ATTACHMENT 4

BUDGET AND SUPPORTING DOCUMENTS

City of
Santa Monica®

Budget

The enclosed project budget was based on staff research, conversations with vendors, preliminary cost estimates, standard engineering construction references, and the City's experience in building similar improvement projects such as the City's Arcadia reverse osmosis water treatment facility.

DWR WATER-ENERGY GRANT PROGRAM
APPLICATION BUDGET SUMMARY

Applicant: City of Santa Monica
Project: City of Santa Monica Water-Energy Project

	Requested Grant	Local Match	Other Funding	Total	% Local Match
1. Direct Project Administration Costs	**$61,800**	**$21,600**	**$0**	**$83,400**	**26%**
Professional/Consultant Resources (eng.)	$61,800	$21,600	$0	$83,400	
				$0	
2. Planning/Design/Engineering/ Environmental	**$146,400**	**$51,400**	**$0**	**$197,800**	**26%**
Design/Schedule Prep/Planning, Consultant Design Resources (eng.)	$146,400	$51,400		$197,800	
				$0	
3. Construction/Implementation	**$231,610**	**$80,000**	**$0**	**$311,610**	**26%**
Professional Resources, Legal, Site Prep, Traffic Control, Consultant Resources (eng.)	$231,610	$80,000		$311,610	
				$0	
4. Equipment	**$1,443,560**	**$481,185**	**$0**	**$1,924,745**	**25%**
80K Gal Retention Tanks, Filter, 25-HP Pump Transfer, Extraction Well Pump/Control Box, Fencing, Poly Mats, Solar Panels, Angle-Drilled Well, BWRO Container, Crane, Pretreatment Modules, Misc. Equipment/Piping	$1,443,560	$481,185		$1,924,745	
				$0	
5. Monitoring/Performance	**$62,400**	**$21,000**	**$0**	**$83,400**	**25%**
Professional Resources		$21,000		$21,000	
Consultant Resources (eng.)	$62,400			$62,400	
				$0	
6. Education/Outreach	**$35,000**	**$12,000**	**$0**	**$47,000**	**26%**
Professional Resources, Consultant Resources (eng./graphics)	$35,000	$12,000		$47,000	
				$0	
Grand Total:	**$1,980,770**	**$667,185**	**$0**	**$2,647,955**	**25%**

Other Funding Sources: None at this time.

Does the Budget Summary Total match the Budget Details Total? **YES**

DWR WATER-ENERGY GRANT PROGRAM
APPLICATION BUDGET DETAILS

Applicant: City of Santa Monica
Project: City of Santa Monica Water-Energy Project

Budget Category	Percent of Cost	Discipline/Consultant/ Description	Labor Costs			Consulting/Materials/Equipment				TOTALS
			Rate	# of Hours	Total Labor	Unit Cost	Units	# of Units	Total Cost	
1. Direct Project Administration Costs	**3.1%**									**$83,400**
Professional Resources (CSM)			$200.00	108	$21,600				$0	$21,600
Consultant Resources (eng.)			$200.00	309	$61,800				$0	$61,800
2. Planning/Design/Engineering/ Environmental	**7.5%**									**$197,800**
Design/Schedule Prep/Planning (CSM)			$200.00	257	$51,400				$0	$51,400
Consultant Design Resources (eng.)			$200.00	732	$146,400			1	$0	$146,400
3. Construction/Implementation	**11.8%**									**$311,610**
Professional Resources (CSM)			$200.00	400	$80,000				$0	$80,000
Legal			$200.00	190.8	$38,160				$0	$38,160
Site Prep					$0	$53,000		1	$53,000	$53,000
Traffic Control					$0	$2,650		1	$2,650	$2,650
Consultant Resources (eng.)			$200.00	689	$137,800				$0	$137,800
4. Equipment	**72.7%**									**$1,924,745**
80K Gallon Retention Tanks					$0	$52,000		1	$52,000	$52,000
Filter					$0	$15,600		1	$15,600	$15,600
25-HP Pump Transfer					$0	$3,000		1	$3,000	$3,000
Extraction Well Pump/Control Box					$0	$31,000		1	$31,000	$31,000
Fencing					$0	$10,250		1	$10,250	$10,250
Poly Mats Installed					$0	$73,110		1	$73,110	$73,110
Solar Panel/Equipment/Install					$0	$257,850		1	$257,850	$257,850
Angle-Drilled Well					$0	$731,050		1	$731,050	$731,050
BWRO Container					$0	$678,850		1	$678,850	$678,850
Crane					$0	$3,655		2	$7,310	$7,310
Pretreatment Modules					$0	$52,225		1	$52,225	$52,225
Misc. Ancillary Equipment/Piping, Fittings, etc.					$0	$12,500		1	$12,500	$12,500
5. Monitoring/Performance	**3.1%**									**$83,400**
Professional Resources (CSM)			$200.00	105	$21,000				$0	$21,000
Consultant Resources (eng.)			$200.00	312	$62,400				$0	$62,400
6. Education/Outreach	**1.8%**									**$47,000**
Professional Resources (CSM)			$200.00	60	$12,000				$0	$12,000
Consultant Resources (eng./graphics)			$200.00	175	$35,000				$0	$35,000
Grand Total:	**100%**									**$2,647,955**

