

AD Series

FACT SHEET

High rejection seawater RO element

The AD Series family of proprietary thin film reverse osmosis elements is characterized by an excellent sodium chloride rejection. The AD Series is selected when high quality permeate is demanded from seawater that is relatively high in TDS.

AD Series membrane chemistry provides excellent rejection characteristics when operated at seawater operating conditions (pressures exceeding 800 psi (5,516 kPa) and elevated temperatures).

Table 1: Element Specification

Membrane	Thin-film membrane (TFM)			
Model	Average permeate flow gpd (m ³ /day) (1)(2)	Average NaCl rejection (1)(2)	Minimum NaCl rejection (1)(2)	Typical boron rejection (2)
AD-90	1375 (5.2)	99.8%	99.5%	95.0%
AD-400,34	7000 (26.5)	99.8%	99.5%	95.0%
AD-440	7700 (29.2)	99.8%	99.5%	95.0%

(1) Average salt rejection after 24 hours of operation. Individual flow rate may vary ±20%.

(2) Testing conditions: 32,000mg/l NaCl & 5mg/l boron solution at 800psi (5,516kPa) operating pressure, 77°F (25°C), pH 8.0 and 7% recovery.

Table 2: Element Properties (3)

Model	Active area ft ² (m ²)	Outer wrap	Part number
AD-90	90 (8.4)	Fiberglass	3056651
AD-400,34	400 (37.2)	Fiberglass	3056654
AD-440	440 (40.9)	Fiberglass	3056655

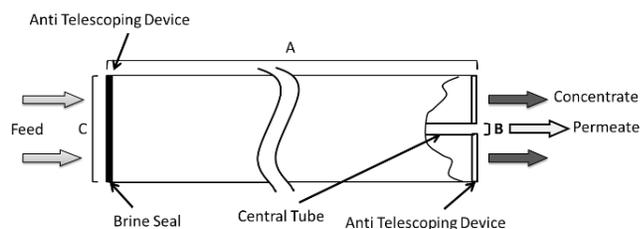


Figure 1: Element Dimensions Diagram – Female

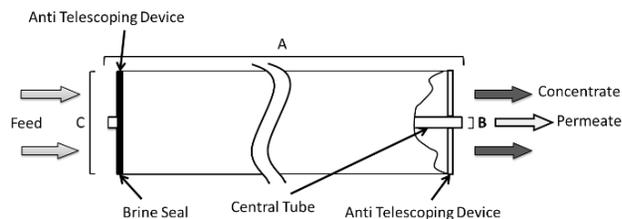


Figure 2: Element Dimensions Diagram – Male

Table 3: Dimensions and Weights (3)

Model	Type	Dimensions, inches (cm)			Boxed Weight lbs. (kg)
		A	B	C	
AD-90	Male	40.0 (101.6)	0.75 (1.90)	3.9 (9.9)	9 (4)
AD-400, 34	Female	40.0 (101.6)	1.125 (2.86)	7.9 (20.1)	35 (16)
AD-440	Female	40.0 (101.6)	1.125 (2.86)	7.9 (20.1)	35 (16)

Table 4: Operating and CIP Parameters (3)

Typical Operating Pressure	800psi (5,516kPa)
Typical Operating Flux	7-11GFD (12-19LMH)
Maximum Operating Pressure	1,200psi (8,274kPa)
Maximum Temperature	Continuous operation: 122°F (50°C) Clean-In-Place (CIP): 122°F (50°C)
pH Range	Optimum rejection: 7.0-7.5, Continuous operation 2.0-11.0, Clean-In-Place (CIP): 1.0-12.0 (4)
Maximum Pressure Drop	Over an element: 15 psi (103 kPa) Per housing: 50 psi (345 kPa)
Chlorine Tolerance	1,000+ ppm-hours, dechlorination recommended
Feedwater	NTU < 1 SDI ₁₅ < 5

(3) Element properties and parameters are indicative numbers. Specific values by element may vary within normal element manufacturing tolerances.

(4) Refer to Cleaning Guidelines Technical Bulletin TB1194.

SWRO.Z

HOJA DE PRODUCTO

WATER TECHNOLOGIES



Filtro de profundidad con tecnología Z.Plex* para una prefiltración de agua de mar por ósmosis inversa



Características y Beneficios

- Diseñado específicamente para el pretratamiento de agua de mar por ósmosis inversa
- El filtro de profundidad atrapa partículas a lo largo del medio filtrante
- Una verdadera densidad graduada ofrece una mayor vida útil del filtro
- Caída de presión muy baja y resistencia al flujo
- El exterior fundido asegura que no haya migración en el medio

Aplicaciones

- Prefiltración de agua de mar por ósmosis inversa para sistemas Veolia RO y equipos universales

Especificaciones

Tabla 1: Especificaciones e información de rendimiento

Clasificaciones	1, 5 micras (nominal)
Diámetro interno (nominal)	1.1 in (2.5 cm)
Diámetro externo	2.46 in (6.2 cm)
Longitudes	Consulte la Tabla 3: información para realizar pedidos
<i>Se pueden obtener longitudes más largas, de hasta 70 pulgadas, previa solicitud.</i>	
Materiales de construcción	
Medio de filtrado	Polipropileno
Adaptadores	Polipropileno
Elastómero	Buna, EPDM, Silicone
Condiciones de rendimiento	
Flujo:	Exterior a interior
Caída de presión máxima: 35 psid (2.4 bar) @ 77°F (25°C)	
Caída de presión de intercambio recomendada: 20 psid (1.4 bar) @ 77°F (25°C)	

Información Sobre Eficiencia

Tabla 2: Eficiencia de eliminación basada en un procedimiento de prueba ASTM 795 modificado

