

## Technical Service Bulletin

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### Procedure for Pressure Vessel Probing

This bulletin provides general instructions for probing a pressure vessel containing reverse osmosis membrane elements. Probing a pressure vessel allows you to determine where there is a problem in a particular vessel. The problem may be either a poorly performing membrane element, an O-ring leak at an interconnector or end adapter, or possibly even a cracked adapter. Probing consists of inserting semi-rigid tubing into the permeate channel of the pressure vessel and measuring the water quality at different areas along the length of the pressure vessel.

### Test Equipment Set Up

1. Shut down the RO system.
2. Remove the permeate cap from the pressure vessel that you wish to probe. (The cap should be on the opposite end of the vessel from where you are collecting the permeate).
3. Connect a 1 1/4" threaded coupling to the permeate port. Thread in a 1 1/4" by 1/2" threaded reducer bushing into the coupling. Thread in a 1/2" nipple and 1/2" ball valve. Finally, thread in a 1/2" Parker Fast & Tite male connector (for 1/4" tubing). Remove the metal collar and O-ring from the Fast & Tite fitting.
4. Obtain a piece of 1/4" outside diameter natural colored polyethylene tubing. The tubing should be several feet longer than the length of the vessel. Obtain a 4" long piece of 3/8" outside diameter clear flexible polyethylene tubing. Slip 3.5" of the 4" long by 3/8" flexible tubing over the end of the 1/4" tubing. Using a permanent marker, mark the total length of tubing needed to place the end of the tubing at the point where the farthest element connects to the adapter. Then, mark the tubing in 20" increments from this point.

## Test Procedure

1. Close the ball valve on the probing fittings. Restart the RO system.
2. After the system has run for 15 minutes, insert the tubing into the Fast & Tite fitting while opening up the ball valve. Push the tubing in until the "total length" mark is reached.
3. After 1 minute, measure the conductivity of the water coming out of the tubing. Recheck several times to make sure the value is constant. Record the conductivity and note the location.
4. Pull the tubing out 20" using your black marks as a guide, wait 1 more minute, and repeat the measurement procedure. You may slightly close the ball valve to hold the tubing in place. When the end of the tubing comes out of the vessel, close the ball valve, and continue to the next vessel.
5. Chart the value of the permeate conductivity over the length of the vessel. A steady trend should be observed as a function of position.

## Interpreting Probing Data

Evaluation of the data can be done by reviewing the conductivity values along the length of the permeate channel for individual pressure vessels, and by comparing the trends of parallel vessels against one another. Since individual situations and systems are unique, it is best to contact Hydranautics for consultation in analyzing data.

In many cases, a sudden increase in the permeate conductivity at a junction between elements indicates an O-ring problem or a disconnect between elements and interconnectors. Replace faulty O-rings and ensure that elements are properly shimmed (TSB109) to eliminate one possible source of a problem. If the problem should persist following these corrective actions, contact Hydranautics for specific information on troubleshooting a particular system.

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