully responsible for the effects of chemicals that are incompatible with the elements. Their use will void the element Limited Warranty.
6. Maximum operating pressure will vary depending on feed temperature. Please ask for detailed information from Toray if needed.

Toray RO membrane TM800K series is only applicable for selected projects.

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Product Datasheet

TORAY
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TM800M Series

Standard Sea Water Reverse Osmosis (RO) Membrane Element

Toray's reverse osmosis membrane technology applies decades of R&D and precision automated manufacturing under ISO 9001 for consistency in product quality. State-of-the-art cross-linked fully aromatic polyamide composite membranes produce high-quality permeate and robust membrane chemistry for improved performance and longer membrane life.

Product Specifications	Unit	TM820M-400	TM820M-440
Membrane Area	ft^2 (m^2)	400 (37)	440 (41)
Nominal Salt Rejection	%	99.80	99.80
Minimum Salt Rejection	%	99.50	99.50
Product Flow Rate	gpd (m^3/d)	7,000 (26.5)	7,700 (29.2)
Min. Product Flow Rate	gpd (m^3/d)	5,600 (21.2)	6,200 (23.5)
Feed spacer thickness	mil	34	28

C SA US

Products manufactured at our U.S. facility (TMUS) are certified to NSF/ANSI 61 for drinking water applications.

Test Conditions: Feed water pressure 800 psi (5.52 MPa); Feed water temperature 77 °F (25°C); Feed water concentration 32,000 mg/L as NaCl; Recovery rate 8%; Feed water pH 7

Typical Boron Rejection: 95% at pH 8 (5 mg/L Boron added to feed water)

Applications

Seawater desalination, High salinity feed water, Industrial wastewater, High recovery RO systems

Dimensions in. (mm)	
A	7.9 (201)
B	40 (1,016)
C	1.125 (29)

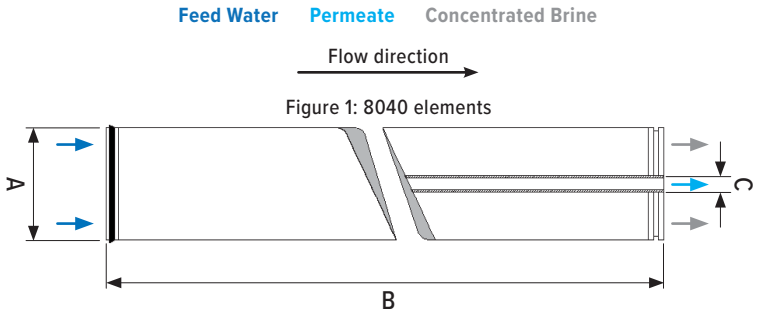

Figure 1: 8040 elements

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TM800M Series

Standard Sea Water Reverse Osmosis (RO) Membrane Element

Operating Limits		Unit	Value
Maximum operating pressure[6]		psi (MPa)	1,200 (8.3)
Maximum feed water temperature		°F (°C)	113 (45)
Maximum feed water SDI_{15}			5
Feed water chlorine concentration		ppm	Not detectable
Feed water pH range	Continuous operation		2–11
	Chemical cleaning		1–12
Maximum pressure drop per element		psi (MPa)	15 (0.10)
Maximum pressure drop per vessel		psi (MPa)	50 (0.34)

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