

Duratherm HWS Series

Hot Water Sanitization Pure Water Elements

Description and Use

The Duratherm HWS Series includes **RO**, **NF** and **UF** membrane elements. This Series is specifically designed to maximize the benefits of hot water sanitization for industries relying on chemical free sanitization for product quality and/or industry compliance standard.

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

The Duratherm HWS RO and HWS NF are suitable for separation systems purifying water at temperature up to 122°F (50°C) in low crossflow environment and no suspender ended solids and. The Duratherm HWS RO HR and HWS UF can be selected for continuous operation with feed stream temperature up to 70°C (158°F).

This Series includes a variety of size 8", 4" and 2.5" diameters ⁽¹⁾. All element constructions include Durasan outerwrap, PSO ATD and PSO Central tube.

Features and Benefits

- > **Certified for Bottled Water in the EU** ^{b,c}
- > Kills bacteria
- > Prevent bio-fouling development
- > No disposal costs
- > 100% wet testing Quality Assurance
- > Durable construction
- > Sanitization on the permeate side

Markets

- Food / Beverage
- BioPharm
- Medical / Dialysis
- Electronics
- Chemical

Chemical Operating and Design Parameters for temperatures below 50°C (122°F)

Membrane Types — Thin-Film Membrane (TFM®) ^{abc}, Polyethersulfone^d

Typical Applied Pressure — 225 psi (13.8 bar)^{a,b}, 100 psi (6.8 bar)^c, 80 psi (5.5 bar)^d

Typical Operating Process Flux — 10-18 GFD (17-35 LHM)^{a,b,c}, 10-25 GFD (15-40LHM)^d

Maximum Feed Water Temperature for continuous operation 122°F(50°C)^{b,c}, 158°F(70°C)^{a,d}

Maximum Pressure Drop – 10 psi per element and 50 psi per pressure vessel

Operating pH Range — 2.0 -10.0 ^{a,b,c,d}

Cleaning pH Range — 2.0 -11.5^{a,b,c,d}

Chlorine Tolerance — 500 ppm-hours, Dechlorination recommended ^{a,b,c} +5,000 ppm -days ^d

Recommended Single Element Recovery <15%

Feed Turbidity — <1 NTU , **SDI** — <5

(a=HWS RO-HR, b=HWS RO, c=HWS NF, d=HWS UF)



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Maximum Operating Pressure vs Operating Temperature

Temperature Model Description	5°C-50°C	51°C-70°C	71°C-90°C
HWS RO-HR	600 psi	300 psi	HWS only
HWS RO	600 psi	Hot Water Sanitizing only	
HWS NF	600 psi	Hot Water Sanitizing only	
HWS UF	600 psi	300 psi	HWS only

Do not exceed 20 GFD in any circumstances.

Hot Water Sanitization Recommendations:

For optimal performance, Duratherm HWS RO elements should always be cleaned using approved CIP procedures and flushed with fouling-free water before the sanitization process. Feed pressure during sanitization should not exceed 40 psi and the crossflow should not incur a pressure drop greater than 2 psi per element. Heating rate to sanitizing temperature and cool down should not be faster than 5°C/minute. Maximum sanitization temperature is 90°C.