Clasificación en micras	Clasificación de eliminación (µm) a varias eficiencias		
	90.0%	99.0%	99.9%
1 µm	<i>La eficacia de los filtros nominales varía según la aplicación. Véase la nota para obtener información sobre la eficiencia nominal de los filtros.¹</i>		
5 µm			

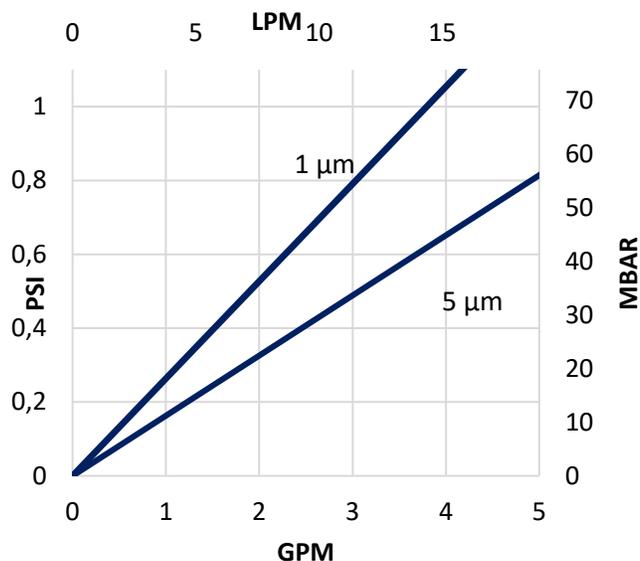


Gráfico 1: Flujo de agua limpia SWRO.Z basada en un filtro de 10 pulgadas de longitud

Calidad

Los filtros SWRO.Z se fabrican bajo un sistema de gestión de calidad. Cada caja de filtro tiene un código de lote para garantizar la trazabilidad de los datos y materiales utilizados en el proceso de fabricación.

Certificaciones de medios filtrantes

- FDA de EE.UU. 21CFR 177.1520
- Reglamento del Marco de la UE N° 1935/2004/CE
- Reglamento sobre plásticos de la UE N° 10/2011
- Criterios de los plásticos VI-121°C Clase USP
- Certificación según NSF 61²
- Procesos con certificación ISO 9001:2015

Los cartuchos de filtro de Veolia están diseñados y fabricados para resistir una amplia gama de soluciones químicas. Las condiciones variarán con cada aplicación y los usuarios deben verificar cuidadosamente la compatibilidad química. Póngase en contacto con su representante de Veolia para obtener más información.

Información Para Pedidos

Reemplace los números con los valores deseados de cada columna. Las columnas 3, 4 y 5 son opcionales dependiendo de la configuración deseada. Omita las columnas 3 y 4 si el código es XX.

Ejemplo: SWRO.Z 05-40-XK

SWRO.Z [1] - [2] - [3] [4] [5]

Tabla 3: Información de pedidos

Tipo	1 Clasificación en micras (nominal)	2 Longitud del cartucho	3 Tremo N° 1 del Adaptador	4 Extremo N° 2 del Adaptador	5 Material del elastómero
SWRO.Z	01 = 1 µm 05 = 5 µm	40 in (101.6 cm) 50 in (127.0 cm) 60 in (152.4 cm) 70 in (177.8 cm)	X = Extremo abierto estándar (sin junta) E = 222 O-Ring F = 226 O-Ring L = Núcleo extendido	X = Extremo abierto estándar (sin junta) H = Fin K = Muelle de autosellado S = Extremo sólido	B = Buna E = EPDM S = Silicona

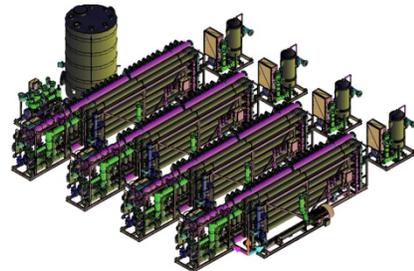
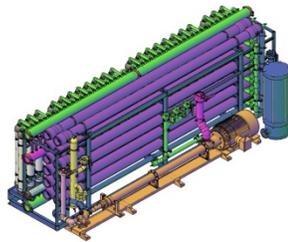
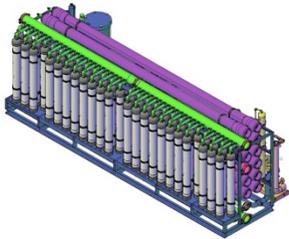
¹ Los filtros con clasificación absoluta han sido diseñados y probados para rechazar al menos el 99% de las partículas del tamaño en micrones indicado. Los filtros con clasificación nominal tienen una distribución más amplia de tamaños de poros y, por lo tanto, una distribución más amplia de tamaños de partículas rechazadas. La clasificación nominal se utiliza principalmente para comparar eficiencias dentro de una familia de filtros y entre fabricantes de filtros. La eficiencia depende de la forma, el tamaño, la composición, la aplicación y el protocolo del análisis de las partículas.

