

# Ionics\* Ion Exchange Membranes

## Renewed brand innovating on decades of reliable performance

Ionics\* is a legacy brand within SUEZ – Water Technologies & Solutions which originated with Ionics, Inc., the original inventor of the ion exchange membrane in 1948. Production of these membranes has been continuous through today. The primary use of these membranes is in electro dialysis (ED & EDR) and electrodeionization (EDI) stacks.

Ionics installed the first ED system for demineralization of brackish water in 1951 in Arizona. Since then, Ionics ion exchange membranes have been installed in thousands of ED, EDR, and EDI installations for a wide variety of applications including:

- brackish water desalination
- whey demineralization for infant formula production
- wastewater TDS removal for irrigation
- ultrapure water for silicon chip manufacturing
- demineralization of process streams including glycerine, glycol, fruit juice, amines, and hydrolyzed proteins

In the last 70 years, over 8 million square meters of Ionics ion exchange membranes have been produced. Now, under the stewardship of SUEZ -Water Technologies & Solutions, the Ionics brand returns for our portfolio of ion exchange membranes.

Following are examples of the membranes that have driven Ionics electro dialysis applications for over 50 years along with innovations that will drive new applications for the future.

### Organic Fouling Resistant Membranes

AR103 and CR61 provide stability in high pH environments where aggressive cleaning with caustic solutions is needed along with organic material fouling

resistance. These membrane chemistries have been used for more than 50 years for applications in the food and beverage industry, most prominently in the demineralization of cheese whey. Ionics invented the process for demineralizing cheese whey with electro dialysis in the 1950s, and SUEZ still provides new equipment and membranes for customers in this industry.

### Standard Water Membranes

Ionics AR204 and CR67 membranes have the widest total footprint globally. They have been the primary membrane used in water desalination electro dialysis applications for 30 years. They are a cost-effective, scaling resistant membrane with resistance to chlorine, are NSF approved, and in water desalination applications can have a lifetime of 15 years or more. They can also be used for low organic fouling process applications.

### Nonwoven Cloth Membranes

To improve performance of our ion exchange membranes, we discontinued use of a woven acrylic cloth and replaced it with a nonwoven polyester cloth. First, the nonwoven cloth membranes have lower electrical resistance. This means that when used, the voltage required to achieve a target product TDS can be lower. This can result in lower power consumption by the ED or EDR plant. Since the membranes are made of a nonwoven cloth, they will not generate “strings” hanging on the exterior of the stack as the edge of the membranes become dry, as happens with the use of woven cloths.

Find a contact near you by visiting [www.suezwatertechnologies.com](http://www.suezwatertechnologies.com) and clicking on “Contact Us.”

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Here is an enhanced picture showing the texture comparison of the two membrane types:



These membranes are NSF 61 certified as the woven acrylic cloth membranes were.

### Nonwoven Polypropylene Membranes

SUEZ will also convert the remaining membranes which use woven cloths to a nonwoven structure. AR103P and CR61P are cast on woven polypropylene cloth, and typically used in food and beverage applications. These membranes will be directly replaced by AR103N and CR61N. The 'N' type cloth is a thin nonwoven polypropylene cloth that will provide a superior membrane product with lower power consumption and smoother surface to reduce scaling and other deposits. SUEZ will work with all current customers to ensure a smooth transition to the new membranes.

### Thinner Membranes

As part of our new generation of ED and EDR stack designs, the Ionics V Series, SUEZ is producing thinner membranes that fit in our recessed spacer design to further improve electrical resistance for more efficient ED and EDR operation. These membranes can also be used in existing MkIV stack hardware to provide lower power consumption and/or expanded capacity. 750 cells of membranes will fit in the space that 600 cells of the thicker membranes occupy.

### High pH Anion Membrane

Ionics AR908 membrane is a versatile anion exchange membrane that has been used by some of our largest EDR installations for drinking water and wastewater desalination. It allows for cleaning with high pH solutions which the AR204 does not. However, its resistance to chlorine is lower, so there can be a tradeoff depending on the specific application. The caustic resistance also makes it a cost-effective alternative to the AR103 membrane for process demineralization applications.

### Bipolar Membranes

Ionics Bipolar membranes are used in electro dialysis applications where salts are converted into acid and caustic product streams or where pH of process solutions can be adjusted. These membranes have two layers; one cation-selective and one anion-selective layer. The AR103 and CR61 are the primary options for the layers of the bipolar membrane. The anion layer is treated with a catalyst to aid in the water splitting function of the membrane.

### Acid-blocking Anion Membranes

For Bipolar Electro dialysis applications which convert salt solutions into separate product streams of acid and caustic, use of standard anion-exchange membranes limits the concentration of acid that can be achieved due to the free movement of protons (H+) from the high concentration acid stream through the anion membrane back to the diluting salt stream. The proton-blocking AR118U membrane limits this transfer and allows for higher concentrations in the acid and caustic streams, typically to 2.0N versus 1.0N with the AR103.

### ED for Brine Concentration Membranes

Electro dialysis can be used as a brine concentrator for reaching concentrations higher than can be reached with reverse osmosis, thus reducing the size and energy consumption of thermal evaporators in ZLD applications. The Ionics CR62T membrane is designed, along with the AR103N, for use in these brine concentrations applications which require a low water transport membrane to achieve target concentrations of up to 200,000 mg/l TDS.

SUEZ continues to invest in innovation within our ion exchange membrane portfolio and in developing new applications using these membranes.