Does the Budget Summary Total match the Budget Details Total? **YES**

Chris Aguillon

From: Garrett T. Wong
Sent: Tuesday, November 18, 2014 3:18 PM
To: Tom Watson; Chris Aguillon; George Rodriguez
Subject: FW: SMURRF Solar Potential
Attachments: SMURRF Site A1.pdf

From: Drew Lowell-Britt [mailto:dlowell-britt@ecomotion.us]
Sent: November 18, 2014 12:18 PM
To: Garrett T. Wong
Cc: 'Michael Ware'
Subject: RE: SMURRF Solar Potential

Dear Garrett,

This site is basically in the sand! I'm thinking extra robust supports and over-engineering for this site.

Site A1 – Shade structure	500 sf
SunPower 327W panel	18.2 sq ft each
Maximum number of panels	27
Solar system size	8.83 kW DC (7.77 kW AC)
Annual kWh production	12,560 kWh
Equipment Cost Estimate ($5.50/watt)	$48,565
Installation Cost Estimate ($4.00/watt)	$35,320
Total Gross Cost ($9.50/watt)	$83,885

Drew Lowell-Britt, LEED Green Associate
Energy Specialist
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Find us on facebook

From: Drew Lowell-Britt [mailto:dlowell-britt@ecomotion.us]
Sent: Friday, November 07, 2014 3:26 PM
To: 'Garrett T. Wong'
Cc: 'Michael Ware'
Subject: SMURRF Solar Potential

Dear Garrett,

Good afternoon on Friday – below are estimates for SMURRF Sites A-E.

Site A – Ground mount	300 sf
SunPower 327W panel	18.2 sq ft each
Maximum number of panels	16
Solar system size	5.232 kW DC (4.757 kW AC)
Annual kWh production	7,916 kWh
Equipment Cost Estimate ($1.25/watt)	$6,540
Installation Cost Estimate ($2.25/watt)	$11,772
Total Gross Cost ($3.50/watt)	$18,312

Site B - Carport	1,250 sf
SunPower 327W panel	18.2 sq ft each
Maximum number of panels	68
Solar system size	22.236 kW DC (20.218 kW AC)
Annual kWh production	32,335 kWh
Equipment Cost Estimate ($3.50/watt)	$77,826
Installation Cost Estimate ($3.00/watt)	$66,708
Total Gross Cost ($6.50/watt)	$144,534

Site C – Shade structure	625 sf
SunPower 327W panel	18.2 sq ft each
Maximum number of panels	34
Solar system size	11.12 kW DC (10.11 kW AC)
Annual kWh production	16,167 kWh
Equipment Cost Estimate ($3.50/watt)	$38,920
Installation Cost Estimate ($3.00/watt)	$33,360
Total Gross Cost ($6.50/watt)	$72,280

Site D – Rooftop	900 sf
SunPower 327W panel	18.2 sq ft each
Maximum number of panels	49
Solar system size	16.02 kW DC (14.57 kW AC)
Annual kWh production	24,242 kWh
Equipment Cost Estimate ($1.25/watt)	$20,025
Installation Cost Estimate ($2.25/watt)	$36,045
Total Gross Cost ($3.50/watt)	$56,070

Site E - Carport	650 sf
SunPower 327W panel	18.2 sq ft each
Maximum number of panels	35
Solar system size	11.44 kW DC (10.41 kW AC)
Annual kWh production	16,643 kWh
Equipment Cost Estimate ($3.50/watt)	$40,040
Installation Cost Estimate ($3.00/watt)	$34,320
Total Gross Cost ($6.50/watt)	$74,360

I used the California Solar Initiative calculator to calculate production - attached are the reports.