² Los elastómeros (B,E,S) cumplen la norma FDA 21 CFR 177.2600. Los productos filtrantes que incluyen elastómeros cumplen la norma NSF61

SeaPAK* Series

FACT SHEET

Integrated ultrafiltration and seawater reverse osmosis platform for 1,000 – 10,000 m³/day



Features

- UF membranes, SWRO membranes, and equipment all manufactured by Veolia
- Single Control System for entire system
- Single compact multifunctional tank
- Scalable into four blocks of same capacity with same control system (qty 2, 3, or 4 X 1000 m³/day or X 2500 m³/day)

Instrumentation

Flow Meters:..... UF Feed, UF BW,RO Permeate, RO concentrate
 Conductivity Meter:.....RO Feed, RO Permeate
 pH Meter.....UF CIP, RO Feed (opt)
 Pressure Transmitters..... UF Feed, UF Permeate, RO Primary, RO Final
 Pressure Switch..... UF Feed / Backwash, RO Feed, RO Permeate, RO Concentrate
 ORP.....RO Feed
 Temperature..... Tank
 Turbidity Meter..... UF Feed
 Level Transmitter..... Tank

Available Options

- Self-Cleaning Pre-Screen Filter
- Aeration Blower
- VFD (UF Feed, UF backwash/CIP, RO HP Pump)

System Operating Parameters

Design Recovery 35%
 Design Temperature..... 60°F (15°C)
 Operating Temperature Range 59-85°F (15-29°C)
 System Inlet Pressure 1.0-4.5 bar
 UF average membrane flux..... 35 gfd
 RO average membrane flux 8.5 gfd

Materials of Construction

High-pressure piping 2205 Stainless Steel, Sch. 10
 Low-pressure piping PVC, Sch. 80
 Frame Painted blue carbon steel
 Enclosure Nema 4

Membrane Elements and Housings

SWRO Membrane AD-440
 StyleSpiral-wound, TFC (polyamide)
 Membrane rejection..... 99.3% min, 99.75% ave.
 RO Membrane Housing Material FRP
 RO Membrane Housing Pressure Rating 1200 psi
 UF Membrane Model..... Veolia ZW1500
 UF Membrane Surface 550 ft²

Cartridge Filtration

Housing materialRubber Lined Carbon Steel
 Cartridge filter.....1.0-micron nom., Veolia Z-Plex*

SeaPAK Models

MODEL	SeaPAK-1000	SeaPAK-2500
SWRO Permeate Rate	1000 m ³ /day (185 gpm)	2500 m ³ /day (460 gpm)
SWRO Concentrate Rate	1857 m ³ /day (344 gpm)	4643 m ³ /day (854 gpm)
UF Feed Rate	2857 m ³ /day (529 gpm)	7143 m ³ /day (1311 gpm)
SWRO HP Pump Manufacturer & Model:	FEDCO MSS-16010	FEDCO SSD-500/50
Quantity:	1	1
Motor Power and type:	184 kW TEFC	371 kW TEFC
Design Flow Rate:	119 m ³ /hr (529 gpm)	298 m ³ /hr (1311 gpm)
Design boost pressure:	35.2 bar (510 psid)	35.4 bar (513 psid)
Energy Recovery Device Manufacturer & Model:	FEDCO HBPe-120	FEDCO HBPe-350
RO Booster Pump Model:	CL30707	CL50707
Manufacturer:	Grundfos	Grundfos
Quantity:	1	1
Motor Power and type:	15 kW TEFC	37 kW TEFC
Design Flow Rate:	119 m ³ /hr (529 gpm)	298 m ³ /hr (1311 gpm)
Design boost pressure:	2.8 Bar (41 psid)	2.8 Bar (41 psid)
UF CIP/Backwash Pump Model:	CL40959	CL80155
Manufacturer:	Grundfos	Grundfos
Quantity:	1	1
Motor Power and type:	30 kW TEFC	55 kW TEFC
Design Flow Rate:	164 m ³ /hr (722 gpm)	410 m ³ /hr (1804 gpm)
Design boost pressure:	3.5 Bar (51 psid)	3.5 Bar (51 psid)
Maximum UF modules:	48	120
RO Membranes Quantity:	72	182
RO Membranes Housing Style:	6 element long, 4 port	7 element long, 4 port
Banking Arrangement:	12 in parallel	26 in parallel
Housing Model:	Horizon VT-03-DN500CSR	Horizon VT-06-DN700CSR
Housing Quantity:	1	1
Cartridge Filter Model:	RFP010-40NPX-L, 1 micron	RFP010-40NPX-L, 1 micron
Cartridge Filter Length:	40-inch (100 cm)	40-inch (100 cm)
Cartridge Filter Qty:	3 per housing, 3 per change out	6 per housing, 6 per change out
Tank Size:	8000 liters (2100 gallons)	18,000 liters (4737 gallons)
Tank Material:	HDPE	HDPE
Tank Style:	Dome Top, Cone Bottom	Dome Top, Cone Bottom
Tank Height:	2.4 m (95 inch)	2.8 m (111 inch)
Tank Diameter:	2.2 m (87 inch)	3.0 m (119 inch)
Self-Cleaning Pre-Screen Filter Mode:	CBR-D-M6-RL	CTF-A60-L10-RL
Manufacturer:	Amiad	Amiad
Quantity:	1	1
Micron Rating:	200 micron	200 micron
Design Flow Rate:	142 m ³ /hr (625 gpm)	350 m ³ /hr (1540 gpm)
Motor Power:	180 Watts	550 Watts
Aeration Blower Model:	GRB-80	GRB-125
Manufacturer:	Chuanyuan	Chuanyuan
Quantity:	1	1
Motor Power:	15 kW	37 kW
UF Inlet:	8.0" flange	12.0" flange
RO Permeate:	3.0" flange	6.0" flange
RO Concentrate:	4.0" flange	8.0" flange
UF Waste:	6.0" flange	10.0" flange
Minimum Inlet Water Pressure:	0.5 bar (8 psig)	0.5 bar (8 psig)
Air Pressure (Actuated Valve Feed):	6.9 bar (100 psig)	6.9 bar (100 psig)
Power:	380 VAC, 3-phase, 50/60Hz	380 VAC, 3-phase, 50/60Hz
Control Circuit:	220 VAC, 1-phase, 50/60Hz	220 VAC, 1-phase, 50/60Hz
SWRO Skid	260 x 290 x 740 cm	260 x 458 x 823 cm
Height x Width x Depth cm (inch)	(103 x 115 x 292 inch)	(103 x 181 x 324 inch)
UF Skid	Included in SWRO Skid	278 x 150 x 969 cm
Height x Width x Depth cm (inch)		(110 x 60 x 382 inch)
SWRO Filter and Pumping Skid	268 x 183 x 128 cm	290 x 160 x 230 cm
Height x Width x Depth cm (inch)	(106 x 73 x 51 inch)	(115 x 63 x 91 inch)
UF Process / Pumping Skid	263 x 115 x 255 cm	286 x 230 x 318 cm
Height x Width x Depth cm (inch)	(104 x 46 x 101 inch)	(113 x 91 x 126 inch)
Ancillary Skid	185 x 151 x 220 cm	210 x 195 x 305 cm
Height x Width x Depth inch (cm)	(73 x 60 x 87 inch)	(83 x 77 x 121 inch)

