

## Technical Service Bulletin

August 2018 TSB218.01

### Sanitary, Food Processing Membrane Storage, Preservative Flushing, and Start-up Guidelines

This Technical Service Bulletin provides information related to storage, starting up, and initial flushing of Hydranautics' sanitary, food processing membrane elements.

#### Storage Guideline

When elements are stored prior to installation, they should be protected from direct sunlight and stored in a cool, dry place with an ambient temperature range of 40°F to 95°F (4.4°C to 35°C). During the period of transit between the factory and the plant site, the elements should not be exposed to temperatures below freezing, 32°F (0°C), or above 113°F (45°C). New elements may be enclosed in a sealed polyethylene bag containing a storage solution, and then packaged in a cardboard box. Large shipments may come packaged in crates strapped to pallets containing 25 single elements. When storing the pallets of elements, they may be stacked two high. Pallets should NOT exceed two high.

#### Storage Period

Because of long-term potential for biological growth even with well packaged and preserved membrane elements and to maintain optimum element performance, the following recommended storage periods should be observed.

Product	Recommended storage period from date of shipment (months)
SUPRO	12
DairyUF 5K, DairyUF 10K	9
DairyUF 10K-HF	9
DairyRO (all)	12
HYDRACoRe (all)	12

## **System Start-up**

Once removed from the vacuum bag, membrane elements should be loaded into the pressure vessels immediately. Prolonged exposure to the open atmosphere over several days may cause the membrane to oxidize and discolor. This discoloration does not have any impact on membrane performance and warranty claims for such discoloration will not be accepted.

It is important to be sure that the elements are loaded and shimmed correctly to remove any excess slack that may cause disconnects. The user should prepare an element loading diagram to record serial number(s), date, element model number, and location in the system for future reference. Seals should be well lubricated with a non-petroleum based lubricant such as glycerine. Insert the ATD with lip seals with a slow twisting motion to ensure proper connection. A low pressure flush to purge air from the membranes is always recommended before a high pressure startup. This can be accomplished through the use of a soft-start mechanism, or a variable frequency drive. Failure to do this can result in a water shock wave (water hammer) that can cause physical damage to the membranes. The permeate valves should always be open to drain during this flush to prevent damage to the membranes.

After the air has been purged from the system the feed pressure should be increased gradually up to the working pressure of the RO/NF unit. Pressurization (and depressurization) of the membrane elements should not exceed ten (10) psi/second (0.7 bar/second) at any time.

## **Preservative Flushing Introduction**

To preserve elements from biological growth and to help maintain performance over time, new Hydranautics membranes are stored in dionized water, sodium bisulfite solution, or are shipped dry. (Please see product specification sheet to determine preservation solution for each specific product). It is therefore required to flush new membranes prior to first use to eliminate residual preservatives in the product stream.

## **Preservative Flushing during Start-up**

Hydranautics has received both US and European Union approvals for our sanitary, food processing membrane products. These approvals are contingent on 30 minutes of low pressure flushing of new elements to ensure that any preservative and other potential manufacturing residual chemicals are sufficiently removed from the element prior to first use. We also recommend that the user carry out a bisulfite test of the product water after flushing to ensure that SBS concentration is below any additional regulations required by local authorities. Flush water should be clean water of RO permeate or DI quality and be free of hardness, transition metals, and chlorine.

**Note: A more stringent Clean-in-Place prior to first use of new membranes is highly recommended.**

**Pre-start cleaning procedure for SuPRO, DairyUF<sup>®</sup> 5K, DairyUF<sup>®</sup> 10K, and DairyUF<sup>®</sup> 10K-HF spiral elements**

The following procedure should be performed prior to first use of elements. This procedure will remove storage preservative (if present) and condition membranes for production.

Step 1. Flush Cycle. Flush system at low pressure with clean water of RO permeate or DI quality using three times system hold-up volume sending concentrate and permeate to drain.

Neutral pH, 113 °F (45 °C), 15 minute duration

Step 2. Alkaline Wash. Cleaning solution (target pH of 10.0-10.5) of 0.1% (w) of NaOH (sodium hydroxide) and 0.03% (w) of SDS (sodium dodecylsulfate). This wash is useful in the removal of organic foulants of natural origin, colloidal foulants of mixed organic/inorganic origin, and biological material (fungi, mold, slimes and biofilm). SDS is a detergent that is an anionic surfactant that will cause some foaming. Use clean water of RO permeate or DI quality for the make-up water.

pH 10.0-10.5, 113 °F (45 °C), 15 minute duration

Step 3. Flush Cycle. Flush system at low pressure with clean water of RO permeate or DI quality using three times system hold-up volume sending concentrate and permeate to drain.