Nanofiltration Specifications

HYDRACoRe™

Test Conditions

NaCl Solution, PPM ..... .500
Applied Pressure, psig (MPa) ..... .75 (0.52)
Operating Temperature, °F (°C) ..... .77° (25°)
Permeate Recovery ..... .15%
Feed pH 6.5

Application Data

Maximum Applied Pressure, psig (MPa) 600 (4.14)
Maximum Feed Flow, GPM (m^3/h) 75 (17.0)
Maximum Operating Temperature, °F (°C) ..... .104° (40°)
Feedwater pH Range ..... .2.0 - 11.0
Maximum Feedwater Turbidity, NTU 1.0
Maximum Feedwater SDI (15 mins) 5.0
Maximum Continuous Chlorine Concentration, PPM .... .10
Maximum Chlorine Concentration for Cleaning, PPM .. .100
Maximum Pressure Drop for Each Element, psig ..... .10

Element Performance

Element Type	Min. Salt Rej.,%	Nom. Salt Rej.†,%	MWCO*, Daltons**	Permeate Flow, GPD	(m^3/d)
HYDRACoRe 50	50.0	35.0	1,000	8,200	(31.0)

† Typical rejection for brackish water

* Molecular Weight Cut-Off measurement based on Cytochrome C

** Salt rejection of this membrane varies significantly depending on concentration, pressure and ion species. Contact Hydranautics' technical support for more information.

Selected Project References for Hydranautics' HydraCoRe Membranes

Irvine Ranch, California ..... 7.35 MGD (27,800 m^3/d) of potable water from a ground water source

ESNA

Test Conditions

NaCl Solution, PPM ..... .500
$CaCl_2$ Solution ESNA1-LF, PPM ..... .500
Applied Pressure, psig (MPa) ..... .75 (0.52)
Operating Temperature, °F (°C) ..... .77° (25°)
Permeate Recovery ..... .15%
pH Range ..... .6.5 - 7.0

Application Data

Maximum Applied Pressure, psig (MPa) 600 (4.14)
Maximum Feed Flow, GPM (m^3/h) .....
..... .4040-16(3.6), 8-inch -75(17.0)
Maximum Operating Temperature, °F (°C) ..... .113° (45°)
Feedwater pH Range ..... .3.0 - 10.0
Maximum Feedwater Turbidity, NTU 1.0
Maximum Feedwater SDI (15 mins) 5.0
Maximum Chlorine Concentration, PPM ..... <0.1
Maximum Ratio of Concentrate to Permeate Flow .....
..... .for Any Element, 5:1
Maximum Pressure Drop for Each Element, psig ..... .10
Feed TOC, PPM ..... <3
Feed TOC ESNA1-LF, PPM ..... <30

Element Performance

Element Type	Min. Salt Rej.,%	Nom. Salt Rej.,%	Typical Rej. Brackish Water	Permeate Flow, GPD	(m^3/d)
ESNA1-LF	73.0	80.0	96.0	7,500	(28.0)
ESNA1-LF2	70.0	77.0	93.0	8,300	(30.9)

Selected Project References for Hydranautics' ESNA Membranes

Hollywood, Florida .... 18 MGD (68,000 m^3/d) of potable water from a well water source

Collier County, Florida .. 12 MGD (45,500 m^3/d) of potable water from a well water source

City of Fort Myers, Florida .... 12 MGD (45,400 m^3/d) of potable water from a well water source

Hydranautics Corporate: 401 Jones Road, Oceanside, CA 92054
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HYDRANAUTICS
A Nitto Denko Company
www.membranes.com