Element Specifications

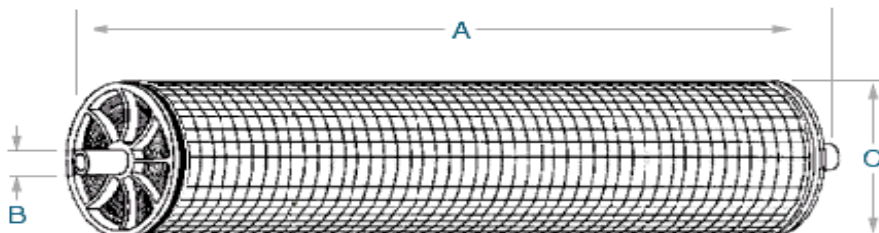
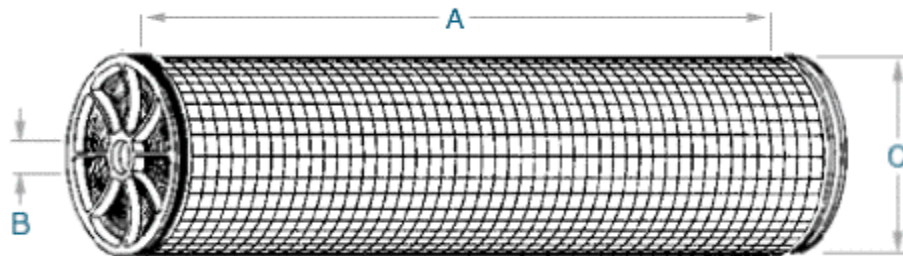
Model Description	Membrane Area in sq.ft (m ²)	Flowrate sq.ft (m ²)	Rejection average / MWCO @ 25°C	Maximum Crossflow rate (GPM)	Maximum Temperature for continuous operation	PN
HWS RO 8040 – HR ¹	350 (6,500	99.5%	65	70°C	1263599
HWS RO 4040 – HR ¹	85	1,600	99.5%	20	70°C	1263435
HWS RO 2540 – HR ¹	25	420	99.5%	4	70°C	1263600
HWS RO 8040 ¹	350	9,200	99.0 %	65	50°C	1228481
HWS RO 4040 ¹	85	2,200	99.0%	20	50°C	1228459
HWS RO 2540 ¹	25	760	99.0%	4	50°C	1229430
HWS NF 8040 ²	380(35.3)	5,800	98%	65	50°C	1262377
HWS NF 4040 ²	85(7.9)	1,600	98%	20	50°C	1263437
HWS NF 2540 ²	25(2.3)	420	98%	4	50°C	1263452
HWS UF 8040 ³	360 (33.4)	NA	6,000 D	65	70°C	1263602
HWS UF 4040 ³	85 (7.9)	NA	6,000 D	20	70°C	1263598
HWS UF 2540 ³	25 (2.3)	NA	6,000 D	4	70°C	1263601

(1) specification are based on a 2,000 mg/L NaCl solution at 225 psig operating pressure, 77° F, pH 7.5, and 15% recovery after preliminary hot water sanitization cycles. Final flowrate is subject to individual temperature profile. In most cases, flowrate will stabilize to +25% / -25% of the nominal flowrate after preliminary high water temperature cycles. (2)) specification are based on a 2,000 mg/L MgSO₄ solution at 100 psig operating pressure, 77° F, pH 7.5, and 15% recovery after preliminary hot water sanitization cycles. Final flowrate is subject to individual temperature profile. In most cases, flowrate will stabilize to +25% / -25% of the nominal flowrate after preliminaru high water temperature cicles. (3) specification based on pure water at 25oC

Dimensions:

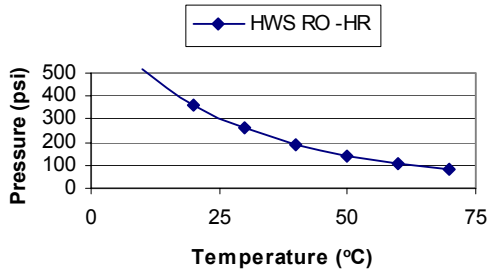
Dimensions in inches (mm)	8040	4040	2540
Center Tube Design	Flush Cut	Stinger Style	Stinger Style
A	40 (1016)	40 (1016)	40 (1016)
B	1.125(29)	0.75(19)	0.75 (19)
C	7.88(200)	3.88(99)	2.40 (61)

The element diameter (dimension C) is designed for optimum performance in GE pressure vessels. Other pressure vessel dimension and tolerance may result in excessive bypass and loss of capacity. Length includes ATDs. Elements are shipped dried.

