



By Ben Movahed, PE, BCEE

If you have a tip or a suggestion for a future design article, please contact

Ben Movahed

(240) 780-7676 | movahed@watek.com

Pretreatment for Membrane TREATMENT SYSTEMS

Pretreatment ahead of any membrane system is critical to successful operation and life of the membrane system itself. The role of the pretreatment is to make the feed water compatible with the membrane treatment system. Pretreatment is required to increase the efficiency and life expectancy of the membranes by minimizing fouling, scaling, chemical and physical degradation.

Low pressure membranes, Microfiltration (MF), Ultrafiltration (UF) and Membrane Bio Reactors (MBR) have minimum requirements for pretreatment. The main purpose of such pretreatment would be to protect the membranes from sharp objects, silt and sand, and—in the case of MBR—protect them from hair and grease. Most low pressure membrane manufacturers will establish the type and effective size of the strainers or fine screens ahead of their membrane system as a part of their warranty. If low pressure membranes are used to reduce organic matter or remove oxidized compounds, then pre-oxidation and coagulation is often required. In those cases, careful attention should be given to the pretreatment, so materials or chemicals used

in pretreatment are compatible with the membrane system, to ensure precise dosage control and to prevent overfeeding of pretreatment chemicals.

For Reverse Osmosis (RO) and Nanofiltration (NF), more elaborate pretreatment may be required. The optimum pretreatment depends on raw water composition, seasonal and historical water quality changes and the RO/NF system specific design and operational parameters. Typically, disposable cartridge filters are utilized as the last step for protecting these membranes.

Pretreatment for Seawater RO is often more complex and critical than groundwater, because most large seawater plants use open intakes, which possess more pollutants (oil & grease, fines, algae, phytoplankton). Open seawater sources also have more fluctuations in turbidity, organic matter and biological activities. In addition to conventional media filtration and dissolved air floatation, various MF/UF pretreatment technologies are now being applied in SWRO applications. This application is anticipated to grow as ceramic membranes and new membrane technologies from developing markets are implemented.

The more comprehensive and complex the pretreatment becomes, the more it should be viewed as a separate system and not a side process component. The importance of this system approach and adequate pretreatment needs cannot be over emphasized and should be taken very seriously by design engineers and end users.

Many of us involved in the membrane industry strongly believe that it is usually not the membranes that fail, it is often the improper application and/or inadequate pretreatment which cause failures in membrane systems.

For a more comprehensive discussion on pretreatment requirements and our guidelines refer to the "[Pretreatment for Membrane Processes](#)" fact sheet on the AMTA website. ■