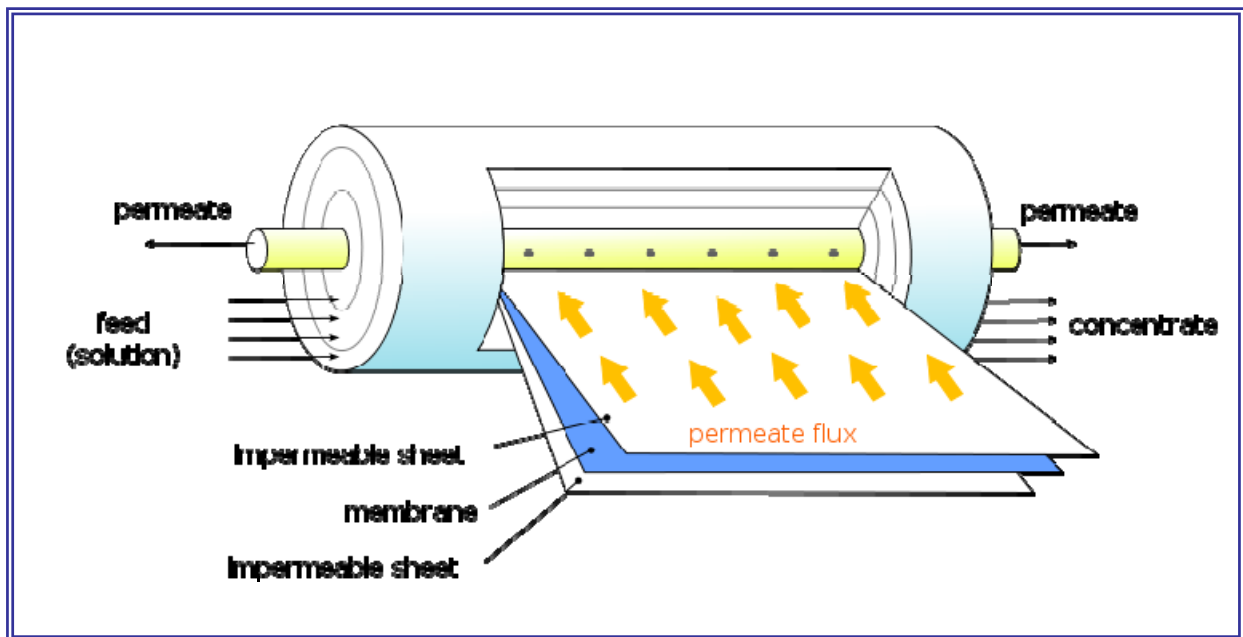


## Spiral Membrane Systems

*Manufactured by New Logic Research*

Spiral wound membranes are tightly packed filter media where a permeable membrane is wrapped around a center core in a spiral fashion similar to a roll of fabric. The permeable membrane is sealed at the edges and is gapped with a spacer material that allows flow of the liquid that is to be filtered. Water to be filtered enters the membrane module from one end. Once inside the module, filtration occurs when backpressure is applied to drive the clean water through the membrane surface. Coming out of the module on the other end, you have clean water (permeate) traveling through the core where it has been collected and a concentrated brine (concentrate).



Spiral Module Construction

These modules can be used in parallel and in series as needed to accomplish the desired separation and concentration levels. The modules are placed inside fiberglass housings called "vessels". There are plumbing connections at the entrance and exit of the vessel. Pumps are used ahead of the system to generate the flow into the filter module. A backpressure valve is used on the concentrate outlet to set the flow rate out and provide resistance for pressure to develop in the module. The speed of the pump on the inlet is controlled to develop the desired pressure level.

Spiral membrane systems made by New Logic also have instrumentation on the piping to measure the flow, pressure, and conductivity of the liquid as filtration is occurring. These systems are skid mounted and are individually factory tested in Emeryville, California USA. New Logic generally uses Reverse Osmosis (RO) membranes; however, looser membranes such as Nanofiltration, Ultrafiltration, and Microfiltration membranes are available.

RO membranes are used to remove dissolved salts and other solids from the water being filtered. RO membranes are very tight and will allow water molecules to pass, but will limit the passage of other molecules to very low levels. Salt rejection rates can be 96-99% of the amount present in the feed water.

Generally, the higher the dissolved solids content, the higher the pressure that is needed to drive the filtration process. Because dissolved molecules by laws of nature want to disperse and exist in equilibrium at even concentrations throughout a liquid body, forcing most of the dissolved molecules into one compartment requires force in the form of pressure to overcome the tendency for the molecules to disperse. This driving force is known as osmotic pressure. Osmosis is the act of molecules to diffuse through a membrane layer. It is called Reverse Osmosis because you are forcing the liquid in the reverse direction that nature is pulling it as osmosis occurs through the membrane.

