

Application Brief

MEMBRANE SYSTEMS

Membrane purification, most frequently through reverse osmosis, is a water purification process that removes ions, unwanted molecules, and larger particles from water using a semi-permeable membrane.

Membranes operate on size exclusion MF, UF or NF, RO, so the solute remains on the membrane's pressurized side, and the pure solvent passes through.

Your Pain Points

When saline water passes through a membrane, it separates the water from the solute without heating or phase change. The saline feed water is pumped into a closed vessel and pressurized against the membrane – as water passes through the membrane, the remaining feed water increases in salinity before being discharged. Without this discharge, the pressurized feed water would continue to rise in salinity and create scaling and precipitation problems through the salts' supersaturation.

A membrane system comprises of:

- Pre-treatment
- High-pressure pump
- Low or High Pressure Membranes
- Post-treatment

Pre-treatment of the feed water to remove suspended solids is of utmost importance as the feed water must pass through narrow passages in the membrane. The clarification process must eliminate microbiological growth. Coagulation, filtration, disinfection, and de-chlorination protect the membranes against possible foulants.

Post-treatment, minerals are added to the water stream to adjust the water quality, conductivity, and pH to its desired target.

Membranes are highly effective in water and wastewater treatment applications, but their performance relies on an effective chemical treatment program. Our portfolio includes chemistries that clean membranes, ensure performance, and enhance efficacy against scale-forming substances.

Our Comprehensive Solution

Gradient offers a comprehensive approach to address these challenges, integrating advanced chemical treatment with sophisticated feed, monitoring, and control systems. Our tailored programs provide complete protection for membrane system applications, ensuring safe, reliable, and efficient water production for both utility and process water applications.

By combining our application expertise and suite of high-performance CURE chemicals, we can tailor the optimal combination to your plant's unique operating needs:

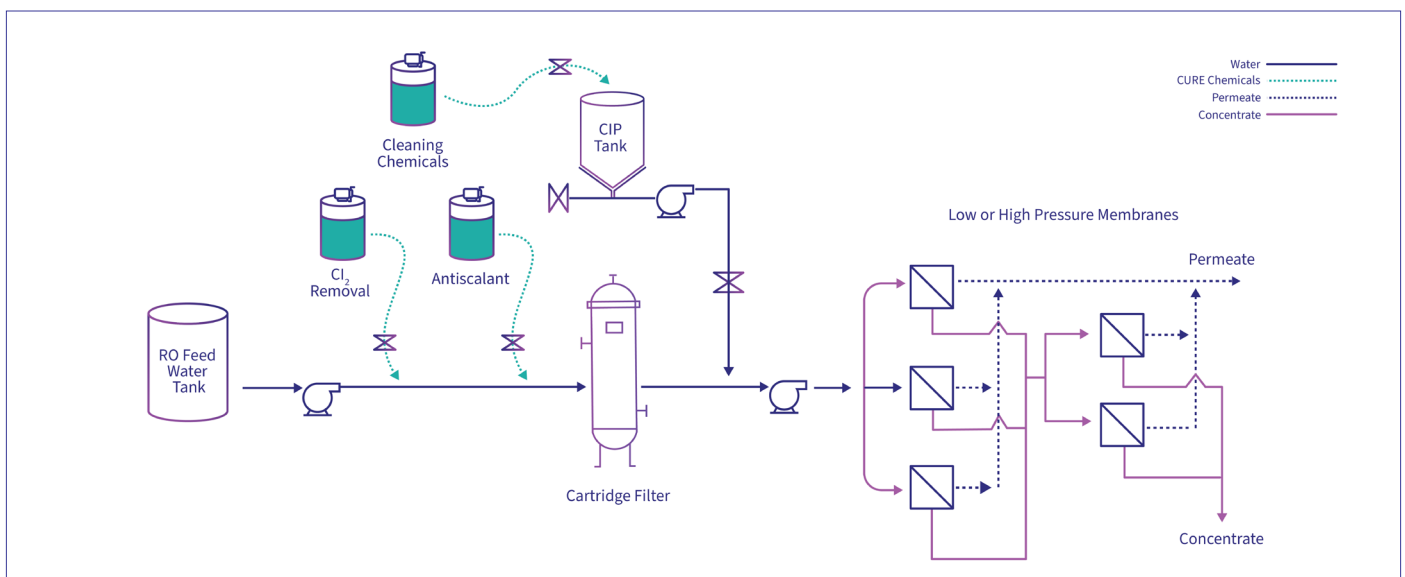


Figure 1: CURE Chemicals in Membrane Systems

- Antiscalants - prevent scale buildup for improved efficiency, reliability, and production rates
- Cleaners - remove organic and inorganic material that build up between cleaning cycles, increasing recovery rates and decreasing energy consumption
- Dechlorinating agents - eliminate chlorine from water to protect membranes from premature failure

Bespoke Service Programs

Gradiant designs customized service programs aligned with each facility's needs. These include routine water chemistry analyses, chemical inventory checks, system performance monitoring, training, technical support, and on-site response. Chemical dosing systems are integrated into the comprehensive chemical and service program.

Benefits:

Boost production, enhance the longevity of your equipment, and use less energy —Gradiant's tailored solutions redefine the potential of your membrane systems.



Optimizing production

Our treatment programs enable system operation at higher recovery rates without the risk of scaling. With optimized treatment programs, users commonly experience production increases and recovery rate improvements of 10% or more.



Increased Longevity

Applying a disciplined chemical program prevents irreversible membrane damage, reduces the frequency of membrane replacement, and ensures consistent, long-term performance, extending membrane life by 20% and more.



Improved Energy Efficiency

The careful combination of select chemicals will enhance membrane efficiency by preventing scale formation and minimizing fouling, lowering the workload on system feed pumps that translates directly into energy savings.

Have a question? Contact us at:
[gradiant.com/contact](https://www.gradiant.com/contact)

This document is for general information only. No warranty or guarantee whatsoever is given or implied and Gradiant is not bound by or liable for or by the information contained herein. Customer has the sole responsibility to determine whether the information in this document are appropriate for Customer's use, including without limitation actual site, geographical, and plant conditions, specifications, requirements, disposal, applicable laws and regulations. This document is the intellectual property of Gradiant, including but not limited to any patent or trademark contained in this document. Distribution of this document is not and does not imply any transfer of Gradiant's intellectual property.

Gradiant, the Gradiant logo, and all trade and service marks denoted with ™ and ® are owned by Gradiant Corporation unless otherwise noted. ©2024 Gradiant.

Document No. 800-004-01-EN
 April 2024



Learn more about Gradiant's water treatment expertise across your facility:

- [Technologies](#)
- [Solutions & Industries](#)
- [CURE Chemicals:](#)
 - Water Clarification Systems
 - Membrane Systems
 - Wastewater Treatment
 - Cooling Systems
 - Process Treatment
 - Boiler Systems