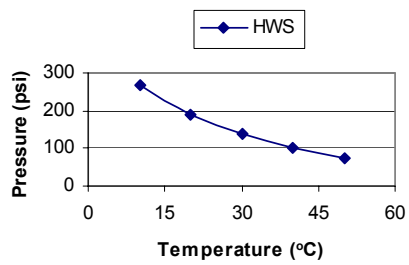


Net Driving Pressure

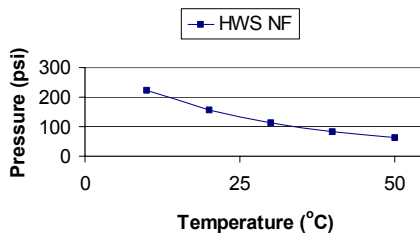
**Net Driving Pressure
for 20 GFD / 33 LMH**



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for 20 GFD / 33 LMH**



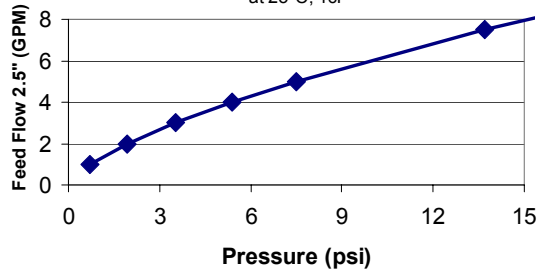
**Net Driving Pressure
for 20 GFD / 33 LMH**



Pressure Drop

Pressure Drop vs Flow

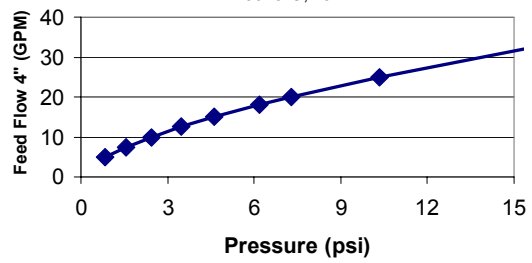
at 25°C, 1cP



* Based on Osmonics 2.5" Housings
* Use as a guideline, ΔP will vary based on tolerances of housing

Pressure Drop vs Flow

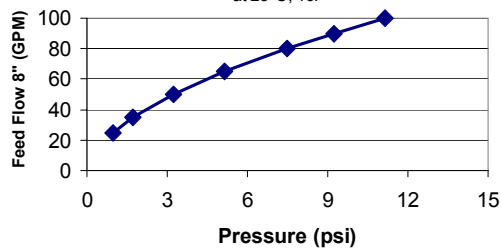
at 25°C, 1cP



* Based on Osmonics 4" Housings
* Use as a guideline, ΔP will vary based on tolerances of housing

Pressure Drop vs Flow

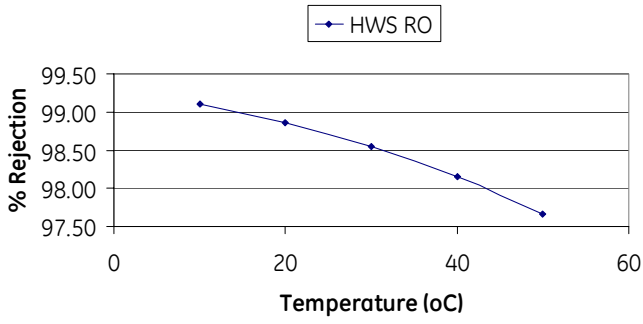
at 25°C, 1cP



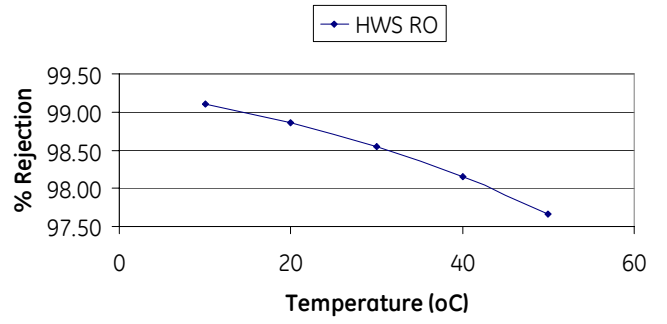
* Based on Osmonics 8" Housings
* Use as a guideline, Δ P will vary based on tolerances of housing

Salt Rejection

NaCl Rejection
20 GFD / 33 LMH



NaCl Rejection
20 GFD / 33 LMH



Magnesium Sulfate Rejection
Normalized to 20 GFD / 33 LMH

