

Drinking Water Reverse Osmosis Elements

CUSTOMER BENEFITS

Veolia product portfolio includes various membranes and elements which are well suited for all types of drinking water applications

Application

Many drinking water plants are faced with balancing multiple priorities and stakeholders in their mission to provide a healthy, safe, and sustainable water supply for their communities. In some areas, plants have concerns about pollutants and micropollutants. This includes more widely present compounds such as nitrate and also emerging contaminants such as PFAS (per- and polyfluoroalkyl substances) compounds. In other areas, energy is not just an important factor in operating cost but is only available in limited quantities. In addition, water quality remains unique to each plant and each intake. Drinking water plants regularly turn to trusted experts at Veolia to ensure they can provide reliable, high-quality drinking water in an increasingly challenging environment while operating effectively and efficiently. Veolia spiral wound membrane elements are a critical part of many solutions.

Product Offering Overview

Veolia has a full portfolio of spiral wound reverse osmosis and nanofiltration elements that can be used in drinking water applications all over the world. For treating brackish waters, Veolia offers multiple combinations of flow, energy consumption, and rejection that can be chosen from to find the best fit for each specific opportunity. These range from the highest rejecting AG H Series elements to the ultra-low energy AK and AK H Series elements. In some brackish waters where hardness removal is the primary objective, the best solution is a nanofiltration membrane such as the HL Series. Veolia also offers elements capable of seawater desalination with the AC, AD, and AE Series elements.

The complete list in Table 1 reflects Veolia's clear priority in providing technology that promotes the health, safety, and sustainability of our partner communities.

Table 1: Veolia elements with use in drinking water applications

Type of Water	Type of Spiral Wound Element	Product Name
Brackish Water	Standard Pressure	AG Series
	Standard Pressure with High Rejection	AG H Series and AG FR H Series
	Low Energy	AG LE H Series
	Ultra-Low Energy	AK Series
	Ultra-Low Energy and High Rejection	AK H Series
	Nanofiltration	HL Series
Seawater	Low Energy, High Rejection, Very High Rejection	AE, AD, and AC Series

Ultra-Low Energy Membranes

To the advantage of our partner communities, Veolia's ultra-low energy membranes are known to deliver high-quality water with reduced pressure and energy demand that lowers operating costs, and is a step forward in the ongoing sustainability journey. The AK H Series of ultra-low energy elements is a high-performance product with high rejection of salts (Table 2), micropollutants, and low molecular weight organics while further reducing operating costs through longer element lifetimes. The membrane used in these elements was designed with a very hydrophilic surface which combats fouling by reducing the adsorption of organics and minimizes cleaning frequency, thereby enabling the already high

rejection of the AK H Series to remain more stable for the life of the element. Further, the 400 square feet active area membranes include an optimized 34 mil feed spacer to improve pressure drop and provide another fouling-resistant feature.

AK H Series membranes have been tested on various contaminants and micropollutants with excellent results. A list of some important compounds is included in Table 3.

Table 2: Fact sheet specifications for the AK H Series

Model	Average permeate flow gpd (m ³ /day)	Typical NaCl rejection	Minimum NaCl rejection
AK-400 H	11,000 (41.6)	99.65%	99.50%
AK-440 H	12,000 (45.4)	99.65%	99.50%

Testing conditions: 500ppm NaCl solution at 115 psi (793 kPa) operating pressure, 77°F (25°C), pH 7 and 15% recovery.

Higher Rejection Brackish Water Products

In municipalities where effectively complete removal of micropollutants is a primary concern, other high rejection brackish water reverse osmosis elements are the more ideal fit than ultra-low energy membranes. Three other elements present interesting options for a drinking water plant to consider.

First, with AG H Series of elements offers the highest typical and minimum rejection of all Veolia brackish water RO products and can be used in many applications, but was designed for cleaner RO feed water. Table 4 lists the specifications for AG H with more information available in the fact sheet.

Table 3: Measured rejection of a few contaminants and micropollutants

Tested contaminant	Measured rejection
Nitrate	97.0%
1,4-dioxane	95.8%
Gen X	97.3%
Iomeprol	98.7%
Acesulfam	90.4%
Carbamazepine	99.3%
Mecoprop	99.0%
Diclofenac	99.6%
Ibuprofen	99.6%

Test conditions varied, including 500 ppm NaCl solution at 115 psi (793 kPa) operating pressure at 77°F (25°C), pH 7 and 15% recovery with 200 mg/L NO₃ and 5 µg/L iomeprol, acesulfam, carbamazepine, mecoprop, diclofenac, and ibuprofen. Gen X and 1,4-dioxane were tested at approximately 25°C, 95 psi (660 kPa), feed conductivity 125 µS/cm, and 92% recovery with 0.2 ng/L 1,4-dioxane and < 5 ng/L Gen X.



If the water source has more fouling potential to the RO elements, such as a surface water source, then Veolia's second option is the AG FR H Series of membrane shown in Table 5, that has only a very small reduction in rejection while optimizing the design to be more fouling resistant.

The third option with higher rejection (normalization must be accounted for) than the ultra-low energy membranes is the AG LE H Series shown in Table 6, that was developed to provide intermediate energy savings between the AG H or AG FR H Series and the ultra-low energy AK H Series. This AG LE H product gets used most often when energy savings is an important consideration, but fouling potential of the water source requires lower flux than the AK H Series.

Table 4: Fact sheet specifications for the AG H Series

Model	Average permeate flow gpd (m ³ /day)	Typical NaCl rejection	Minimum NaCl rejection
AG-400 H	11,000 (41.6)	99.8%	99.65%
AG-440 H	12,000 (45.4)	99.8%	99.65%

Testing conditions: 2,000 ppm NaCl solution at 225 psi (1,550 kPa) operating pressure, 77°F (25°C), pH 7 and 15% recovery

Table 5: Fact sheet specifications for the AG FR H Series

Model	Average permeate flow gpd (m ³ /day)	Typical NaCl rejection	Minimum NaCl rejection
AG-400 FR H	11,000 (41.6)	99.8%	99.5%

Testing conditions: 2,000 ppm NaCl solution at 225 psi (1,550 kPa) operating pressure, 77°F (25°C), pH 7 and 15% recovery

Table 6: Fact sheet specifications for the AG LE H Series

Model	Average permeate flow gpd (m ³ /day)	Typical NaCl rejection	Minimum NaCl rejection
AG-400 LE H	10,000 (37.9)	99.5%	99.0%
AG-440 LE H	11,000 (41.6)	99.5%	99.0%

Testing conditions: 2,000 ppm NaCl solution at 150 psi (1,034 kPa) operating pressure, 77°F (25°C), pH 7 and 15% recovery.

Contact Us

If you would like to learn more about how Veolia can provide an RO or NF solution for your drinking water needs, please visit:

www.veoliawatertechnologies.com/contact-us

