

Water Technologies

Membrane technology.
Worth a closer look.

USFilter

A Siemens Business



eVOLU T I O N 4

AND WHAT THE FUTURE HOLDS

Welcome

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The Evolution Continues...

Evolution has been published for the past four years, providing answers to industry questions pertaining to low-pressure membrane technology, procurement and system operation.

As more stringent regulations come into effect, membranes are gaining greater acceptance than ever before. More and more people are "taking a closer look" at this innovative technology to address their water quality challenges. Because membrane technology is constantly evolving, numerous questions arise as operators and engineers sift through fact and fiction. As the sole membrane manufacturer with production capability and system design experience in both pressurized and submerged membrane configurations, we are frequently asked to comment on industry claims. The aim of *Evolution4* is to address those claims based on technological facts.

For additional information e-mail us at information.water@siemens.com or visit www.memcor.usfilter.com.

e V O L U T I O N **4**
AND WHAT THE FUTURE HOLDS

Membrane technology.

Low-pressure membranes offer significant benefits in many water applications. However, not all claims regarding membranes are accurate. Here are some common statements made in the membrane marketplace today:

Truth or Myth? Operating membrane systems at high flux (gallons/square foot/day) has no long-term effect on performance.

Myth. Membranes tend to lose permeability slowly over time, reducing the filtrate flux at a given pressure differential. The rate of permeability loss will be much higher when high flux is forced at a high pressure differential. The harder you run the membrane from the

start, the greater the effect of permeability loss and the greater the potential of capacity shortfall. In addition, operating at high flux requires more frequent chemical use and therefore increased disposal and operating costs. Better to protect your membrane investment now rather than gamble on meeting your capacity demands in the future.



Truth?
or
Myth?

Truth or Myth? Membranes are effective in numerous water treatment applications.

Truth. Membranes can be used in numerous applications, from drinking water to reuse, pretreatment to RO and desalination. A good membrane can handle many feeds, provided the surrounding equipment is designed appropriately for the given application.



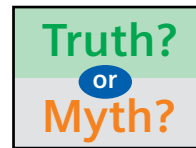
Water Technologies Working together for a greener planet

MEMCOR® membranes are used all over the world, turning alternative water sources into high quality water. With membrane technology, wastewater can be reclaimed and reused for agriculture, irrigation and industrial purposes—making our available drinking water supply more sustainable. This further reduces wastewater discharge to oceans, lakes and rivers, making it an attractive and environmentally conscious alternative. Here's to a greener planet!

Installation Update

West Basin Municipal Water District, located near Los Angeles, Calif., supplies water to local customers for irrigation, industrial, and potable purposes. It was one of the first municipalities to implement a reclamation system using membrane technology to treat secondary effluent as pretreatment to reverse osmosis (RO). Memcor pressurized technology was first selected in 1997 to meet capacity demands of 2.5 MGD.

Since then, the West Basin has added additional Memcor pressurized and submerged systems. Operating costs have significantly decreased and the life of RO modules has increased compared to their existing conventional processes. In total, West Basin will treat nearly 30 MGD with membrane technology and produce drought-free, low-cost water that keeps the environment even greener.



Continued...

Truth or Myth? In membrane technology, one system is effective for all applications.

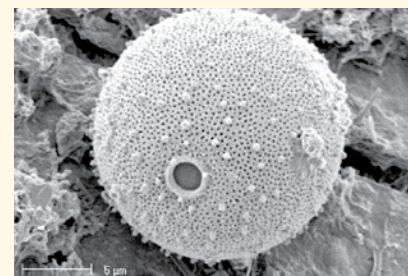
Both. There are two main configurations associated with hollow fiber, low-pressure membrane systems—pressurized and submerged. Some applications, such as groundwater and pretreatment to RO systems, are typically better suited for pressurized configurations. Conventional plant retrofits, for example, are better suited for submerged configurations because they easily fit into existing filter bays. In addition, it is important that the membrane manufacturer have a broad understanding of the chemical and biological makeup of the given water in order to offer a solution that fits the needs of that particular application.

Truth or Myth? Pressurized membrane configurations can handle high solids and water fluctuations better than submerged configurations.

Myth. Typically, pressurized systems run up to 20 to 30 psi, while submerged systems operate between 10 to 12 psi. Although some manufacturers claim that a higher allowable pressure differential allows a greater threshold to handle solids, this is a bit misleading.