Veolia Water Technologies

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SeaPRO* Series

FACT SHEET

Seawater reverse osmosis desalination systems

35,000 ppm tds, 50 or 60 hz, 20-70 gpm (109-382 m³/d)



SeaPRO-28

System Features

- Balance of low capital cost and energy efficiency through use of turbocharger energy recovery technology
- Use of Veolia High Flow Z depth filters for faster and easier replacement
- High pressure pump optimally placed on membrane skid for reduced footprint
- Allen-Bradley PV+700 Panel 6.5 inch color display with touchscreen controls
- Allen-Bradley MicroLogix 1200 PLC
- 4-20 mA instruments displayed on instrument center
- Variable frequency drive (VFD) for high pressure pump
- Low pressure feed water flush on shutdown
- Skid mounted control enclosure



SeaPRO-8



SeaPRO-16

Operating Parameters

Design Feed TDS	35,000 ppm
Maximum Recovery	40-45%
Nominal Rejection	97-99%
Operating Temperature	35 to 85°F (1.6 to 29.4°C)
Minimum Inlet Pressure	30 psig (2 Bar)
Design Temperature	77°F (25°C)

Instrumentation

Flow Meters.....	Permeate, concentrate
Conductivity.....	Permeate
pH.....	Feed
Pressure Gauges.....	Pre-filter, post-filter, high pressure pump outlet (turbocharger inlet), feed inlet to membrane pressure vessels, concentrate outlet from membrane pressure vessels, permeate, concentrate
Pressure Transmitters.....	Feed inlet to membrane pressure vessels, concentrate outlet from membrane pressure vessels
Pressure Switches.....	High pressure pump feed, permeate, concentrate
Temperature.....	Permeate
Instrument Center.....	Thornton M800

Materials of Construction

Frame	Siloxane coated carbon steel
Cartridge Filter	Veolia HF.RO.Zs 01-40, 1-micron nominal
Cartridge Filter Housing	HFRP1-40, Veolia FRP (fiber reinforced plastic) 40 inch single round high flow
Membrane Elements	Veolia D-400
Membrane Housing	FRP
Low Pressure Pipe	Schedule 80 PVC
High Pressure Pipe	Duplex 2205
Enclosures	Main Enclosure: NEMA 4X, FRP VFD Enclosure: NEMA 4X, plastic carbonate with stainless steel backplate

Options Available

- Safety relief valves (ASME Compliance)
- Multi-media filters
- Clean-in-place (CIP) units
- Chemical feed systems
- Transfer pumps and storage tanks

Documentation Included

- Operation and maintenance manual
- Control narrative
- Drawings: piping and instrumentation, electrical, and general dimensional

SeaPRO Models

MODEL	SeaPRO-8	SeaPRO-16	SeaPRO-28 ¹
Permeate rate:	20 gpm (109 m ³ /d)	40 gpm (218 m ³ /d)	70 gpm (382 m ³ /d)
Concentrate Rate:	30 gpm (164 m ³ /d)	49 gpm (268 m ³ /d)	86 gpm (469 m ³ /d)
Feed Rate:	50 gpm (273 m ³ /d)	89 gpm (486 m ³ /d)	156 gpm (851 m ³ /d)
Power Requirements			
Power and Control Circuit	Choice of:		
	Power: 230/460 VAC, 3-phase, 60 Hz with Control Circuit: 120 VAC, 1-phase, 60 Hz		
	Power: 380 VAC, 3-phase, 50 Hz with Control Circuit: 220 VAC, 1-phase, 50 Hz		
Pumps and Motors			
Manufacturer:	FEDCO	FEDCO	FEDCO
Quantity:	1 High Pressure	1 High Pressure	1 High Pressure
60 Hz HP Pump, Type:	MSS 1540, 40 hp TEFC	MSS 2026, 60 hp TEFC	MSS 5532, 125 hp TEFC
50 Hz HP Pump, Type:	MSS 1547, 40 hp TEFC	MSS 2026, 60 hp TEFC	MSS 5532, 125 hp TEFC
Energy Recovery Booster			
Model:	HPB-20	HPB-20	HPB-40
Manufacturer:	FEDCO	FEDCO	FEDCO
Quantity:	1	1	1
Design Feed Flow Rate:	30 gpm (164 m ³ /d)	49 gpm (268 m ³ /d)	86 gpm (469 m ³ /d)
Membrane Elements and Housings			
Membranes Quantity:	8	16	28
Membrane Housing Style:	4 element long, 4 port	4 element long, 4 port	4 element long, 4 port
Banking Arrangement:	2, parallel	4, parallel	7, parallel
Cartridge Filtration			
Manufacturer: Cartridge Filter:	Veolia HF.RO.Zs 01-40-FSE	Veolia HF.RO.Zs 01-40-FSE	Veolia HF.RO.Zs 01-40-FSE
Filter Length:	40"	40"	40"
Filter Quantity:	1 per change out	2 per change out	4 per change out
Installation and Other Utility Requirements			
Inlet:	1.5" flange	2.0" flange	4.0" flange
Permeate:	1.0" flange	1.5" flange	3.0" flange
Concentrate:	1.5" flange	1.5" flange	3.0" flange
Inlet Water Pressure:	30 psig, minimum	30 psig, minimum	30 psig, minimum
Air Pressure:	100 psig, oil-free	100 psig, oil-free	100 psig, oil-free
Drain to be Sized for:	50 gpm (273 m ³ /d)	89 gpm (486 m ³ /d)	200 gpm (851 m ³ /d)
SeaPRO Skid Estimated Dimensions			
Equipment Skid			
Height:	80" (204 cm)	80" (204 cm)	102" (260 cm)
Width:	57" (145 cm)	57" (145 cm)	60" (153 cm)
Depth:	205" (521 cm)	205" (521 cm)	235" (597 cm)
Weight Estimate (Shipping):	3,300 lbs (1,500 kg)	4,300 lbs (1,953 kg)	6,190 lbs (2,811 kg)
Membranes			
Weight Estimate (Shipping):	280 lbs (128 kg)	560 lbs (255 kg)	980 lbs (445 kg)

