

# Reverse Osmosis Membrane

## Sanitary element for dairy and food processing

Toray's sanitary reverse osmosis (TRO-series and TMRO-series) products are high-rejection fully cross-linked aromatic polyamide composite membrane in a sanitary net wrap design.



### Product Specifications

Model	Feed spacer thickness in. (mm)	Active area ft <sup>2</sup> (m <sup>2</sup> )
<b>REVERSE OSMOSIS</b>		
TRO 3838N1	0.031 (0.79)	77 (7.2)
TRO 3838N2	0.046 (1.17)	60 (5.6)
TRO 3838N3	0.065 (1.65)	46 (4.3)
TRO 3839N1	0.031 (0.79)	77 (7.2)
TRO 7838N1	0.031 (0.79)	380 (35.3)
TRO(D) 7838N1	0.031 (0.79)	380 (35.3)
TRO 7838N2	0.046 (1.17)	310 (28.8)
TRO 8038N1	0.031 (0.79)	390 (36.2)
TRO 8038N2	0.046 (1.17)	320 (29.7)
TRO 8038N3	0.065 (1.65)	240 (22.3)
TRO(D) 8038N1	0.031 (0.79)	390 (36.2)
TMRO 8040PS	0.031 (0.79)	390 (36.2)
TMRO(D) 8040PS	0.031 (0.79)	390 (36.2)
<b>HIGH-PRESSURE REVERSE OSMOSIS</b>		
TRO 3838HP	0.031 (0.79)	77 (7.2)
TRO 8038HP	0.031 (0.79)	390 (36.2)
TRO 8038HPN2	0.046 (1.17)	312 (29.0)
TMRO 8040HP	0.031 (0.79)	390 (36.2)
TMRO 8040HPN2	0.046 (1.17)	312 (29.0)

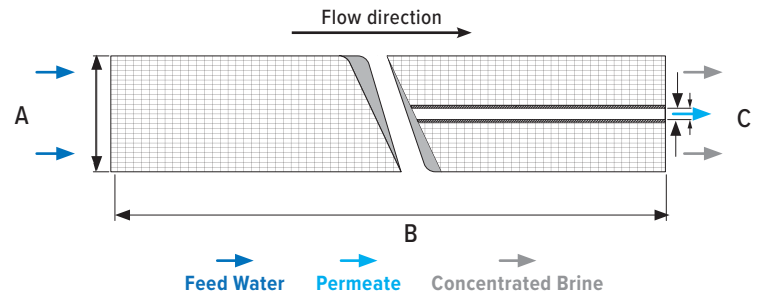
If you do not see a configuration or performance requirement that meets your needs, a team of product specialists is ready to develop custom engineered solutions. Please inquire within.

### Standard dimensions in. (mm)

Size	A Diameter	B Length	C Permeate tube ID
3838	3.8 (97)	38 (965)	0.83 (21.1)
3839	3.8 (97)	38.75 (984)	0.83 (21.1)
7838	7.7 (196)	38 (965)	1.125 (28.6)
8038	7.9 (201)	38 (965)	1.125 (28.6)
8040	7.9 (201)	40 (1,016)	1.125 (28.6)

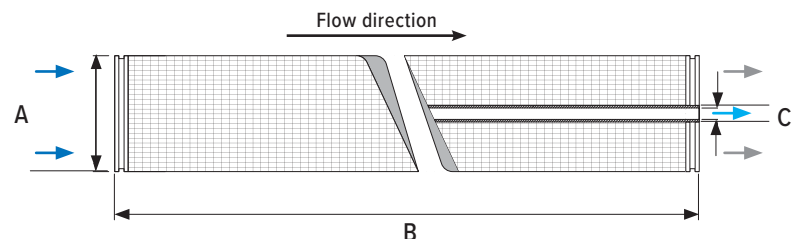
### Spiral Elements in Sanitary Design (no ATD)

