Duratherm* STD Series

FACT SHEET

High temperature pure water elements

Description and Use

The Duratherm STD Series is specifically designed to maximize the benefits of continuous high temperature operation as well as hot water sanitization for industries willing to maximize energy recovery and use hot purified water.

Separation system sanitization protocol is performed via periodic exposure to temperature as high as 90°C (194°F) at minimum feed pressure to kill microorganisms by denaturation and coagulation of the proteins chains.

The Duratherm STD are suitable for separation systems purifying water at temperature up to 70°C (158°F) in low crossflow environment and no suspended solids.

This Series includes a variety of size 8” and 4” diameters. All element constructions include Durasan* Cage outer wrap, Polysulfone ATD and central tube.

Features and Benefits

- Prevent bio-fouling development
- No disposal costs
- 100% wet testing Quality Assurance
- Durable construction
- Sanitization on the permeate side

Markets

- Food / Beverage
- BioPharm
- Electronics
- Chemical

Table 1: Element Specification

Membrane	A-Series, thin-film membrane (TFM*), PES

Model	Average Permeate Flow gpd (m^3/day)	Average nacl Rejection
Duratherm STD RO4040[1,2]	2,300 (8.7)	99.5%
Duratherm STD RO8040[1,2]	9,000 (34.1)	99.5%
Duratherm STD UF8040HR	-	5,000Da

[1]Testing conditions: 2,000ppm NaCl solution at 225psig (1,550kPa) operating pressure, (25°C) 77°F, pH7.5 and 15% recovery before any hot water sanitization.
[2]Average salt rejection after 24 hours of operation. Individual flow rate may vary +/-20%. Final permeate flow rate is subject to variations in the heat treatments. In most cases, the permeate flow rate after heat treatments will stabilize at 25% below nominal flow rate before heat treatment for the Duratherm STD RO. This is taken into consideration in Winflows Database 3.07 and later.

Model	Active Area ft^2 (m^2)	Outer Wrap	Part Number
Duratherm STD RO4040	90 (8.4)	Cage	1228197
Duratherm STD RO8040	374 (34.9)	Cage	1228225
Duratherm STD UF8040HR	348 (32.5)	Cage	1207315

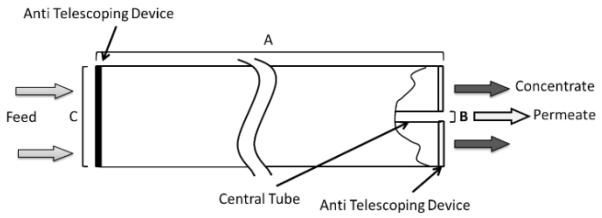

Figure 1: Element Dimensions Diagram (Female)

Table 2: Dimensions and Weight

Model[1]	Dimensions, inches (cm)			Boxed
	a	b[2]	c	Weight lbs (kg)
STD 4040 models[1]	40.0 (101.6)	0.625 (1.59)	3.9 (9.9)	9 (4.1)
STD 8040 Models	40.0 (101.6)	1.125 (2.86)	7.9 (20.1)	35 (16)

[1]"A" includes the interconnector.
[2]Internal diameter unless specified OD (outside diameter).

Table 3: Temperatures

Do not exceed 20 GFD (34LMH) in any circumstances

Model	Maximum Operating Temperature	Maximum Cleaning Temperature	Maximum Sanitization Temperature
Duratherm STD RO	158°F (70°C)	122°F (50°C)	194°F (90°C)
Duratherm STD UF	158°F (70°C)	122°F (50°C)	194°F (90°C)

Table 4: Operating Parameters – Duratherm STD RO

Operating Temperature	41–122°F (5–50°C)	122–158°F (50–70°C)
Typical Operating Flux	10-18GFD (17-31LMH)	10-18GFD (17-31LMH)
Max. Operating Pressure	600 psi (4,137 kPa)	400psi (2,758kPa)
Recommended Crossflow	STD 4040 Models: 20 GPM (4.5 m^3/hr) STD 8040 Models: 65 GPM (14.8 m^3/hr)	
Max. Pressure Drop: Over an element Per Housing	15 psig (103kPa) 60 psig (414kPa)	7.5 psig (51kPa) 30 psig (207kPa)
pH range: Continuous operation Clean-In-Place (CIP)	4.0-11.0 2 – 11.5	4.0-11.0 Not Allowed
Chlorine Tolerance	500 ppm-hours, dechlorination recommended	
Feedwater	NTU < 1 SDI_{15} < 5	

