Element Start-Up Guide Heat-Sanitizable Elements

The following guidelines are intended to provide information on initializing operation with TRISEP® heat-sanitizable reverse osmosis (RO), nanofiltration (NF), ultrafiltration (UF) and microfiltration (MF) elements. For questions regarding deviations from these guidelines, please contact MICRODYN-NADIR Technical Service.

SAFETY EQUIPMENT

Having proper equipment is essential for safely executing the following start-up procedure. Appropriate gloves, shoes and safety glasses should be worn at all times. Additional equipment may be necessary depending on specific system design.

HEAT-SETTING PROCEDURE

After the elements have been removed from their packaging and have been installed into their pressure vessels (please refer to **Element Loading Guide – Loading of Pressure Vessels** (TSG-O-006) for loading instructions), the following heat-setting procedure must be performed prior to initial use of elements. The procedure below will remove residual storage solution and will prepare membranes for start-up. This same procedure may also be used for subsequent heat-sanitizations.

Heat-sanitizable RO and NF elements will have high water permeability before being exposed to the initial heat-setting procedure. After the initial heat-setting, the elements will experience a one-time flux loss and attain the specified flow and salt rejection performance characteristics listed on the product data sheet. The performance will remain stable despite subsequent additional heat-sanitization cycles.

TABLE 1. HEAT-SETTING PROCEDURE FOR TRISEP HEAT-SANITIZABLE RO, NF, UF, AND MF ELEMENTS FOR HIGH PURITY APPLICATIONS.

Step	Procedure
1	Flush system with high quality water to drain for 30 min at low pressure and low permeate flow rate (see Tables 2 & 3).
2	Recirculate near-neutral (pH 6 – 8) water through the system at a pressure not exceeding 1.7 bar (25 psi). Maximum pressure drop through a single element is 0.5 bar (7.3 psi).
3	Ramp temperature up at a rate no faster than 5°C/min until a temperature between 80 – 90°C (176 – 194°F) for one hour.
4	Maintain temperature between 80 – 90°C (176 – 194°F) for one hour.
5	Ramp temperature down at a rate no faster than 5°C/min until a temperature below 45°C (113°F) is achieved.
6	Flush system with high quality water to drain at very low pressure (Table 2).

Note: DO NOT recycle permeate during the heat-setting procedure.
Note: DO NOT start-up a second pass RO before the first pass RO has been heat-set.

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RECOMMENDED WATER QUALITY AND FLOW RATES

The system flush during heat-set should be performed with high-quality water (see Table 2).

TABLE 2. FLUSH WATER QUALITY RECOMMENDATIONS.

Solute	Recommended Limit
Iron (Fe)	< 0.05 mg/L
Manganese (Mn)	< 0.02 mg/L
Aluminum (Al)	< 0.05 mg/L
Silica (SiO_2)	< 5.0 mg/L
Total Hardness as $CaCO_3$	< 50 mg/L as $CaCO_3$
Total Alkalinity as $CaCO_3$	< 50 mg/L as $CaCO_3$
Chlorine	0 mg/L *
Turbidity	< 0.5 NTU
Silt	< 1 SDI

* Chlorine must be undetectable for RO & NF membranes and may be ≥ 2 mg/L for UF & MF membranes.

The recommended flow rates for flushing vary based on the diameter of the elements (see Table 3).

TABLE 3. RECOMMENDED FLOW RATES FOR FLUSHING.

Membrane Diameter	Flow Rate per Vessel	Recommended Pressure
4.0"	2.7 – 3.2 m^3/hr (12 – 14 GPM)	1.5 – 4.0 bar (20 – 60 psi)
8.0"	7.0 – 9.1 m^3/hr (30 – 40 GPM)	1.5 – 4.0 bar (20 – 60 psi)

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