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0703/2M

'TORAY'
Innovation by Chemistry

Standard BWRO

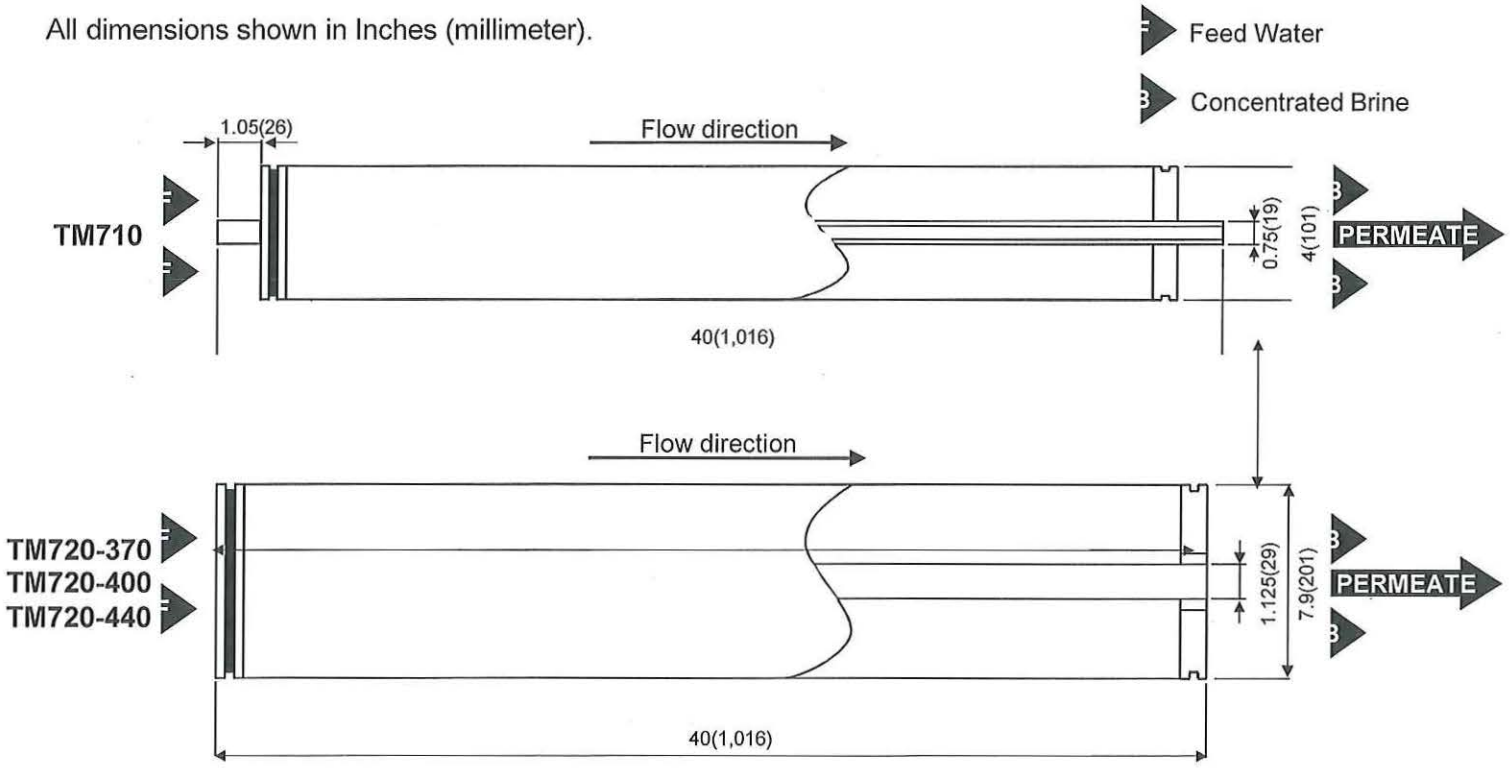
TM700

Type	Diameter Inch	Membrane Area $ft^2(m^2)$	Salt Rejection %	Product Flow Rate $gpd(m^3/d)$	Feed Spacer Thickness mil
TM710	4"	87(8)	99.7	2,400(9.1)	31
TM720-370	8"	370(34)	99.7	9,500(36.0)	31
TM720-400	8"	400(37)	99.7	10,200(38.6)	31
TM720-440	8"	440(41)	99.7	11,300(42.6)	28

1. Membrane Type		Cross Linked Fully Aromatic Polyamide Composite
2. Test Conditions	Feed Water Pressure Feed Water Temperature Feed Water Concentration Recovery Rate Feed Water pH	225 psi(1.55MPa) 77° F(25°C) 2,000 mg/l Nacl 15% 7
3. Minimum Salt Rejection		99.0%
4. Minimum Product Flow Rate		2,000gpd(7.6m³/d)(TM710) 7,500gpd(28.4m³/d)(TM720-370) 8,200gpd(31.0m³/d)(TM720-400) 9,000gpd(34.1m³/d)(TM720-440)

Dimensions

All dimensions shown in Inches (millimeter).



Operating Limits

Maximum Operating Pressure	600psi (4.1 MPa)
Maximum Feed Water Temperature	113° F (45°C)
Maximum Feed Water SDI_{15}	5
Feed Water Chlorine Concentration	Not Detectable
Feed Water pH Range, Continuous Operation	2-11
Feed Water pH Range, Chemical Cleaning	1-12
Maximum Pressure Drop per Element	15 psi (0.10 MPa)
Maximum Pressure Drop per Vessel	50 psi (0.34 MPa)

Operating Information

1. For the recommended design range, please consult the latest Toray technical bulletin, design guide lines, computer design program, and/ or call an application specialist. If the operating limits given in this Product Information Bulletin are not strictly followed, the Limited Warranty will be null and void.
2. All elements are wet tested, treated with a 1% by weight percent sodium bisulfite storage solution, and then vacuum packed in oxygen barrier bags, or treated with tested feed water solution, and then vacuum packed in oxygen barrier bags with deoxidant inside. To prevent biological growth during short term storage, shipment, or system shutdown, it is recommended that Toray elements be immersed in a protective solution containing 500 - 1,000 ppm of sodium bisulfite (food grade) dissolved in permeate.
3. The presence of free chlorine and other oxidizing agents under certain conditions, such as heavy metals which acts as oxidation catalyst in the feed water will cause unexpected oxidation of the membrane. It is strongly recommended to remove these oxidizing agents contained in feed water before operating 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.

