

Technical Service Bulletin 108

Vessel Probing

A useful diagnostic method to identify membrane performance problems within a pressure vessel is to probe the elements within the pressure vessel in order to identify O-ring or interconnector leaks, locate poorly performing elements, or to identify other problems. Vessel probing involves inserting a length of polyethylene tubing into the vessel permeate channel so that conductivity measurements can be taken from each element within the pressure vessel. If abnormally high conductivity is observed at any individual element, this may be an indication of a poorly performing membrane element, O-ring leak, decoupled interconnector, or other problem.

Setting Up the Equipment

1. Shut down the RO system or train containing the pressure vessel(s) to be probed.
2. Remove the permeate cap from the opposite end of the pressure vessel from where you intend to measure permeate conductivity.
3. Connect a 1¼ inch threaded coupling to the permeate port and thread a 1¼ inch x ½ inch threaded reducer bushing into the coupling. Next, thread onto the coupling a ½ inch nipple and DN 15 (½ inch) ball valve onto the assembly. Finally, thread a ½ inch Parker Fast & Tight male connector for use with DN 10 (⅜ inch) tubing. Remove the metal collar and O-ring from the Fast & Tight fitting.
4. Obtain a length of DN 10 (⅜ inch) O.D. polyethylene tubing. The length of tubing needs to be significantly longer than the length of the pressure vessel being probed.
5. Using a marking pen with permanent ink (non water-soluble ink), place a mark at the point where the furthest membrane element connects to the end adapter. This is the "total length" mark. Then, mark the tubing in 508 mm (20-inch) increments from that point forward. (Black tubing is not recommended as you must be able to observe the markings)
6. Close the ball valve on the probe fitting and restart the RO system or put the train back in service.
7. Allow the system or train to run for approximately 15 minutes to stabilize performance.
8. After performance has stabilized, insert the tubing into the Fast & Tight fitting while opening the ball valve. Insert the tubing down the length of the permeate channel until the "total length" mark is reached.
9. After approximately one minute, measure the conductivity of the water coming out of the tubing. Repeat the reading several times to confirm that the values are consistent. Record the conductivity and the location from which it was taken.
10. Retract the tubing 508 mm (20 inches) to the next mark, wait one minute, repeat the conductivity measurement and record the data and the position from which the data was taken. Repeat this procedure until all element positions have been probed. You may want to slightly close the ball valve to better hold the tubing in place. Once the tubing has been removed from the vessel permeate channel, close the ball valve and continue to the next vessel.

Evaluate the conductivity values along the length of the permeate channel for each individual pressure vessel, then compare the trends of vessels operating in parallel. A sudden increase in conductivity where two elements interconnect indicates a feed to permeate leak that may be caused by a leaking O-ring or a disconnected interconnector. Replacing the faulty O-ring or reseating the interconnector can easily resolve the issue. If interconnectors become decoupled, shim the element stack within the pressure vessel. Please refer to "Vessel Shimming Procedures - TSB 103"

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