

Water Technologies

Maximizing Your  
Membrane Investment

**SIEMENS**



**e**VOLU**TION** **MEMBRANE** **5**

AND WHAT THE FUTURE HOLDS

# The Evolution continues...



The fifth edition of *Evolution* focuses on "Maximizing Your Membrane Investment." You'll get helpful insight on choosing the right low-pressure membrane technology for your application, procuring and evaluating suppliers and protecting your community's long-term membrane investment.

As the only supplier, manufacturer and system integrator of pressure-driven, vacuum-driven (submerged) and membrane bioreactors, and with over 1,000 installations on six continents, we've tackled a wide variety of source water challenges. But, we're always ready for new challenges. Once you read *Evolution*, we'd like to know what you think. E-mail us at [memcor.water@siemens.com](mailto:memcor.water@siemens.com). You can also visit us at [www.siemens.com/memcor](http://www.siemens.com/memcor).

**e** VOLUTION **MEMBRANE 5**  
AND WHAT THE FUTURE HOLDS

Low-pressure membrane technology is available in a variety of configurations. Here are some basic characteristics to consider to achieve the best fit for your application.

## Choosing... the right technology



	Technical definition	Customer benefit	Suitable applications
<b>Microfiltration (MF)</b>	Membranes that fall in the range of 0.1 to 1.0 microns are microfilters.	Physical barrier to bacteria, protozoa and some virus.	Drinking water, reuse, membrane bioreactor (MBR) and pretreatment to reverse osmosis (RO).
<b>Ultrafiltration (UF)</b>	A membrane that falls in the range of 0.01 to 0.1 microns.	Similar properties to MF, but with greater virus reduction. Disinfection by chlorination or ionization will still be required.	Drinking water, reuse, membrane bioreactor (MBR) and pretreatment to reverse osmosis (RO).
<b>Fiber Alignment</b>	Horizontally aligned fibers run perpendicular to the flow of water. Vertically aligned fibers are parallel to water flow.	Vertically aligned fibers do not stretch and break due to cross forces. Also, vertical fibers are easy to visually see and repair.	Vertically aligned fibers are suitable for all applications. Horizontally aligned fibers should only be used in low solids applications with minimal backwashing to reduce stretching.
<b>Flow Pattern</b>	Outside-in versus inside-out refers to the pattern that raw water moves through the membrane to produce filtered water.	Outside-in flow allows for higher solids and is easier to clean. Inside-out flow typically indicates a UF.	Outside-in can be used in all applications. Inside-out should be used in low solids, low mineral applications.

# Maximizing your membrane investment

## Five Simple Steps

When selecting a membrane supplier, be sure to use these five simple steps to ensure the best value for your membrane dollar and long term, trouble free performance.

## STEP 1 Selection

Determine how your application may impact membrane design. *Here are some helpful hints:*

### THE MEMBRANE MAZE

Once you have chosen a membrane type, you now must decide on the best configuration for your plant—pressure-driven or submerged.



*Here are some questions to help guide you:*

- **Do you have an existing filter basin to use?**  
Submerged membranes may be able to be retrofitted into the basin.
- **Do you have available pressure (head) upstream?**  
Pressure-driven may be a better option.
- **Do you have height constraints?**  
This could be problematic for either configuration.
- **What is the water quality?**  
For example, high solids are easily handled by submerged systems, while colder temperatures are best suited for pressure-driven systems.

(See “Choosing the right technology” for more information.)

### ACCESS AND REPAIR

All membranes have the potential to break or foul overtime. A single fiber has a very small filter area (for Siemens, one fiber is 1/10,000 of flow per module). So, when a problem arises, how do you fix it?

*Here are some things to ask the membrane supplier:*

- Is there direct visual and physical access to the fiber ends to make a repair?
- How accurate is the repair method?
- What tools are needed to repair a membrane?
- Will the repair last forever?