As a rough rule of thumb, there is 100 psi of osmotic pressure for every 1% of dissolved solids. So a solution with 3.5% dissolved solids (like seawater) would have about 350 psi of osmotic pressure. This means that water would not begin to permeate through the membrane until the pressure on the feed side was increased to at least 350 psi. A pressure of 450 psi would have a net driving pressure of 100 psi.



New Logic's S-18000 Spiral Membrane System Installed

RO membranes can be used for seawater desalination and groundwater filtration for drinking water. It can also be used to make ultra pure water for industrial applications such as electronics manufacturing, feed water for steam boilers, pharmaceutical manufacturing, food and beverage applications, power plant cooling water, and many others. In addition to removing dissolved salts, RO membranes will remove bacteria, viruses, pathogens, and organic contaminants.

New Logic provides Spiral membrane systems that can be used independently or in conjunction with other equipment such as the vibratory VSEP membrane system. Each New Logic spiral membrane system has top of the line materials, instrumentation, and controls. These controls can easily be integrated with other systems if needed, or the system can operate as a stand alone unit.

The conventional spiral RO membrane systems that New Logic manufactures are inexpensive and easy to operate. New Logic always recommends that these conventional RO spiral membrane systems be used wherever possible. However, in cases where the limits are reached for the spiral type system, then New Logic recommends it's VSEP product, which has the capability to handle many wastewaters or brine waters that a spiral system cannot. For spiral systems there are limits for the salt solubility, turbidity, suspended solids, organic materials, solvents, free chlorine, and other things. Consult with your New Logic Engineer for more information about whether a spiral membrane system or a VSEP membrane system is appropriate for you.

Each membrane system also comes with the ability to perform cleaning in place (CIP) operations where a cleaning solution is recirculated through the membrane modules to help to restore flux rates. Fouling can occur even with good pre-treatment. Cleaning can be used to reset the performance. New Logic also manufactures a wide range of membrane cleaning chemicals that can be used for this purpose. The cleaning function in the spiral membrane system is automated with larger systems. Your New Logic engineer can assist you in selecting the best cleaning solution and any pre-treatment chemicals to insure that you get the maximum benefit from your system.

New Logic also provides replacement parts and membrane modules. Training is of course provided as well. Membrane modules (elements) should last years. The length of time they last will depend on the application and also on the care that is taken during operation and storage. The basic module is 8" in diameter and 40" long and is fairly easy to handle and change out when the time comes.

New Logic manufactures many sizes of spiral RO membrane systems. Each system is also customized depending on the project requirements. There are many options for materials of construction, electrical area classifications, and brands of instrumentation and devices. The following table shows the various models that are available.

Model #	Membrane Area	Nominal Capacity	Element	Automation?
S-85	85 Sq Ft (8.5 m <sup>2</sup> )	0.5 GPM (1.9 L/min)	4" OD	No
S-255	255 Sq Ft (23.8 m <sup>2</sup> )	1.5 GPM (5.7 L/min)	4" OD	No
S-850	850 Sq Ft (79.4 m <sup>2</sup> )	5.0 GPM (19 L/min)	4" OD	No
S-1600	1,600 Sq Ft (150 m <sup>2</sup> )	10 GPM (38 L/min)	8" OD	Yes
S-3600	3,600 Sq Ft (336 m <sup>2</sup> )	20 GPM (76 L/min)	8" OD	Yes
S-7200	7,200 Sq Ft (673 m <sup>2</sup> )	40 GPM (151 L/min)	8" OD	Yes
S-18000	18,000 Sq Ft (1800 m <sup>2</sup> )	100 GPM (380 L/min)	8" OD	Yes
S-36000	36,000 Sq Ft (3364 m <sup>2</sup> )	200 GPM (760 L/min)	8" OD	Yes

If you have an application that you think might be suited for a spiral membrane system, contact your New Logic sales engineer. With some basic analytical information about your water quality, a software program can be used to determine the suitability of this type of membrane system for your application. New Logic can also make projections of the treated water quality and the concentration level that could be achieved.

New Logic can also provide bench scale pilot test units for us in onsite testing to determine the long-term performance capabilities and also to study cleaning and system optimization.

Spiral membrane systems can provide the following benefits:

- Precise separation of dissolved materials regardless of the type
- Consistent treated water quality not subject to wide variations
- Exceedingly good treated water quality compared to other technologies
- Low maintenance
- Automated process that work in slip-stream
- Very economical compared to distillation or evaporation
- Wide range of materials and membrane options

For pricing or other information, contact a New Logic sales engineer at:

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