

Reverse Osmosis Membrane

Technical Service Bulletin 106

Membrane Element Operation Precautions

To obtain the maximum service life from your NanoH2O membrane elements, certain precautions should be followed to avoid element damage or impaired performance. Additional requirements may be outlined in your product or performance warranty and in other sections of this technical manual. Should there be a conflict between the values and information provided in this manual and in your warranty, the values and information provided in your warranty supersede those outlined in this manual.

Cautions Regarding Feedwater Quality, Operating Limits and Recommended Good Practices

Failure to observe any of the following may result in irreversible damage to your membrane elements, shorten the membrane element's useful life and void the product warranty.

- The maximum applied pressure shall NEVER exceed the value outlined in the NanoH2O product data sheet.
- The maximum permeate water recovery shall NEVER exceed the maximum safe water recovery specified by NanoH2O's **Q+ Projection Software**.
- The RO feedwater shall contain NO more than 0.1 ppm of free chlorine.
- The RO feedwater shall contain NO concentration of oil or grease.
- The RO feedwater shall NEVER exceed a 15-minute Silt Density Index (SDI15) of 5 or an NTU of 1. Please refer to "Silt Density Index (SDI15) Procedure - TSB 107" in this manual for more information on how to measure SDI.
- The RO feedwater shall NOT exceed a temperature of 45°C (113°F).
- The membrane elements shall be taken offline and chemically cleaned when the pressure differential (ΔP) reaches 1 bar (15 psi) per element and/or 3.8 bar (55 psi) for the housing.
- Only chemicals approved by NanoH2O should be used in conjunction with the operation and maintenance of your membrane
- The pH operating range shall be 2-11 pH. The pH cleaning range shall be 2-12 pH.
- If a more aggressive cleaning is required (ie. pH 13), please contact the NanoH2O Tech Service Team before proceeding.

Cautions Regarding Permeate Valve Operation

RO membrane elements should **NEVER** be exposed to permeate backpressure exceeding the feed or concentrate static pressure. This potential issue is most frequently encountered during system or train shutdown. The permeate valves must remain open during all phases of train or system operation including pre-start-up, flushing, cleaning and normal operation.

 CAUTION

Closing the permeate valves during any phase of system or train operation will create a pressure differential across the tail-end membrane elements that can result in ruptured glue lines and an immediate increase in salt passage. Ruptured glue lines cannot be repaired.

The permeate valves may be closed after flushing and cleaning, following a complete system or train shutdown. It is good practice to fully close the permeate valves during extended periods of shutdown to prevent an aerobic environment in the pressure vessels that can lead to biological growth. Be sure to reopen the permeate valve(s) prior to introducing feedwater back into the system or train.

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Cautions Regarding Concentrate Valve Operation

Prior to train or system start-up, confirm that the concentrate control valve (the valve that controls the ratio of concentrate flow to permeate flow) is in the fully open position.

⚠ CAUTION

NEVER start up a train or system with the concentrate control valve fully or partially closed. After feedwater is introduced to the train or system with the concentrate control valve fully open, slowly close the valve until the desired recovery is achieved. Starting a train or system with the concentrate control valve fully or partially closed can over-pressurize the system, damage the membrane elements, burst piping and create a safety hazard. Train or system permeate recovery should NEVER exceed the maximum safe permeate recovery as recommended by NanoH2O or by its Q+ Projection Software.

Cautions Regarding the Rate of Pressurization During Start-up

No train or system should be brought online (pressurized) at a rate faster than 0.7 bars (10 psig) per second.

⚠ CAUTION

Rapid pressurization of a train or system can cause mechanical damage to the membrane elements. Such damage can include cracking of the fiberglass outer-shell, failure of the anti-telescoping device and membrane telescoping. Mechanical damage to membrane elements caused by overly rapid pressurization or over-pressurization will void any product or performance warranty.

Chlorine Tolerance

NanoH2O membrane elements show some resistance to short-term chlorine (hypochlorite) exposure. The free chlorine tolerance of the membrane is < 0.1 ppm. Continuous exposure, however, may damage the membrane and should be avoided. Under certain conditions, the presence of free chlorine and other oxidizing agents will cause premature membrane failure. Since oxidation damage is not covered under warranty, NanoH2O recommends removing residual free chlorine by pretreatment prior to membrane exposure.

⚠ CAUTION

Membrane damage caused by oxidation is irreversible and will void your product or performance warranty.

Cautions Regarding the Use of Lubricants

Petroleum-based lubricants should **NEVER** be used in conjunction with NanoH2O RO membrane elements. Approved lubricants for interconnector O-rings, end adapter O-rings or membrane element brine seals include glycerin, silicon-based Molykote III, or other silicone-based lubricants that do not contain hydrocarbons.