## STEP 2 Procurement

So, you've picked your top membrane supplier (or two) and maybe performed a pilot. Now you go to bid. ***What are the things you need to make an apples-to-apples comparison?***

### LIMIT THE FLUX, LIMIT YOUR LIABILITY

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A "high flux" will decrease initial capital costs but will limit operating flexibility and increase hidden "soft" costs. This is because of reduced operating windows (in terms of available pressure differential) and unforeseen fouling. How do you ensure a maximum value in the long run? Limit the flux to industry standard. For clean water, design flux should be no more than 60 gfd (102 LMH). Keep in mind regulated "flux limits" are maximum to assure pathogen removal and are not an intended design parameter. Regulators have not established flux criteria based on long-term use, but instead based on a three-week study for pathogens.

### LIMIT CHEMICAL USAGE

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Frequent chemical usage is the first sign a membrane system is under-designed.

***Here are some industry-established chemical usage guidelines:***

- Cleaning (in-site cleaning) should take place on a 30-day interval. Chemicals used are dependent on feedwater quality.
- Maintenance washes (termed by some as "mini-cleans" or "effective flow maintenance") should be limited to one-time per day for less than 30 minutes. Again, chemicals are dependent on feed water quality.
- Chemical backwashing at regular intervals should not be allowed for design, but can be used as a "tool" for operators down the road.



***Increase your plant's capacity and water quality — in the same space***

MEMCOR® membranes can be easily retrofitted into the footprint of your existing conventional plant to boost your water quality, prepare you for population growth and help you manage increasingly stringent water regulations. This can often be done with little or no expansion. By doing so, construction and expansion costs are minimized, leaving you with the flexibility to use the land around your plant for who really deserves it, your community!

## STEP 3 Evaluation

No two systems are the same in terms of flexibility, complexity or ease of operation. Your evaluation criteria should consider long-term issues and costs in addition to immediate outcomes.

### CAPITAL COSTS

Often, capital costs do not include installation costs. Make sure you account for building footprint, height, and access and equipment installation.

### LONG-TERM BENEFITS

This category includes questions about the supplier such as:

- How easy is it to detect and repair breaks? (See "Access and Repair")
- Does the supplier make the membrane?
- How much installation experience does the supplier have?
- Who provides the membrane warranty?
- What is the company's history of innovation?

### OPERATING COSTS

Over time, membranes may require more chemical or more energy to make the same flow. Estimates are typically provided and guaranteed for the first year or so of operation. But what happens if a supplier has not met the flux?



## STEP 4 Operation

Membrane systems are typically automated, allowing for easier operation. Here are some things to consider when operating your plant:

### ✓ KNOW WHAT'S IN YOUR "MEMBRANE TOOLBOX"

This includes backwashing, maintenance washing, cleaning flexibility and available flux for potential water quality changes or spikes.

### ✓ MECHANICAL vs. CHEMICAL

Membranes provide a physical barrier to ensure high quality water. Don't be surprised if more time is focused on controls and instrumentation versus chemical addition.

### ✓ DON'T BE AFRAID TO ASK

Talk to your supplier. If you have a question, always feel free to pick up the phone and call.

### SUCCESS STORY

## Maui, Hawaii USA

Maui, Hawaii, can attest to the importance of day-to-day operation and maintenance to assure long, useful membrane life. One of the first drinking water plants in the country to use membranes, Maui has been using the technology for 10 years, using the original Memcor membranes.

The four Maui water plants regularly undergo routine maintenance and system-monitoring checks that ensure operating procedures for filtration, backwash, CIP and integrity testing are carried out

correctly. Annual process audits help the Maui plants maintain optimum filter performance that achieves long membrane life.

Maui will soon be retrofitting their plants with MEMCOR® polyvinylidene fluoride (PVDF) membranes to meet increased capacity demands at lower operating costs than their original polypropylene membranes. The PVDF membranes will assure that Maui experiences consistent, high quality drinking water at the lowest cost.