In 1998 during the demonstration of our submerged technology in the US, we conducted this very test. Both our pressurized and submerged configurations were held to the same flux and backwash interval. The pressurized system operated up to 22 psi while the submerged operated up to 12 psi. The results showed that when operating at a sound flux, the performance between pressurized and submerged systems is nearly identical, resulting in similar cleaning intervals. The test has repeated itself time after time.

Sure, if a plant is designed to operate constantly at a high flux, certainly having more available pressure differential will save you intermittently, but beware—greater problems lie ahead!



LT2 and You

The Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) is intended to ensure microbial protection by reducing disease incidence associated with *Cryptosporidium* and other harmful microorganisms in drinking water. Unlike viruses, *Cryptosporidium* is highly resistant to traditional disinfection methods. So, how can you ensure that your system is safe?

The Memcor membrane fiber acts as an absolute, verifiable physical barrier against *Cryptosporidium*, *Giardia*, and other microorganisms, resulting in reduced disinfection dosages and achieving goals set by LT2ESWTR. Membranes can also assure your community is safe by meeting the requirements established by the Disinfection By-Products, Groundwater and Calif. Title 22 Reuse Regulations.



Truth or Myth? The periodic use of chemicals is effective in maintaining flux.

Truth. Short duration, low strength unheated chemical washes are used to manage membrane fouling. However, keep in mind that the frequent use of high strength, heated washes is a likely sign of an over-aggressive design flux.

The use of a chemical wash is a powerful tool for operators after water quality upsets and to minimize fouling, but is not intended to offset an aggressive system design.



Truth or Myth? A membrane fiber can be judged by how much weight it can hold.

Myth. The true test of a membrane is its ability to provide an integral, physical barrier. Strength, to a degree, is important. However, when configured vertically, the "strongest" tensile strength membranes often have the weakest radial strength. What does that mean? "Strong" or "reinforced" membranes are typically laminated, rely on a substrate for strength and have only a thin membrane skin. When membranes are in operation, they see different pressures and forces. The ability to move side to side to handle these forces is important. Because of the two-part structure, movement and thermal differentials can be troublesome and can cause the skin to peel from the substrate. Bye, bye physical barrier!

Truth or Myth? Membranes that offer the longest warranty must be the best.

Tough question. Some rules of thumb to keep in mind:

CHECKLIST

- 1. Who is providing the warranty—the actual membrane manufacturer or the system provider?
- 2. Will the membrane be available at the end of the warranty period? As you know, the membrane industry is rapidly changing.
- 3. Are there sufficient warranty parameters in the contract? Vagueness can often lead to finger-pointing. Be sure to use a supplier that adheres to sound business practices to ensure that they are in it for the long haul!
- 4. What is the warranty based on? The main warranty should be based on the ability to produce the design capacity and not the system integrity alone.



Introducing the latest evolution in membrane technology.



Introducing the latest evolution.

So, what's all the buzz about? We've incorporated over 20 years of experience in membrane design and operation with customer feedback to develop a system that combines robust membrane technology, sound engineering design and optimized operation in a simple-to-install system.