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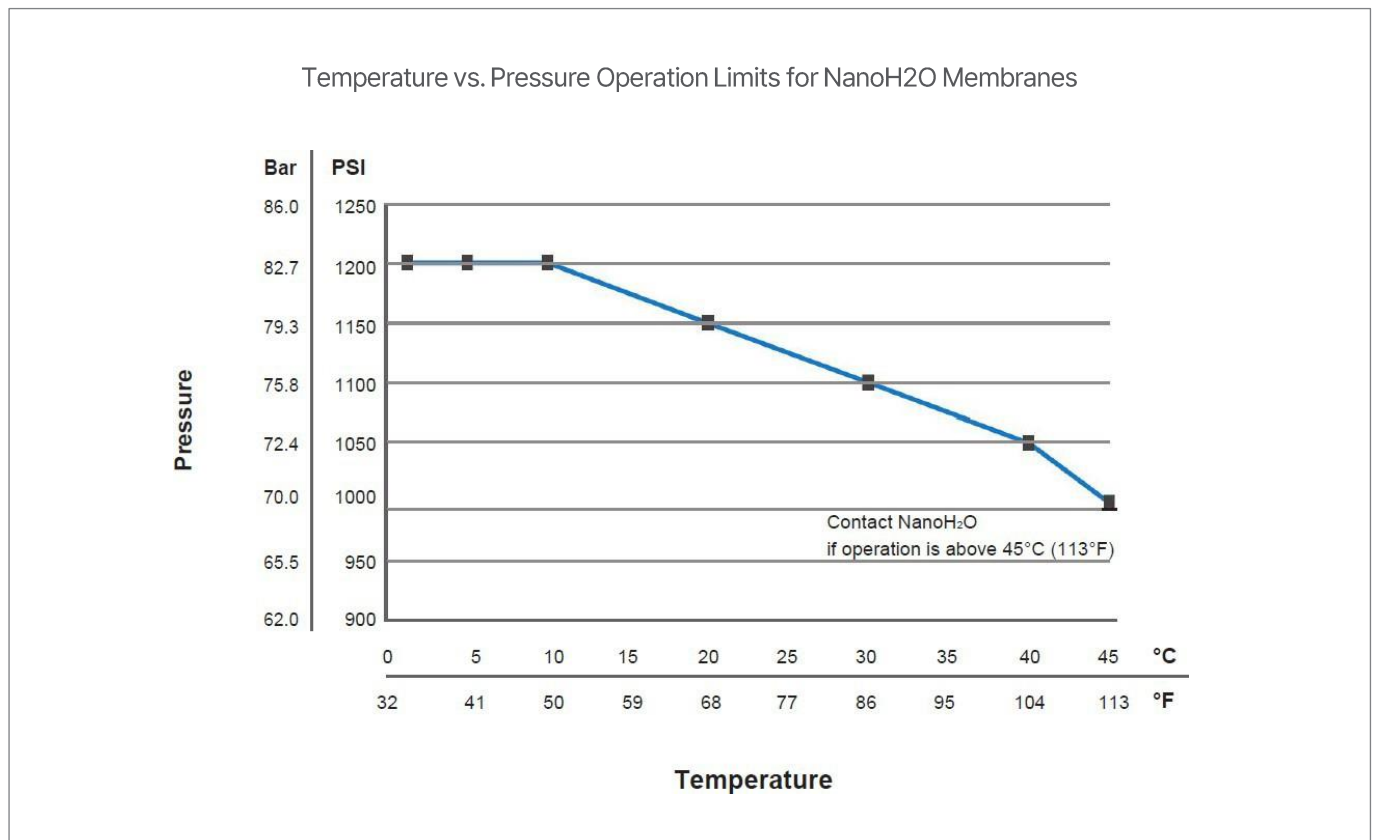
Cautions When Operating at High Temperature and High Pressure

Operation at certain high temperature and high pressure may result in compaction of the polysulfone support layer. Membrane compaction reduces permeability, resulting in higher feed pressure to maintain permeate flow (Figure 106.1).

CAUTION

Reduction in permeability from compaction caused by operation at feedwater temperatures and pressures that exceed NanoH2O's recommended limits will void your product or performance warranty. NanoH2O membrane elements should be operated in compliance with the temperature and pressure recommendations outlined in the following graphs. Please contact NanoH2O Technical Support for additional information.

Figure 106.1



The information and data contained herein are deemed to be accurate and reliable and are offered in good faith, but without guarantee of performance. NanoH2O assumes no liability for results obtained or damages incurred through the application of the information contained herein. Customer is responsible for determining whether the products

and information presented are appropriate for the customer's use and for ensuring that customer's workplace and disposal practices are in compliance with applicable laws and other governmental enactments. Specifications subject to change without notice.

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