

1.1 RO MEMBRANE ELEMENT CLEANING PROCEDURE

1.1.1 General Information

Do not arbitrarily clean a new BWD System. It is unlikely that low product water production or high salinity readings from a new BWD System is due to fouling. If a new BWD System is not producing the expected quantity and/or quality of product water, run the new BWD System for up to 12 continuous hours to clear the RO Membrane Element Product Water Channel.

With regular use of the BWD System the RO Membrane Element will require occasional cleaning. Eventually, RO Membrane Element will require replacement due to biological growth and salt accumulation. Cleaning frequency will depend on the rate of production loss and salt rejection loss. Maintain the daily log readings to track performance changes.

The following variables should be considered and compensated for when determining the percentage of performance changes: feed water temperature, feed water salinity and operating pressure. After compensations have been made, a 10% decline in productivity and/or a 10% increase in salt passage indicate that the RO Membrane Element requires cleaning.

A drastic drop in production since the last use may be due to the RO Membrane Element drying out or fouling during storage. If the BWD System has not been used for several months, run the BWD System for up to 12 continuous hours to saturate the RO Membrane Element Product Water Channel.

A drastic drop in production from one day to the next may be due to chemical exposure or suspended solids fouling. It is unlikely this type of fouling is cleanable.

1.1.2 Types of Fouling

Biological fouling is usually the first cause of fouling. If not promptly addressed, the RO Membrane Element may become unusable and un-cleanable. Biological fouling begins upon first exposure to seawater.

Mineral fouling is a slow process, which takes place over many hours of use. If the RO Membrane Element has relatively few hours of use the fouling is likely biological. If the RO Membrane Element has 1000+ hours of use mineral fouling and biological fouling are likely.

Iron fouling affects the RO Membrane Element and damages the membrane surface. If the RO Membrane Element is heavily fouled with rust it may not be recoverable.

1.1.3 Cleaning Chemicals

Information

Cleaning Chemical	Chemical Type	Purpose
CH1002	Alkaline cleanser	Biological and oil (slight) removal
CH1000	Acid cleaner	Calcium carbonate and mineral deposit removal



CAUTION: Do not mix different cleaning chemicals together. Always mix cleaning chemicals separately and use them separately. Mixing the cleaning chemicals may neutralize the effectiveness of the cleaning chemicals.

Usage Requirements

The amount of product water required for rinsing and cleaning depends on which cleaning chemicals are used and which Pre-Filtration equipment is installed in the BWD System. See the following tables for detailed requirements.

The CCs are intended to clean the RO Membrane Elements in a closed-loop configuration and to clean moderate fouling. If fouling is extensive and in-filed cleaning is not successful the BWD System may be returned to BWD (or a service dealer) for a stronger chemical cleaning. To request BWD to perform a cleaning, contact BWD for a Return Authorization Number, a price quote and return instructions.

1.1.4 Cleaning Instructions

1. Close the Inlet Sea Cock Valve.
2. Replace all of the Pre-Filtration Elements with new Pre-Filtration Elements.
3. If not already connected, connect the Rinse/Clean Inlet line from the Rinse/Clean Inlet Valve to the pickup point of the Rinse/Clean Tank.
4. Fill the Rinse/Clean Tank full with non-chlorinated product water. The Rinse/Clean Tank must contain enough product water to sustain rinsing until all of the feed water is displaced. About 10 to 20 gallons of fresh product water is required.
5. Position the Rinse/Clean Outlet Valve to the Brine Discharge (normal operation) position.
6. Fully open the Back-Pressure Regulating Valve.
7. Operate the system by pressing the START button on the Touch Pad. The fresh water rinses the entire BWD System and discharges out to waste.
8. Just prior to depleting the rinse water from the tank, press the STOP button on the Touch Pad to stop the BWD System.
9. Refill the Rinse/Clean Tank with 10 to 20 gallons of non-chlorinated product water.
10. Fill a separate plastic bucket or container (1/2 to 2 gallons capacity) halfway with product water. Add the full contents of the BWD System CH1002 or CH1000 cleaning chemical to the water in the plastic bucket. After the Cleaning Chemical is thoroughly mixed and dissolved in the bucket, pour the solution into the Rinse/Clean Tank.
 - Storage Chemical Ratio: 1 bottle SC per 20 gallons product water
 - Example: For 10 gallons product water, add 1/2 bottle SC. For 20 gallons product water, add 1 bottle SC.
11. Position the Rinse/Clean Outlet Valve to the Rinse/Clean Tank return for a closed loop recirculation.
12. Operate the system by pressing the START button on the Touch Pad. The cleaning chemical solution now flows from the Rinse/Clean Tank, through the BWD System and then back to the Rinse/Clean Tank in the closed loop configuration.



CAUTION: Do not pressurize the system above 50 psi maximum.

13. After approximately 60 minutes of re-circulation, press the STOP button on the Touch Pad to stop the BWD System.
14. In order to empty the Rinse/Clean Tank, position the Rinse/Clean Outlet Valve to the Brine Discharge Thru-Hull Fitting.
15. Operate the system by pressing the START button on the Touch Pad. Operating the system discharges the SC mixture Brine Discharge Thru-Hull Fitting.
16. Just prior to depleting the cleaning chemical solution from the tank, press the STOP button on the Touch Pad to stop the BWD System.
17. Refill the Rinse/Clean Tank with non-chlorinated water.
18. Position the Rinse/Clean Outlet Valve to the Rinse/Clean Tank return for rinse re-circulation.
19. Operate the system by pressing the START button on the Touch Pad. Operating the system re-circulates the water from the Rinse/Clean Tank, through the BWD System and back into the Rinse/Clean Tank. Continue rinsing for 20 minutes.
20. After the 20 minutes of rinsing, press the STOP button on the Touch Pad to stop the BWD System.
21. In order to empty the Rinse/Clean Tank, position the Rinse/Clean Outlet Valve to the Brine Discharge (normal operating) position.
22. Operate the system by pressing the START button on the Touch Pad. Operating the system discharges the rinse water out through the Brine Discharge Thru-Hull Fitting.
23. Just prior to depleting the rinse water from the tank, press the STOP button on the Touch Pad to stop the BWD System.
24. Refill the Rinse/Clean Tank with non-chlorinated water.
25. Position the Rinse/Clean Outlet Valve to the Brine Discharge (normal operating) position.
26. Operate the system by pressing the START button on the Touch Pad. Operating the system rinses the BWD System and discharges the rinse water out through the Brine Discharge Thru-Hull Fitting to waste.
27. Just prior to depleting the rinse water from the tank, press the STOP button on the Touch Pad to stop the BWD System.
28. The BWD System is now ready for additional cleaning, storage or use.
 - If additional cleaning is required, repeat Steps 9 through 27 for each additional cleaning.
 - If cleaning is complete and the BWD system is to be stored, return to beginning of Section **Error! Reference source not found..**
 - If cleaning is complete and the BWD system will be operated again within a short period of time, proceed to the following step.
29. Position the Rinse/Clean Inlet Valve towards the Sea Strainer (normal operation) position.