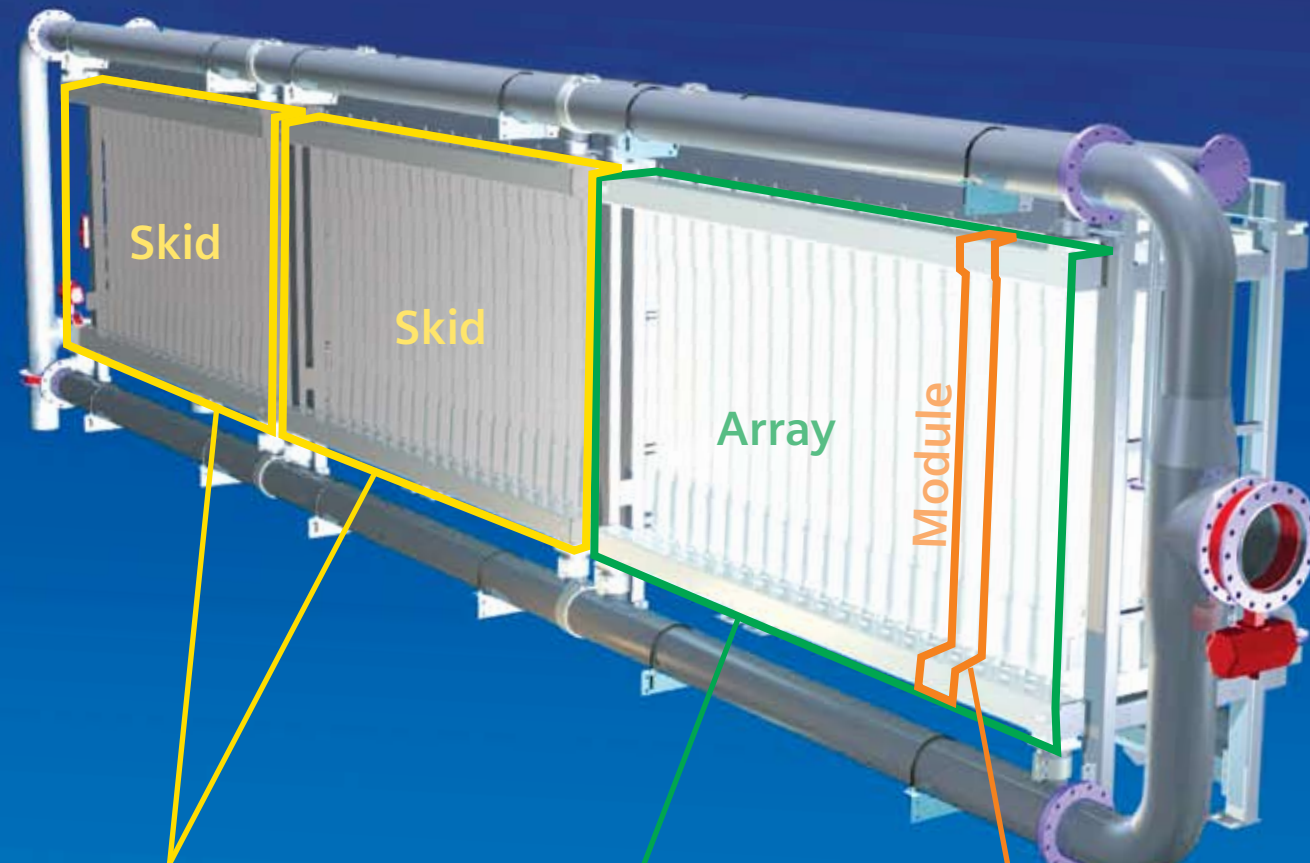
For the first time in membrane history, customers can design a membrane plant that uses catalog specifications to simplify and expedite both design and installation. Designs can be easily modified based on flow and expansion requirements, which provides cost savings now and in the future. Better yet, owners can "build" their own plant to determine the best layout that suits their needs and budgets. The result? The lowest cost of treated water using the world's most advanced membrane treatment technology.

Ideal for gravity-driven systems, treatment requiring coagulants and pretreatment to RO applications such as desalination and reuse, the system is able to meet a fast-tracked installation schedule and produce superior water quality.

To learn more about our newest evolution, visit www.seeit.usfilter.com.

Meeting your capacity demands is as simple as building blocks.

Membrane modules are pre-loaded into arrays. Each array contains from 72 to 120 modules. Arrays arrive at your site fully assembled and ready to be skid-mounted. Up to three arrays can be combined to create a skid that uses common piping, valves and controls. What does that mean for you? Simple engineering at significant cost-savings.



By simply adding an additional array or skid, expansion to meet future capacity demands is easily accomplished.

Arrays arrive with membrane modules pre-loaded, reducing on-site installation hours.

Easy to access, isolatable modules allow for continuous operation, assuring capacity goals are consistently met.

You asked, and we listened! The results are in the numbers:

- 0.04 micron pore size fiber
- 30% flow increase in same footprint
- 30% reduction in energy
- 98%* overall system recovery
- 10 MGD hydraulic capacity

* based on surface water testing

Still not convinced? There's more:

- Rapid site assembly
- Interchangeable components
- Designed for future expandability
- Simple control architecture

All that on one 40 foot trailer...



Typical Filtrate Quality

Parameter	Filtrate Quality
Turbidity	< 0.02 NTU
<i>Cryptosporidium/Giardia</i>	> 4-log removal
Virus	> 1.5-log removal
Bacteria	> 6-log removal
SDI	< 2-log removal