SeaPRO Series

MODEL	SeaPRO-8	SeaPRO-16	SeaPRO-28 ¹
Overall			
Height:	80" (204 cm)	80" (204 cm)	102" (260 cm)
Width:	57" (145 cm)	57" (145 cm)	60" (153 cm)
Depth:	205" (521 cm)	205" (521 cm)	235" (597 cm)
Total Operating Weight:	4,235 lbs (1,923 kg)	4,860 lbs (2,207 kg)	8,730 lbs (3,964 kg)

¹ SeaPRO-28 is designed to be able to operate at up to 90 gpm of permeate (110 gpm concentrate, 200 gpm feed) with proper pretreatment.

Veolia Water Technologies

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SeaPRO* Series

FACT SHEET

Seawater Reverse Osmosis Desalination Systems
35,000 ppm TDS, 50 or 60 Hz, 100-300 gpm (545-1,635 m³/d)



SeaPRO-84

System Features

- Greater energy efficiency through use of pressure exchanger energy recovery technology
- Use of Veolia High Flow Z depth filters for faster and easier replacement
- Prefilter housings are on a separate skid for improved modularity and flexibility of placement
- High pressure pump shipped loose on a bedplate to enable more efficient layouts and framing
- Allen-Bradley PV+1000 Panel 10.4-inch color display with touchscreen controls
- Allen-Bradley CompactLogix PLC L33ER
- 4-20 mA instruments displayed on instrument center
- Variable frequency drive (VFD) for high pressure pump
- Automated valves and control to flush permeate to the feed upon shut down
- Skid mounted control enclosure



SeaPRO-42



SeaPRO-63



SeaPRO-126

Operating Parameters

Design Feed TDS	35,000 ppm
Maximum Recovery	45%
Nominal Rejection	97-99%
Operating Temperature	35 to 85°F (1.6 to 29.4°C)
Minimum Inlet Pressure	30 psig (2 Bar)
Design Temperature	77°F (25°C)

Instrumentation

Flow Meters.....	Permeate, concentrate, low pressure (LP) ERD inlet, high pressure (HP) ERD outlet
Conductivity.....	Permeate
pH.....	LP ERD inlet (feed)
Pressure Gauges.....	Pre-filter, post-filter, feed inlet to membrane pressure vessels, concentrate outlet from membrane pressure vessels, boost pump outlet, permeate, concentrate, LP ERD inlet, LP ERD outlet, HP ERD inlet, HP ERD outlet
Pressure Transmitters...	Feed inlet to membrane pressure vessels, concentrate outlet from membrane pressure vessels
Pressure Switches.....	High pressure pump feed, boost pump feed, permeate, concentrate
Temperature.....	Permeate
Instrument Center.....	Thornton M800

Materials of Construction

Frame	Siloxane coated carbon steel
Cartridge Filter	HF.RO.Zs 01-60, 1-micron nominal
Cartridge Filter Housing	HFRP1-60, Veolia FRP (fiber reinforced plastic) 60 inch single round high flow
Membrane Elements	Veolia AD-400
Membrane Housing	FRP
Low Pressure Pipe	Schedule 80 PVC
High Pressure Pipe	Duplex 2205
Enclosures	Main Enclosure: FRP, NEMA 4X VFD Enclosure: Motors ≤125 hp: NEMA 4X, plastic carbonate with stainless steel backplate Motors >125 hp: NEMA 4, powder coated carbon steel

Options Available

- Safety relief valves (ASME Compliance)
- Motor starter for boost pump
- Multi-media filters
- Clean-in-place (CIP) units
- Chemical feed systems
- Transfer pumps and storage tanks

Documentation Included

- Operation and maintenance manual
- Control narrative
- Drawings: piping and instrumentation, electrical, and general dimensional