Notice

1. 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.
2. All data may change without prior notice, due to technical modifications or production changes.

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JUL. 2014

DOW FILMTEC™ Membranes

DOW FILMTEC Extra Low Energy (XLE) Elements for Commercial Systems

Features

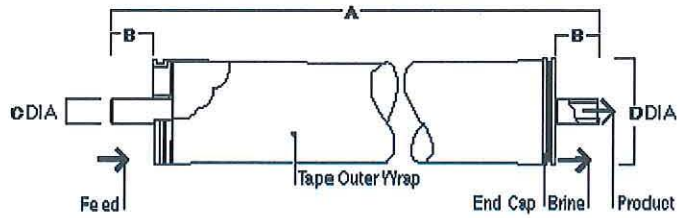
New DOW FILMTEC™ XLE elements offer better system performance and economics by operating at very low applied pressure. XLE membrane, made with a patented technology, provides consistent and reliable system performance. And for added convenience, XLE elements are available in a dry state for rapid start-up (see Figure 1 on reverse). The new XLE series of elements replaces TW30LE elements which were made with an older membrane technology.

Product Specifications

Product	Part Number	Applied Pressure psig (bar)	Permeate Flow Rate gpd (m^3/d)	Stabilized Salt Rejection (%)
XLE-2521	154530	100 (6.9)	365 (1.4)	99.0
XLE-2540	154543	100 (6.9)	850 (3.2)	99.0
XLE-4021	154540	100 (6.9)	1,025 (3.9)	99.0
XLE-4040	154546	100 (6.9)	2,600 (9.8)	99.0

1. Permeate flow and salt rejection based on the following test conditions: 500 ppm NaCl feedstream, pressure specified above, 77°F (25°C) and the following recovery rates: XLE-2521, XLE-4021 – 8%; XLE-2540, XLE-4040 – 15%.
2. Permeate flows for individual elements may vary +/-20%.
3. For the purpose of improvement, specifications may be updated periodically.

Figure 1



FilmTec sells coupler part number 89255 for use in multiple element housings. Each coupler includes two 2-210 EPR o-rings, FilmTec part number 89256.

Product	Maximum Feed Flow Rate gpm (m^3/h)	Dimensions – Inches (mm) A	B	C	D
XLE-2521	6 (1.4)	21.0 (533)	1.19 (30.2)	0.75 (19)	2.4 (61)
XLE-2540	6 (1.4)	40.0 (1,016)	1.19 (30.2)	0.75 (19)	2.4 (61)
XLE-4021	14 (3.2)	21.0 (533)	1.05 (26.7)	0.75 (19)	3.9 (99)
XLE-4040	14 (3.2)	40.0 (1,016)	1.05 (26.7)	0.75 (19)	3.9 (99)

1. Refer to DOW FILMTEC Design Guidelines for multiple-element systems. 1 inch = 25.4 mm
2. XLE-2521 and XLE-2540 elements fit nominal 2.5-inch I.D. pressure vessel. XLE-4021 and XLE-4040 elements fit nominal 4-inch I.D. pressure vessel.

Operating Limits

- Membrane Type — Polyamide Thin-Film Composite
- Maximum Operating Temperature[a] — 113°F (45°C)
- Maximum Operating Pressure — 600 psi (41 bar)
- Maximum Pressure Drop — 13 psig (0.9 bar)
- pH Range, Continuous Operation[a] — 2 - 11
- pH Range, Short-Term Cleaning[b] — 1 - 13
- Maximum Feed Silt Density Index — SDI 5
- Free Chlorine Tolerance[c] — <0.1 ppm

[a] Maximum temperature for continuous operation above pH 10 is 95°F (35°C).
[b] Refer to Cleaning Guidelines in specification sheet 609-23010.
[c] Under certain conditions, the presence of free chlorine and other oxidizing agents will cause premature membrane failure. Since oxidation damage is not covered under warranty, DOW FILMTEC recommends removing residual free chlorine by pretreatment prior to membrane exposure. Please refer to technical bulletin 609-22010 for more information.

