



Technical Service Bulletin

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Installation Procedures for PVD Membrane Elements Used for Production of Ultra-Pure Water in the Polishing Loop

This bulletin provides guidelines for start-up of Hydranautics' Polyvinyl Derivative (PVD) Reverse Osmosis (RO) membrane elements used to produce ultra-pure water (UPW) in the polishing loop. It includes procedures for the initial cleaning of piping and tubes, membrane element installation, and membrane element initial rinse-up.

System Cleaning

System cleaning procedures are as follows:

1. Clean the piping and pressure vessels of the RO system by recirculating Solution 2 (refer to TSB102 for specific details), with the addition of 0.4 liter of Triton X-100.
2. Disinfect the system by recirculating a 0.5-2.0% solution of hydrogen peroxide (H_2O_2) or ozone (O_3) for 24 hours through the system.
3. Flush the system with ultra-pure water for approximately 2-3 hours. Monitor total organic carbons (TOC), resistivity, and particle count of the inlet and outlet solutions. Stop the flushing when no significant change in these parameters is observed.

Membrane Element Installation

Membrane element installation procedures are as follows:

1. If the membrane element is filled with 0.5% formaldehyde, remove the formaldehyde by washing the elements with pure water, equal to or better than the feedwater.
2. Install one U-packing at the upstream groove of each element in such a way that the U-packing lip opens in the upstream direction.
3. Install O-rings in the interconnectors.

4. Load the membrane elements according to the pressure tube manufacturer's recommendation. For Hydranautics tubes, refer to TSB104.

Membrane Element Rinse-Up

Membrane element rinse-up procedures are as follows:

1. Flush the system with ultra-pure water for 2-3 hours. Monitor TOC, resistivity, and particle count of the inlet and outlet solutions. Stop the flushing when no significant change in these parameters is observed.
2. Run the system under regular operating conditions. Carefully monitor resistivity, TOC, and particle count of the permeate, feedwater, and concentrate. The resistivity of the permeate should reach the same level as that of the feedwater in about 50 hours. (The rate of resistivity increase depends on the total system design.)

System Disinfection

The system should be disinfected on a regular basis. Disinfection should be started when the water quality begins to deteriorate. Refer to TSB102 for sterilization procedures, and TSB103 for storage procedures.

Table 1 indicates the operating conditions during flushing, recirculation, soaking, and operation.

Table 1. Operating Conditions

OPERATION	FEED FLOW PRESSURE	RATE	SINGLE PASS ?***
Flushing	Low*	High**	Yes
Recirculation	Low*	High**	No
Soaking	Zero	Zero	No
Normal Operation	Regular	Regular	Yes

* Pressure should be high enough so that the brine pressure is higher than zero and permeate is produced in all membrane elements. Typically, a pressure of 70-140 psi is used.

** Do not exceed the maximum flow rate of 52.8 gpm per vessel.

*** During single-pass operation, the permeate and brine are not returned to the feed tank.