SeaPRO Models

MODEL	SeaPRO-42	SeaPRO-63	SeaPRO-84	SeaPRO-126
Permeate rate:	100 gpm (545 m ³ /d)	150 gpm (818 m ³ /d)	200 gpm (1,090 m ³ /d)	300 gpm (1,635 m ³ /d)
Concentrate Rate:	123 gpm (671 m ³ /d)	184 gpm (1,003 m ³ /d)	245 gpm (1,336 m ³ /d)	367 gpm (2,001 m ³ /d)
Feed Rate:	223 gpm (1,216 m ³ /d)	334 gpm (1,821 m ³ /d)	445 gpm (2,426 m ³ /d)	667 gpm (3,636 m ³ /d)
Power Requirements				
Power and Control Circuit	Choice of: Power: 230/460 VAC, 3-phase, 60 Hz with Control Circuit: 120 VAC, 1-phase, 60 Hz Power: 380 VAC, 3-phase, 50 Hz with Control Circuit: 220 VAC, 1-phase, 50 Hz			
Pumps and Motors				
Manufacturer:	FEDCO	FEDCO	FEDCO	FEDCO
Quantity:	1 High Pressure, 1 Boost	1 High Pressure, 1 Boost	1 High Pressure, 1 Boost	1 High Pressure, 1 Boost
60 Hz HP Pump, Type:	MSS 3040, 100 hp TEFC	MSD 4020, 125 hp TEFC	MSD 4022, 200 hp TEFC	MSD 7016, 250 hp TEFC
60 Hz Boost Pump, Type:	MSS 2009, 15 hp TEFC	MSS 3004, 15 hp TEFC	MSS 5003, 15 hp TEFC	MSS 9003, 20 hp TEFC
50 Hz HP Pump, Type:	MSS 3040, 100 hp TEFC	MSD 4020, 125 hp TEFC	MSD 4022, 200 hp TEFC	MSD 7016, 250 hp TEFC
50 Hz Boost Pump, Type:	MSS 2009, 7.5 hp TEFC	MSS 3008, 15 hp TEFC	MSS 5005, 15 hp TEFC	MSS 9003, 20 hp TEFC
Energy Recovery Booster				
Model:	PX-140S	PX-220	PX-Q260	PX-220
Manufacturer:	ERI	ERI	ERI	ERI
Quantity:	1	1	1	2
Design Feed Flow Rate:	123 gpm (671 m ³ /d)	184 gpm (1,003 m ³ /d)	245 gpm (1,336 m ³ /d)	184 gpm (1,003 m ³ /d) each
Membrane Elements and Housings				
Membranes Quantity:	42	63	84	126
Membrane Housing Style:	7 element long, 4 port	7 element long, 4 port	7 element long, 4 port	7 element long, 4 port
Banking Arrangement:	6, parallel	9, parallel	12, parallel	18, parallel
Cartridge Filtration				
Manufacturer:	Veolia	Veolia	Veolia	Veolia
Cartridge Filter:	HF.RO.Zs 01-60-TSE	HF.RO.Zs 01-60-TSE	HF.RO.Zs 01-60-TSE	HF.RO.Zs 01-60-TSE
Filter Length:	60"	60"	60"	60"
Filter Quantity:	4 per change out	5 per change out	7 per change out	11 per change out
Installation and Other Utility Requirements				
Inlet:	4.0" flange	4.0" flange	6.0" flange	6.0" flange
Permeate:	3.0" flange	3.0" flange	3.0" flange	4.0" flange
Concentrate:	3.0" flange	3.0" flange	4.0" flange	6.0" flange
Inlet Water Pressure:	30 psig, minimum	30 psig, minimum	30 psig, minimum	30 psig, minimum
Air Pressure:	100 psig, oil-free	100 psig, oil-free	100 psig, oil-free	100 psig, oil-free
Drain to be Sized for:	223 gpm (1,216 m ³ /d)	334 gpm (1,821 m ³ /d)	445 gpm (2,426 m ³ /d)	667 gpm (3,636 m ³ /d)

Model	SeaPro-42	SeaPRO-63	SeaPRO-84	SeaPRO-126
SeaPRO Skid Estimated Dimensions				
Membrane/ERD Skid Height: Width: Depth: Weight Estimate (Shipping):	111" (282 cm) 62" (158 cm) 330" (837 cm) 13,120 lbs (5,952 kg)	97" (245 cm) 76" (194 cm) 330" (837 cm) 15,605 lbs (7,079 kg)	112" (284 cm) 76" (194 cm) 330" (837 cm) 19,830 lbs (8,995 kg)	112" (284 cm) 90" (229 cm) 330" (837 cm) 21,890 lbs (9,930 kg)
Prefilter Skid Height: Width: Depth: Weight Estimate (Shipping):	47" (118 cm) 46" (117 cm) 93" (235 cm) 1,040 lbs (476 kg)	59" (150 cm) 46" (117 cm) 93" (235 cm) 1,190 lbs (540 kg)	72" (182 cm) 50" (125 cm) 93" (235 cm) 1,455 lbs (660 kg)	97" (246 cm) 51" (128 cm) 94" (238 cm) 1,890 lbs (858 kg)
Pump Skid Height: Width: Depth: Weight Estimate (Shipping):	33" (89 cm) 23" (58 cm) 130" (331 cm) 1,805 lbs (820 kg)	36" (92 cm) 25" (64 cm) 130" (331 cm) 2,405 lbs (1,091 kg)	37" (93 cm) 27" (68 cm) 145" (369 cm) 3,495 lbs (1,586 kg)	30" (77 cm) 27" (68 cm) 140" (356 cm) 3,670 lbs (1,665 kg)
Membranes Weight Estimate (Shipping):	1,470 (668 kg)	2,200 (998 kg)	2,940 (1,334 kg)	4,410 (2,001 kg)
Overall Height: Width: Depth: Total Operating Weight:	111" (282 cm) 110" (280 cm) 487" (1,236 cm) 22,110 lbs (10,029 kg)	97" (245 cm) 124" (315 cm) 486" (1,233 cm) 27,340 lbs (12,402 kg)	112" (284 cm) 125" (318 cm) 502" (1,274 cm) 36,600 lbs (16,602 kg)	112" (284 cm) 139" (354 cm) 501" (1,273 cm) 41,915 lbs (19,013 kg)

AC Series

FACT SHEET

Very high rejection seawater RO elements

The AC Series, family of proprietary thin film reverse osmosis membrane elements, is characterized by an excellent sodium chloride rejection. AC Series is selected when high quality permeate is demanded from seawater that is relatively high in TDS.