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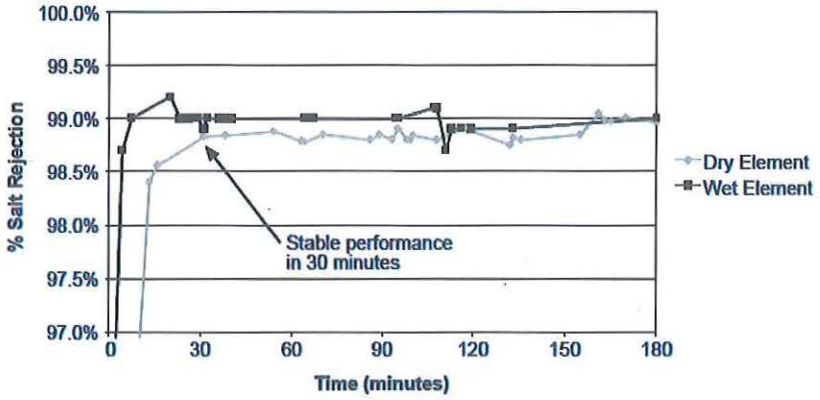
Figure 1. XLE-4040 start-up data



Important Information

Proper start-up of reverse osmosis water treatment systems is essential to prepare the membranes for operating service and to prevent membrane damage due to overfeeding or hydraulic shock. Following the proper start-up sequence also helps ensure that system operating parameters conform to design specifications so that system water quality and productivity goals can be achieved.

Before initiating system start-up procedures, membrane pretreatment, loading of the membrane elements, instrument calibration and other system checks should be completed.

Please refer to the application information literature entitled "Start-Up Sequence" (Form No. 609-02077) for more information.

Operation Guidelines

Avoid any abrupt pressure or cross-flow variations on the spiral elements during start-up, shutdown, cleaning or other sequences to prevent possible membrane damage. During start-up, a gradual change from a standstill to operating state is recommended as follows:

- Feed pressure should be increased gradually over a 30-60 second time frame.
- Cross-flow velocity at set operating point should be achieved gradually over 15-20 seconds.
- Permeate obtained from first hour of operation should be discarded.

General Information

- Keep elements moist at all times after initial wetting.
- If operating limits and guidelines given in this bulletin are not strictly followed, the limited warranty will be null and void.
- To prevent biological growth during prolonged system shutdowns, it is recommended that membrane elements be immersed in a preservative solution.
- The customer is fully responsible for the effects of incompatible chemicals and lubricants on elements.
- Maximum pressure drop across an entire pressure vessel (housing) is 30 psi (2.1 bar).
- Avoid static permeate-side backpressure at all times.

DOW FILMTEC™ Membranes
For more information about DOW FILMTEC membranes, call the Dow Water & Process Solutions business:

North America:	1-800-447-4369
Latin America:	(+55) 11-5188-9222
Europe:	800-3-694-6367
Italy:	800 783 825
South Africa:	0800 99 5078
Pacific:	800 7776 7776
China:	+400 889-0789

www.dowwaterandprocess.com

Notice: The use of this product in and of itself does not necessarily guarantee the removal of cysts and pathogens from water. Effective cyst and pathogen reduction is dependent on the complete system design and on the operation and maintenance of the system.

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Form No. 609-00349-0512

Product Information

DOW™ FILMTEC™ Membranes

DOW™ FILMTEC SW30XLE-440*i* Seawater Reverse Osmosis Element with *iLEC* Interlocking Endcaps

Features

Dow Water & Process Solutions offers various premium seawater reverse osmosis (RO) elements designed to reduce capital and operation cost of desalination systems. DOW™ FILMTEC™ products combine excellent membrane quality with automated precision fabrication which takes system performance to unprecedented levels.

DOW™ FILMTEC™ SW30XLE-440*i* offers medium salinity and medium temperature feed waters an advanced combination of high productivity and high rejection through extra-low energy consumption and single-pass design. It is also an ideal choice for two-pass seawater designs or high salinity brackish water applications. The combination of highest active area and thickest feed spacer of the Dow FILMTEC membranes results in higher productivity and lower cleaning frequency which enable sustainable lower lifecycle cost. Benefits of SW30XLE-440*i* include:

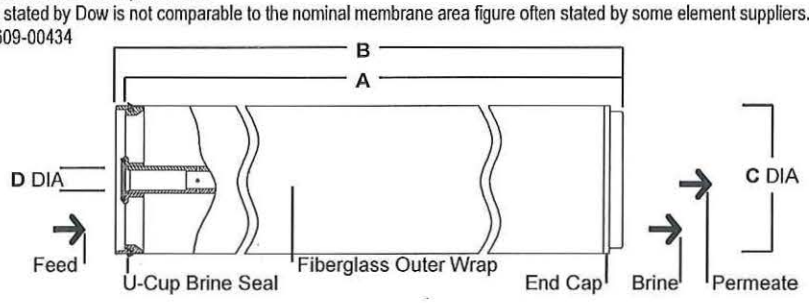
- Active area of 440 sq. ft., enables systems to be designed to deliver the lowest total cost of water by optimizing energy consumption, system productivity and operating flux.
- The highest guaranteed active area of 440 ft^2 (41 m^2) permits lowest system capital cost by maximizing productivity and enables accurate and predictable system design and operating flux.
- The combination of highest active area with thickest feed spacer (28 mil) allows low cleaning frequency and high cleaning efficiency.
- Utilization of the distinct *iLEC*™ interlocking endcaps help reduce system operating costs and reduce the risk of o-ring leaks that can cause poor water quality (See Form No. 609-00446 for information on cost-saving benefits).
- Sustainable high performance over the operating lifetime, because oxidative treatments are not used in membrane production. This is one reason DOW FILMTEC elements are more durable and may be cleaned more effectively over a wider pH range (1-13) than most other RO elements, which use oxidative treatments.
- Can effectively be used in permeate staged seawater desalination systems without impairing the performance of the downstream stage.

Product Specifications

Product	Part number	Active area ft^2 (m^2)	Maximum operating pressure psig (bar)	Permeate flow rate gpd (m^3/d)	Stabilized boron rejection %	Minimum salt rejection %	Stabilized salt rejection %
SW30XLE-440*i*	335156	440 (41)	1,200 (83)	9,900	91.5	99.55	99.8

1. The above values are normalized to the following conditions: 32,000 ppm NaCl, 5 ppm Boron, 800 psi (5.5 MPa), 77°F (25°C), pH 8, 8% recovery.
2. Permeate flows for individual elements may vary +/-15%.
3. Product specifications may vary slightly as improvements are implemented.
4. Active area guaranteed +/-5%. Active area as stated by Dow is not comparable to the nominal membrane area figure often stated by some element suppliers. Measurement method described in Form No. 609-00434

Figure 1



Product	Feed spacer (mil)	Dimensions – inches (mm) A	B	C	D
SW30XLE-440*i*	28	40 (1,016)	40.5 (1,029)	7.9 (201)	1.125 (29)

1 inch = 25.4 mm

1. Refer to Dow Design Guidelines for multiple-element systems.
2. Elements fit nominal 8-inch (203 mm) I.D. pressure vessel.
3. Individual *iLEC* elements measure 40.5 inches (1,029 mm) in length (B). The net length (A) of *iLEC* elements when connected is 40 inches (1,016 mm).

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Operating Limits

• Membrane Type	Polyamide Thin-Film Composite
• Maximum Operating Temperature[a]	113°F (45°C)
• Maximum Element Pressure Drop	15 psig (1.0 bar)
• pH Range, Continuous Operation[a]	2 - 11
• pH Range, Short-Term Cleaning (30 min.)[b]	1 - 13
• Maximum Feed Silt Density Index (SDI)	SDI 5
• Free Chlorine Tolerance[c]	<0.1 ppm

a. Maximum temperature for continuous operation above pH 10 is 95°F (35°C).

b. Refer to Cleaning Guidelines in specification sheet 609-23010.

c. Under certain conditions, the presence of free chlorine and other oxidizing agents will cause premature membrane failure. Since oxidation damage is not covered under warranty. Dow recommends removing residual free chlorine by pretreatment prior to membrane exposure. Please refer to technical bulletin 609-22010 for more information.

Important Information

Proper start-up of reverse osmosis water treatment systems is essential to prepare the membranes for operating service and to prevent membrane damage due to overfeeding or hydraulic shock. Following the proper start-up sequence also helps ensure that system operating parameters conform to design specifications so that system water quality and productivity goals can be achieved.

Before initiating system start-up procedures, membrane pretreatment, loading of the membrane elements, instrument calibration and other system checks should be completed.

Please refer to the application information literature entitled "Start-Up Sequence" (Form No. 609-02077) for more information.

Operation Guidelines

Avoid any abrupt pressure or cross-flow variations on the spiral elements during start-up, shutdown, cleaning or other sequences to prevent possible membrane damage. During start-up, a gradual change from a standstill to operating state is recommended as follows:

- Feed pressure should be increased gradually over a 30-60 second time frame.
- Cross-flow velocity at set operating point should be achieved gradually over 15-20 seconds.
- Permeate obtained from first hour of operation should be discarded.

Please refer to the product technical manual.

General Information

- Keep elements moist at all times after initial wetting.
- If operating limits and guidelines given in this bulletin are not strictly followed, the limited warranty will be null and void.
- To prevent biological growth during prolonged system shutdowns, it is recommended that membrane elements be immersed in a preservative solution.
- The customer is fully responsible for the effects of incompatible chemicals and lubricants on elements.
- Maximum pressure drop across an entire pressure vessel (housing) is 50 psi (3.4 bar).
- Avoid static permeate-side backpressure at all times.