## STEP 5 Protection

To ensure long-term performance, membranes need to be properly maintained.

Your membrane manufacturer should realize the importance of long-term partnerships, and design a customized service package specifically designed for your needs and budget.

### SHORT-TERM CONTRACTS

These are particularly useful for the first two years of operation, to help operators become acquainted with the unique operation of the membrane system.

### LONG-TERM CARE

Suppliers offer long-term services including membrane autopsies, regular site visits and plant assessments to keep your plant running at peak performance.



## Service—Where you need it, when you need it.

To keep your membrane system running at peak performance and on specification, your membrane manufacturer should have a service network that can assist you 24 hours a day, 7 days a week.

Siemens has service branches around the world that can reach you quickly and efficiently. A factory-trained service technician can provide professional guidance or preventative maintenance and service contracts designed to help ensure your peace of mind.

In the USA and Canada **1.800.MEMCOR4**  
Asia **61.2.4577.6800**  
Europe **+44 (0) 1332.387300**

## The MEMCOR® 360° Advantage<sup>SM</sup>



The MEMCOR® 360° Advantage revolves around *your* needs, providing a comprehensive water management solution. You get the most innovative, broadest scope of pressurized and submerged membrane systems in the industry, plus financing solutions that increase your purchasing power and keep your project on track. After start-up, our service and warranty packages keep your plant running at optimal performance for years to come. Working with Siemens means full accountability, a complete understanding of your process needs and a single point of access after your project is up and running!

### SUCCESS STORY

## Colorado City, Colorado USA

Faced with a growing population and a tight schedule, the Colorado City Metropolitan District needed to expand their water treatment infrastructure. Because of long delays associated with the state revolving fund, the city needed to find a provider that could not only supply the equipment, but offer project financing as well.

In one total financing package totaling \$1.85 million, Siemens USA bundled a MEMCOR® membrane treatment system, third-party engineering cost and construction costs together. Colorado City saved taxpayer dollars and expedited the expansion process, as well as increased the efficiency of the entire project by working with one total solution provider.

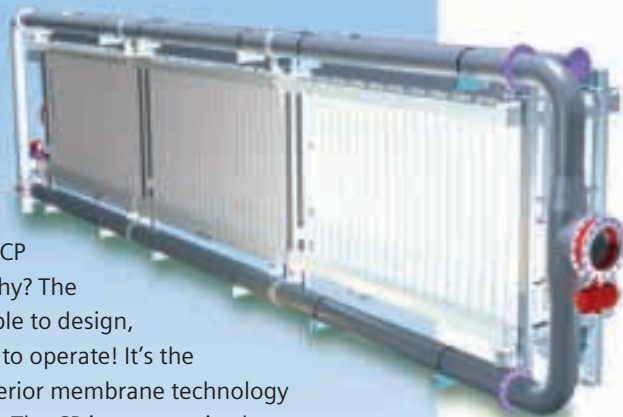
## Product Update

### MEMCOR® CP: The biggest news in membranes!

Industry response to the newly launched MEMCOR® CP has been overwhelming. Why? The explanation is simple—simple to design, simple to install and simple to operate! It's the perfect combination of superior membrane technology and efficient system design. The CP is a pressurized system engineered as three basic sizes to simplify design and installation.

- Easily modified to meet flow and expansion requirements for cost savings now—and in the future
- Meets a fast-track installation schedule
- Physical barrier to turbidity, bacteria, *Cryptosporidium* and viruses
- Operational stability on flashy or high solids applications
- Fully automated system

Join the growing list of communities that have chosen MEMCOR® membranes to produce consistent, superior water quality.



Request a copy of our *Membranes Made Easy* DVD, complete with operator and owner testimonials.

To learn more about MEMCOR® membranes for drinking water applications, e-mail us at [memcor.water@siemens.com](mailto:memcor.water@siemens.com)

[www.siemens.com/memcor](http://www.siemens.com/memcor)

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