

barium  
56

calcium  
20

zinc  
30

arsenic  
33

selenium  
34

chlorine  
17

# IonFlux™ Ion Exchange Membranes

## Breakthrough polymer technology

- Best in class chemical tolerance, permselectivity, conductivity, mechanical durability, and pH tolerance
- Perform chemical separations previously impossible through our advanced monovalent and proton selective membranes
- Offered in Saltworks' Flex EDR and Flex EDR-RO Hybrid platforms
- Manufactured in our quality assured production facility



### > Features

- Standard, monovalent ion selective, proton selective, and proton blocking membranes
- Ductile and tear resistant
- pH tolerance 0 - 12
- Temperature tolerance up to 60°C
- Hydrocarbon tolerance C1 - C10
- Oxidizing agent (chlorine) tolerance up to 1,000 ppm

### > Benefits

- Strong multivalent ion transference removes scaling ions for reduced fouling in downstream reverse osmosis and concentration processes
- Monovalent ion selective and proton selective membranes provide rejections exceeding 98%
- Hydrocarbon tolerance enables produced water applications

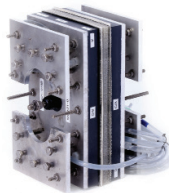
## Our process

### 1 Desktop

Chemistry, engineering and project assessment. Initial plant sizing, performance and economics.

### 2 Test

Run your water on a small scale machine to confirm fit.

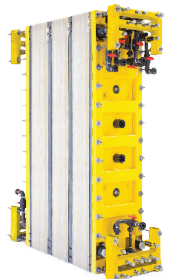


### 3 Pilot

Operate one of our automated pilot machines at your site.

### 4 Operate

Deliver a reliable, low cost plant to meet your needs. We can deliver the entire project or work with partners of your choice. Sale, lease, and operation options available.



# IonFlux™

## Ion Exchange Membranes



### SPECIFICATIONS

	AEM	CEM	mAEM	mCEM	pAEM	pCEM
Type	Anion permselective	Cation permselective	Monovalent anion permselective	Monovalent cation permselective	Proton blocking anion permselective	Proton permselective
Thickness (wet)	100 - 120 µm					
Resistance Ω cm <sup>2</sup> (1)	2.5 - 3.5	3.0 - 4.0	3.5 - 4.5	2.0 - 3.0	2.0 - 3.0	3.0 - 4.0
Permselectivity (2)	> 90%	> 95%	> 90%	> 90%	> 70%	> 70%
Ion transport						
Cl <sup>-</sup>	High	N/A	High	N/A	High	N/A
SO <sub>4</sub> <sup>2-</sup>	Very High	N/A	Low	N/A	High	N/A
NO <sub>3</sub> <sup>-</sup>	High	N/A	Very High	N/A	High	N/A
Na <sup>+</sup>	N/A	High	N/A	High	N/A	Very Low
Ca <sup>2+</sup>	N/A	Very High	N/A	Low	N/A	Very Low
H <sup>+</sup>	Medium	Very High	Medium	High	Very Low	High
Reinforcement	PET					
Burst strength (3)	> 15 PSI					
Maximum operating temperature (4)	60 °C					
pH stability	0 - 12					
Hydrocarbon resistance	C1 - C10					
Chlorine tolerance	Up to 1,000 ppm					
Applications	Electrodialysis (EDR) Electrodeionization (EDI) Capacitative deionization (CDI)		Selective ion separation		Acid recovery Acid and base generation	

(1) Measured by electrochemical impedance spectroscopy in deionized water. Membranes were first equilibrated in 0.5M NaCl solution (pAEM was in 0.1 M HCl solution) and then rinsed with deionized water before measurement.

(2) AEM, CEM, mAEM, mCEM: calculated from potential measurements across membrane between 0.1 and 0.5 M NaCl solutions at 20°C. pAEM, pCEM: calculated from potential measurements across membrane between 0.02 and 0.6 M HCl solutions at 20°C.

(3) Measured by pressuring water through an unsupported wet membrane mounted onto a plastic cylinder with 48 mm inside diameter.

(4) Maximum operating temperature of 60°C at pH 0-12, capability to operate up to 80°C at pH 4-10; contact Saltworks for specific application fit.

### > Storage and handling

Membranes are packaged by roll or sheets in a water/propylene glycol antifreeze solution. Soak membranes in water or 5 wt% NaCl solution before using.