AC Series new membrane chemistry provides excellent rejection characteristics when operated at seawater operating conditions (pressures exceeding 800psi (5,516kPa) and elevated temperatures).

Table 1: Element Specification

Membrane	A-series, thin-film membrane (TFM*)			
Model	Average Permeate Flow Gpd (m ³ /day) ⁽¹⁾⁽²⁾	Ave. NaCl Rejection ⁽¹⁾⁽²⁾	Min. NaCl Rejection ⁽²⁾	Min. Boron Rejection ⁽²⁾
AC-400, 34	5800 (21.9)	99.85%	99.5%	96.0%
AC-440	6400 (24.2)	99.85%	99.5%	96.0%

⁽¹⁾ Average salt rejection after 24 hours of operation. Individual flow rate may vary ±20%.

⁽²⁾ Testing conditions: 32,000mg/l NaCl & 5mg/l Boron solution at 800psi (5,516kPa) operating pressure, 77°F (25°C), pH 8.0 and 7% recovery.

Model	Active Area ft ² (m ²)	Outer Wrap	Part Number
AC-400, 34	400 (37.2)	Fiberglass	3154588
AC-440	440 (40.9)	Fiberglass	3157144

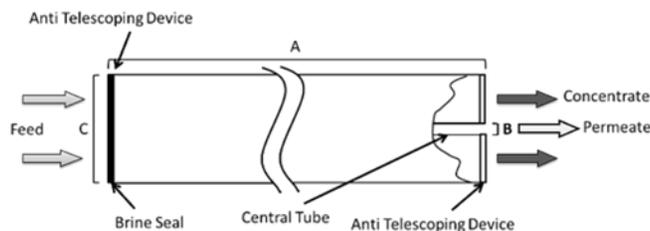


Figure 1: Element Dimensions Diagram – Female

Veolia Water Technologies

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Table 2: Operating and CIP Parameters

Typical Operating Pressure	800psi (5,516kPa)
Typical Operating Flux	7-11GFD (12-19LMH)
Maximum Operating Pressure	1,200psi (8,274kPa)
Maximum Temperature	Continuous operation: 122°F (50°C) Clean-In-Place (CIP): 122°F (50°C)
pH range	Optimum rejection pH: 7.0-7.5, Continuous operation: 2.0-11.0, Clean-In-Place (CIP): 1.0 – 12.0 ⁽¹⁾
Maximum Pressure Drop	Over an element: 15 psi (103 kPa) Per housing: 50 psi (345 kPa)
Chlorine Tolerance	1,000+ ppm-hours, dechlorination recommended
Feedwater	NTU < 1 SDI ₁₅ < 5

⁽¹⁾ Refer to Cleaning Guidelines Technical Bulletin TB1194.

Table 3: Dimensions and Weights

Model	Type	Dimensions, inches (cm)			Boxed
		A	B	C	Weight lbs (kg)
AC-400, 34	Female	40.0 (101.6)	1.125 (2.86)	7.9 (20.1)	35 (16)
AC-440	Female	40.0 (101.6)	1.125 (2.86)	7.9 (20.1)	35 (16)

AE Series

FACT SHEET

High rejection low energy seawater RO elements

The AE series of proprietary thin film reverse osmosis elements are characterized by an excellent sodium chloride rejection. AE series is selected when high quality permeate is demanded from seawater that is relatively high in TDS.

AE series membrane chemistry provides excellent rejection characteristics when operated at seawater operating conditions (pressures exceeding 800psi (5,516kPa)).

Table 1: Element Specification

Membrane	Thin-film membrane (TFM)			
Model	Average permeate flow GPD (m ³ /day) ^{(1) (2)}	Ave. NaCl rejection ^{(1) (2)}	Min. NaCl rejection ^{(1) (2)}	Min. Boron Rejection ⁽²⁾
AE-90	1875 (7.1)	99.8%	99.5%	92.0%
AE-400, 34	9000 (34.1)	99.8%	99.5%	92.0%
AE-440	9900 (37.5)	99.8%	99.5%	92.0%

(1) Average salt rejection after 24 hours of operation. Individual flow rate may vary ±20%.

(2) Testing conditions: 32,000mg/l NaCl & 5mg/l Boron solution at 800psi (5,516kPa) operating pressure, 77°F (25°C), pH 8.0 and 10% recovery.

Table 2: Element Properties (3)

Model	Active area ft ² (m ²)	Outer wrap	Part number
AE-90	90 (8.4)	Fiberglass	3056660
AE-400, 34	400 (37.2)	Fiberglass	3056662
AE-440	440 (40.9)	Fiberglass	3056663

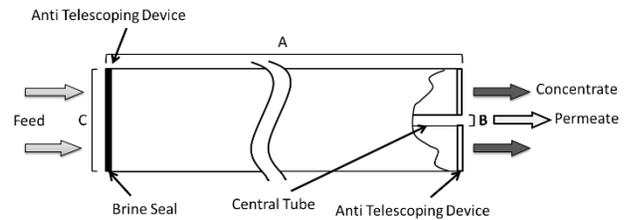


Figure 1: Element Dimensions Diagram – Female

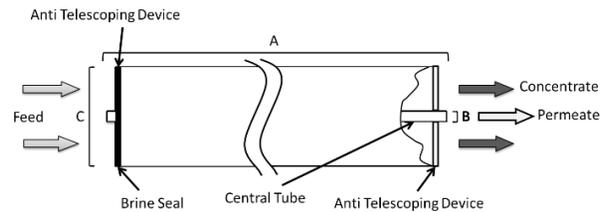


Figure 2: Element Dimensions Diagram – Male

Table 3: Dimensions and Weights (3)