Table 5: Operating Parameters – Duratherm STD UF

Operating Temperature	41–122°F (5–50°C)	122–158°F (50–70°C)
Typical Operating Flux	10-25GFD (17-40LMH)	10-25GFD (17-40LMH)
Max. Operating Pressure	600 psi (4,137kPa)	80psi (522kPa)
Recommended Crossflow	STD 4040 Models: 20 GPM (4.5 m^3/hr) STD 8040 Models: 65 GPM (14.8 m^3/hr)	
Max. Pressure Drop: Over an element Per Housing	15 psig (103kPa) 60 psig (414kPa)	7.5 psig (51kPa) 30 psig (207kPa)
pH range: Continuous operation Clean-In-Place (CIP)	4.0-11.0 2 – 11.5	4.0-11.0 Not Allowed
Chlorine Tolerance	5,000 ppm-hours, dechlorination recommended	
Feedwater	NTU < 1 SDI_{15} < 5	

Hot Water Sanitization Recommendations

Prior to first use, new elements must be flushed with clean water[1] to remove any residual chemicals for at least an hour, at a transmembrane pressure of not more than 45 psi (3 bar). The system must be started and in operation for minimum 24 hours prior to hot water sanitization.

If the new elements are to be hot water sanitized before first use, the system must be flushed at low transmembrane pressure (up to 45 psi (3 bar)), for minimum 24 hours prior to sanitization.

Transmembrane pressure during hot water sanitization should also be maintained as low as possible, not exceeding 45 psi (3 bar), while ensuring some permeate flow for effective sanitization on the permeate side.

The cross flow to the system should be monitored and adjusted so that the pressure drop is not more than 2 psi per element or 10 psi per housing.

The following procedure should be followed step by step for the hot water sanitization of Duratherm elements.

1. The elements that have been in operation should be cleaned with approved Clean In Place (CIP) procedure to remove any mineral scales or organic foulants, and then be thoroughly flushed for at least an hour before sanitization.
2. Increase the temperature in the system from room temperature to target sanitization temperature[2] (up to 90°C/194°F) at a rate not higher than 5°C/9°F per minute. Maintain the target temperature for 30 to 60 minutes.
3. Cool the system to room temperature at a rate not higher than 5°C/9°F per minute.

[1]RO permeate is strongly preferred when available. Feedwater which does not foul or form scale on membrane can also be used but only after appropriate filtration. Note that the solubility of some inorganics, for example calcium carbonate and at least above 45°C calcium sulfate, decreases with increasing temperature.
[2]The effectiveness of heat sanitizing is a function of temperature and time. Duratherm elements can withstand 90°C hot water sustained for over 60 minutes, but there is no gain by maintaining the high temperature for longer time than needed to deactivate the microbes that will be deactivated at the chosen temperature.

Salt Rejection

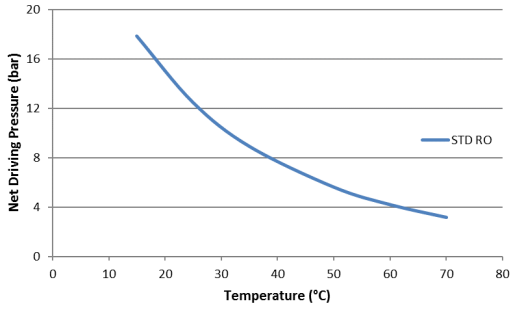

Figure 2: Simulated NaCl rejection for STD RO element with 2000 ppm NaCl at 15% recovery and 33 LMH

Pressure Drop

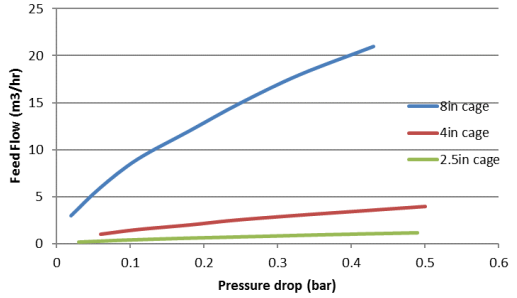

Figure 3: Simulated Pressure Drop

Net Driving Pressure

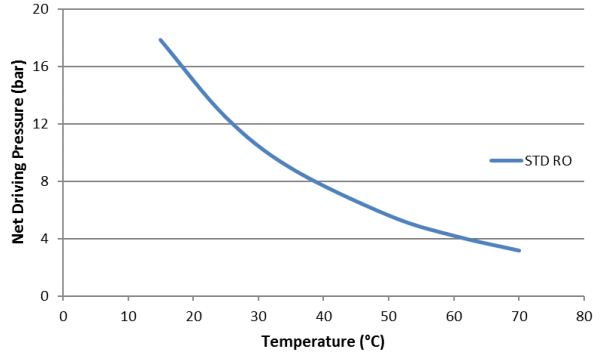

Figure 4: simulated net driving pressure for STD RO elements with 2000 ppm NaCl at 15% recovery and 33 LMH

Veolia Water Technologies
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