Components conform to FDA Regulation CFR Title 21 and USDA/3A Sanitary Standards



### TMRO 8040 models (w/ ATD)

Components conform to FDA Regulation CFR Title 21



### Material Specifications

Feed spacer & element outer wrap	Polypropylene
Permeate tubes, Anti-telescoping device (ATD), inter-connectors for TMNF models	Polysulfone
Permeate carrier	Proprietary
Adhesives	Proprietary

## Product datasheet

### OPERATING LIMITS

Maximum operating pressure	800 psi (55.2 bar)
Maximum operating temperature	122°F (50°C)
Maximum operating temperature for HPRO	150°F (65°C)*
Maximum cleaning temperature	122°F (50°C)
Acceptable operating pH range	2.5–10.5
Acceptable short-term cleaning pH range	1.7–11.5
Maximum pressure drop per element	15 psi (1.0 bar)
Maximum pressure drop per vessel	60 psi (4.1 bar)

*\* Please refer to conditioning procedures on pg. 3 of this document  
Consult Toray for pressure limits when operating above ambient temperature*

### OXIDANT TOLERANCE

Chlorine tolerance (short-term cleaning at pH 11)	Non-detect
H <sub>2</sub> O <sub>2</sub> continuous ppm	20*
H <sub>2</sub> O <sub>2</sub> short-term cleaning <77°F (25°C) ppm	1,000*

*\*Free chlorine should not be present in feed*

### Performance / Test Conditions for High-Pressure RO

Rejection rate	99.8%
Flux rate	17.5 gfd (30 l/mh)
Feed water pressure	800 psi (55.2 bar)
Feed water temperature	77°F (25°C)
Feed water concentration	32,000 mg/l as NaCl
Recovery rate	8%
Feed water pH	8

### Membrane characteristics

TRO-series elements are ideal for maximum retention of valuable milk solids and COD/BOD contributing compounds.

Toray's 'D-family' polyamide composite membranes incorporate membrane chemistry that offers extra durability against foulants and chemical cleaning.

TRO-series HP elements are high-rejection.

### Applications

- Milk permeate concentrate
- Sugar concentration
- Flavor concentration
- Aroma concentration
- Wine de-alcoholization
- Beer de-alcoholization
- Diafiltration water

### Regulatory Information

Toray's membrane elements are certified under:

- ISO 9001:2015 QMS to ensure consistency in product and service quality; and
- ISO 14001:2015 EMS to enhance the environmental performance of our products and services.

### Conditioning procedure for TRO-series HP elements when operating above 50°C

New Toray high-pressure reverse osmosis membrane elements intended for operation at temperatures above 122°F (50°C) must be pre-conditioned before initial use by exposure to hot water at low pressure. Conditioning water must be high-quality chlorine and oxidant free, non-scaling, non-fouling water. RO permeate is preferred (water from an RO that has been in operation for at least 24 hours).

#### Conditioning procedure:

1. Flush water to drain with a non-scaling water at low pressure, maintaining low permeate rates.
2. Recycle warm water 104–113°F (40–45°C) at less than 25 psig (1.7 bar) trans-membrane pressure. The maximum differential pressure is 2 psi per element or 10 psi per vessel.
3. Introduce hot water to the circulating system to increase temperature to 140–150°F (60–65°C).
4. Maintain this temperature and a TMP less than 25 psig (1.7 Bar) for 80 minutes.
5. The maximum temperature increase or decrease is 2° C/minute.
6. Allow the circulating system to cool below 113°F (45°C) or below.

#### NOTICE

1. Elements are preserved in sodium meta-bisulfite. Appropriate personal protective equipment should be worn when handling.
2. Toray accepts no responsibility for results obtained by the application of this information or the safety or suitability of Toray's products, either alone or in combination with other products. Users are advised to make their own tests to determine the safety and suitability of each product combination for their own purposes.
3. All data may change without prior notice, due to technical modifications or production changes.
4. Consult Toray for element sizes not shown.