Model	Type	Dimensions, inches (cm)			Boxed Weight lbs (kg)
		A	B	C	
AE-90	Male	40.0 (101.6)	0.75 (1.90)	3.9 (9.9)	9 (4)
AE-400, 34	Female	40.0 (101.6)	1.125 (2.86)	7.9 (20.1)	35 (16)
AE-440	Female	40.0 (101.6)	1.125 (2.86)	7.9 (20.1)	35 (16)

Table 4: Operating and CIP Parameters (3)

Typical Operating Pressure	800psi (5,516kPa)
Typical Operating Flux	7-11GFD (12-19LMH)
Maximum Operating Pressure	1,200psi (8,274kPa)
Maximum Temperature	Continuous operation: 122°F (50°C) Clean-In-Place (CIP): 122°F (50°C)
pH range	Optimum rejection pH: 7.0-7.5, Continuous operation: 2.0-11.0, Clean-In-Place (CIP): 1.0 – 12.0 (4)
Maximum Pressure Drop	Over an element: 15 psi (103 kPa) Per housing: 50 psi (345 kPa)
Chlorine Tolerance	1,000+ ppm-hours, dechlorination recommended
Feedwater	NTU < 1 SDI ₁₅ < 5

(3) Element properties and parameters are indicative numbers. Specific values by element may vary within normal element manufacturing tolerances.

(4) Refer to Cleaning Guidelines Technical Bulletin TB1194.

AE LE Series

FACT SHEET

Ultra-low energy seawater RO elements

The AE LE series of ultra-low energy seawater reverse osmosis elements are an evolution of the AE Series elements but were designed with a membrane that provides even lower energy consumption while maintaining high rejection. The AE LE series is selected when reducing energy costs is a primary objective.

Due to the ultra-low energy capability of the AE LE Series and its relative lower operating pressure, specifications are given at 600 psi (4,137 kPa) but reference is also made to 800 psi (5,516 kPa) performance.

Table 1a: Element Specification at 600 psi (4,137 kPa)

Membrane		Thin-film membrane (TFM)		
Model	Average Permeate Flow GPD (m ³ /day) ^{(1) (2)}	Average NaCl Rejection ^{(1) (2)}	Minimum NaCl Rejection ^{(1) (2)}	Typical Boron Rejection ⁽²⁾
AE-400 LE	6,100 (23.1)	99.6%	99.3%	84%
AE-440 LE	6,700 (25.4)	99.6%	99.3%	84%

(1) Average salt rejection after 24 hours of operation. Individual flow rate may vary ±20%.

(2) Testing conditions: 32,000 mg/l NaCl & 5 mg/l Boron solution at 600 psi (4,137 kPa) operating pressure, 77°F (25°C), pH 8.0 and 10% recovery.

Table 1b: Reference Performance at 800 psi (5,516 kPa)

Model	Average Permeate Flow GPD (m ³ /day) ^{(3) (4)}	Average NaCl Rejection ^{(3) (4)}	Minimum NaCl Rejection ^{(3) (4)}	Typical Boron Rejection ⁽⁴⁾
AE-400 LE	12,100 (45.8)	99.8%	99.6%	90%
AE-440 LE	13,000 (49.2)	99.8%	99.6%	90%

(3) Average salt rejection after 24 hours of operation. Individual flow rate may vary ±20%.

(4) Testing conditions: 32,000 mg/l NaCl & 5 mg/l Boron solution at 800 psi (5,516 kPa) operating pressure, 77°F (25°C), pH 8.0 and 10% recovery.

Table 2: Element Properties (5)

Model	Active Area ft ² (m ²)	Outer Wrap	Part Number
AE-400 LE	400 (37.2)	Fiberglass	3209384
AE-440 LE	440 (40.9)	Fiberglass	3209385

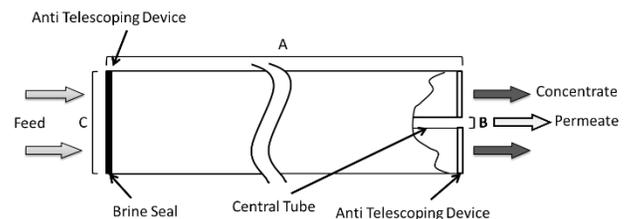


Figure 1: Element Dimensions Diagram – Female

Table 3: Dimensions and Weights (5)

Model	Type	Dimensions, inches (cm)			Boxed Weight lbs (kg)
		A	B	C	
AE-400 LE	Female	40.0 (101.6)	1.125 (2.86)	7.9 (20.1)	35 (16)
AE-440 LE	Female	40.0 (101.6)	1.125 (2.86)	7.9 (20.1)	35 (16)

Table 4: Operating and CIP Parameters (5)

Typical Operating Pressure	800 psi (5,516 kPa)
Typical Operating Flux	7-11 GFD (12-19 LMH)
Maximum Operating Pressure	1,200 psi (8,274 kPa)
Maximum Temperature	Continuous operation: 122°F (50°C) Clean-In-Place (CIP): 122°F (50°C)
pH Range	Optimum rejection pH: 7.0-7.5 Continuous operation: 2.0-11.0 Clean-In-Place (CIP): 1.0 – 12.0 (6)
Maximum Pressure Drop	Over an element: 15 psi (103 kPa) Per housing: 50 psi (345 kPa)
Chlorine Tolerance	1,000+ ppm-hours, dechlorination recommended
Feedwater	NTU < 1 SDI ₁₅ < 5

(5) Element properties and parameters are indicative numbers. Specific values by element may vary within normal element manufacturing tolerances.

(6) Refer to Cleaning Guidelines Technical Bulletin TB1194.