

Reverse Osmosis Membrane

Technical Service Bulletin 115

RO Element Start-Up Consideration and Checklist

Successful RO element performance, both short term and long term, depends on handling, operation, and maintenance in accordance with all published guidelines and limits. Specific guidelines and limits can be found in:

- Performance projection software, Q+
- Element Specification Sheets
- Standard and Custom Warranties
- Tech Service Bulletins

Please refer to all appropriate documents to become familiar with the guidelines and limits for a specific project. As an RO element manufacturer, NanoH2O's scope of supply and liability is limited. The considerations and items presented below are intended as a general reference and are not to be considered all inclusive for any specific project.

Feedwater Source and Pretreatment

- New wells are properly flushed and within SDI and turbidity limits.
- Intake or well flows are able to provide continuous design feed flow to all RO units.
- All pretreatment processes are ready as designed and will meet SDI targets.
- New depth filtration media and carbon are properly installed, backwashed, and rinsed.
- New cartridge filters are properly installed, sealed, rinsed, and free of any chemical leachate.
- Chemical tanks are filled with proper chemicals.
- Chemical injection points are properly located.
- Chemical suction and discharged piping are installed as designed.
- Provisions exist for proper chemical mixing and draw-down measurement.
- If dechlorination is part of pretreatment process, carefully review design, operation, and means of detecting chlorine residuals.

Instrumentation, Sampling, and Monitoring

- Each RO stage requiring monitoring and performance tracking contains provision for reporting: permeate flow, concentrate flow, feed pressure, concentrate pressure, permeate pressure, feed conductivity, permeate conductivity, feed temperature, and feed pH.
(Note: This includes individual stages of a multi-stage RO unit)
- Instruments are properly located and installed.
- Instruments are calibrated to the manufacturer's specifications.
- SCADA (Supervisory Control and Data Acquisition) if provided is functioning and available for retrieval of historic operating data.
- Data collection routine for startup and long term operation has been established.
- Data normalization and analysis routine has been established.
- Arrangements have been made to use either NanoH2O's QSee normalization program or direct transmission of data (in spreadsheet form) to NanoH2O for review and entry into QSee.
- Sample valves are located in the feed, permeate, and concentrate piping of each RO stage to be monitored
- Sample valves, or taps, are located in the permeate piping of each RO pressure vessel.
(Note: sampling must occur at the end of the vessel where the permeate is collected and sent to the RO array permeate piping header)
- Sampling valves and piping exist to allow permeate flow path probing of each pressure vessel.

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RO Element Handling

- Elements have been stored in their original packaging.
- Elements have been stored in a freeze-protected area, not exposed to direct sunlight, or temperatures that exceeded 35°C at any time.
- Preservative of elements stored more than 60 days has been spot checked
(Note: Elements are preserved in a sodium bisulfite solution which may weaken over time. If the pH level of the preservative solution is less than pH 3, contact NanoH2O for re-preserving instructions)
- Only approved lubricants are to be used for element loading.
- For RO units requiring permeate bacteria testing at start-up, special handling and protection should be used to prevent contamination of permeate flow path parts and fittings.
- All pressure vessels are shimmed in accordance with vessel manufacturer guidelines.
- Element serial numbers and loading sequence have been recorded.

Auxiliary and Support Systems

- Shutdown and start-up flush systems are ready as designed.
- Proper flush water source is available.
- Flush lines and tanks have been pre-flushed and sanitized as required
- CIP system is ready as designed.
- All CIP lines have been properly flushed.
- All CIP temporary spool piping is ready.
- Energy recovery devices, associated instrumentation and sample valves are properly installed.
- Piping to and from the ERDs has been properly flushed.
- Provisions have been made to direct design permeate flow to drain without back pressure, if needed during initial start-up.
- Provisions have been made for concentration discharge at design flow without backpressure that exceeds design.

RO Unit Startup and Operation

- Functional testing has been performed to assure that control logic, RO unit shutdowns, and alarms will function as designed.
- All feed piping to the RO stage entry point has been flushed and sanitized as required.
- Permeate pressure relief is operational and installed as designed.
- Permeate piping is open, free, and clear of any restrictions causing a backpressure that exceeds the limits of the RO elements.
- Feed pressure will be applied at a rate that does not exceed 10 psi (0.7 bar) per sec.
- Provisions have been made to vent trapped air from all feed, concentrate and permeate piping prior to start of the high pressure pump.
- Anti-siphon protection has been provided to assure that all RO stages remain full of flush water upon shutdown. RO elements will not be exposed to air when off line.
- Provisions have been made to allow RO units to run continuously during the first 48 hours of operation.
- Critical spares parts (RO elements, O-rings, adapters, interconnectors, rupture discs) are available on site.

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