DOW™ FILMTEC™ Membranes
For more information about DOW FILMTEC membranes, call the Dow Water & Process Solutions business:
North America: 1-800-447-4369
Latin America: (+55) 11-5188-9222
Europe: +800-3-694-6367
Italy: +800-783-825
South Africa: +0800 99 5078
Pacific: +800 7776 7776
China: +400 889-0789
http://www.dowwaterandprocess.com

Notice: The use of this product in and of itself does not necessarily guarantee the removal of cysts and pathogens from water. Effective cyst and pathogen reduction is dependent on the complete system design and on the operation and maintenance of the system.

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Form No. 609-03003-0113

DOW FILMTEC™ Membranes

DOW FILMTEC SW30XLE-400*i* Seawater Reverse Osmosis Element with *iLEC* Interlocking Endcaps

Features

Dow Water & Process Solutions offers various premium seawater reverse osmosis (RO) elements to reduce capital and operation cost of seawater RO systems. DOW FILMTEC™ products combine premium membrane performance with automated precision fabrication and maximize system output to unprecedented performance.

DOW FILMTEC™ SW30XLE-400*i* offers an unequalled combination of productivity and rejection. This is the lowest energy seawater element available on the market, enabling lowest operation cost. It is also ideal for two-pass seawater designs and high TDS brackish water applications. DOW FILMTEC SW30XLE-400*i* comes with the unique *iLEC*™ Interlocking Endcaps that reduce system operating costs and reduce the risk of o-ring leaks that cause poor water quality. See Form No. 609-00446 for information on the trouble-free cost-saving benefits of *iLEC* Interlocking Endcaps. Benefits of SW30XLE-400*i* include:

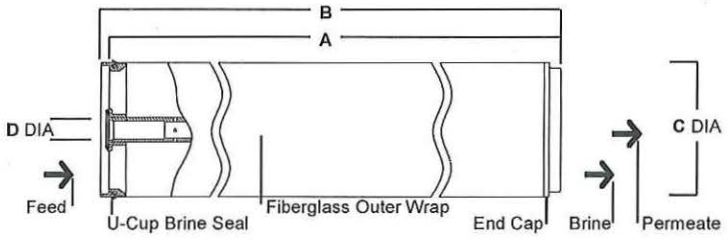
- Highest productivity available, with active area of 400 sq. ft., enables systems to be designed to deliver the lowest total cost of water by optimizing energy consumption, system productivity and operating flux.
- Can effectively be used in permeate staged seawater desalination systems without impairing the performance of the downstream stage.
- Delivers high performance over the operating lifetime without the use of oxidative post-treatments like many competitive products. This is one reason DOW FILMTEC elements are more durable and may be cleaned more effectively over a wider pH range (1-13) than other RO elements.
- Automated, precision fabrication with a greater number of shorter membrane leaves reduces the effect of overall fouling and maximizes element efficiency, lowering your cost of operation.

Product Specifications

Product	Part number	Active area ft² (m²)	Maximum operating pressure psig (bar)	Permeate flow rate gpd (m³/d)	Typical boron rejection %	Minimum salt rejection %	Stabilized salt rejection %
SW30XLE-400*i*	219219	400 (37)	1,200 (83)	9,000 (34)	91.5	99.60	99.8

1. The above values are normalized to the following conditions: 32,000 ppm NaCl, 5 ppm Boron, 800 psi (5.5 MPa), 77°F (25°C), pH 8, 8% recovery.
2. Permeate flows for individual elements may vary +/-15%.
3. Product specifications may vary slightly as improvements are implemented.
4. Active area guaranteed +/-5%. Active area as stated by FilmTec is not comparable to the nominal membrane area figure often stated by some element suppliers. Measurement method described in Form No. 609-00434
5. Specific solute stabilized rejection based on the following test conditions:3 2,000 ppm NaCl, 800 psi (15.5 bar), 77°F (25°C), pH 8 and 15% recovery, 5 ppm boron

Figure 1



Product	Feed spacer (mil)	Dimensions – inches (mm) A	B	C	D
SW30XLE-400*i*	28	40 (1,016)	40.5 (1,029)	7.9 (201)	1.125 (29)

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1 inch = 25.4 mm

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Pacific:	+60 3 7958 3392
Japan:	+813 5460 2100
China:	+86 21 2301 1000

http://www.dowwaterandprocess.com

NOTICE: The use of this product does not necessarily guarantee the removal of cysts and pathogens from water. Effective cyst and pathogen reduction is dependent on the complete system design and on the operation and maintenance of the system.

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