Neutral pH, 113 °F (45 °C), 15 minute duration

Step 4. Alkaline Wash with chlorine. Cleaning solution (target pH of 10.0-10.5) of 0.1% (w) of NaOH (sodium hydroxide) and 0.03% (w) of SDS (sodium dodecylsulfate). Add NaClO to maintain 150-180 ppm total chlorine Use clean water of RO permeate or DI quality for the make-up water.

pH 10.0-10.5 with 150-180 ppm total chlorine, 113 °F (45 °C), 15 minute duration

Step 5. Flush Cycle. Flush system at low pressure with clean water of RO permeate or DI quality using three times system hold-up volume sending concentrate and permeate to drain.

Neutral pH, 113 °F (45 °C), 15 minute duration

## **Pre-start cleaning procedure for HYDRACoRe (all) and DairyRO (all) spiral elements**

The following procedure should be performed prior to first use of elements. This procedure will remove storage preservative (if present) and condition membranes for production.

Step 1. Flush Cycle. Flush system at low pressure with chlorine free, clean water of RO permeate or DI quality using three times system hold-up volume sending concentrate and permeate to drain.

Neutral pH, 113 °F (45 °C), 15 minute duration

Step 2. Alkaline Wash. Cleaning solution (target pH of 10.0-10.5) of 0.1% (w) of NaOH (sodium hydroxide) and 0.03% (w) of SDS (sodium dodecylsulfate). This wash is useful in the removal of organic foulants of natural origin, colloidal foulants of mixed organic/inorganic origin, and biological material (fungi, mold, slimes and biofilm). SDS is a detergent that is an anionic surfactant that will cause some foaming. Use chlorine free, clean water of RO permeate or DI quality for the make-up water.

pH 10.0-10.5, 113 °F (45 °C), 15 minute duration

Step 3. Flush Cycle. Flush system at low pressure with chlorine free, clean water of RO permeate or DI quality using three times system hold-up volume sending concentrate and permeate to drain.

Neutral pH, 113 °F (45 °C), 15 minute duration

Step 4. Alkaline Wash. Cleaning solution (target pH of 10.0-10.5) of 0.1% (w) of NaOH (sodium hydroxide) and 0.03% (w) of SDS (sodium dodecylsulfate). Use chlorine, free, clean water of RO permeate or DI quality for the make-up water.

pH 10.0-10.5, 113 °F (45 °C), 15 minute duration

Step 5. Flush Cycle. Flush system at low pressure with chlorine free, clean water of RO permeate or DI quality using three times system hold-up volume sending concentrate and permeate to drain.

Neutral pH, 113 °F (45 °C), 15 minute duration

### **General Precautions in Cleaning Chemical Usage**

- High-quality water must be used for flushing, cleaning, and disinfecting membranes. Water must be chlorine free for RO and NF systems.
- Minimize temperature differences between cleaning and rinse steps. The temperature difference should not exceed 20F (11C).
- Verify that proper disposal requirements for the cleaning solution are followed

- For safety reasons, make sure all hoses and piping can handle the temperatures, pressures and pH's encountered during a cleaning.
- For safety reasons, always add chemicals slowly to an agitated batch of make-up water.
- For safety reason, always wear safety glasses and protective gear when working with chemicals.
- For safety reasons, do not mix acids with caustics. Thoroughly rinse the 1st cleaning solution from the RO system before introducing the next solution.

## **System Shutdown**

Upon system shutdown, a fresh water flush at low recovery (brine valve wide open) for several minutes is usually sufficient to displace any feed/brine solution from membranes. The permeate valves should be open to drain during this flush to prevent damage to the membranes. Flush water should be clean water of RO permeate or DI quality and be free of hardness, transition metals, and chlorine.

For any shutdown longer than 4 hours, a Clean in Place should be performed prior to returning the membrane elements to service.

For periods where the system must remain out of operation for more than five days, but fewer than thirty days, with the membrane elements in place. Prepare the system as follows:

1. Flush the system at low recovery (brine valve wide open) for several minutes. The permeate valves should be open to drain during this flush to prevent damage to the membranes. Flush water should be clean water of RO permeate or DI quality and be free of hardness, transition metals, and chlorine.
2. When the pressure tubes are filled, close the appropriate valves to prevent air from entering the system.
3. Reflush as described above at 5-day intervals.
4. Perform full Clean in Place prior to returning membranes to service.

Please refer to TSB108 for more details.

### **NOTE:**

The quantity of water used in both normal *System Start-up* and *System Shutdown* flushing should be equal to or greater than that which is retained in the system. For standard 8-inch X 40-inch elements assume ten (10) gallons (37.85L) per element. For standard 4-inch X 40-inch elements assume three (3) gallons (11.35L) per element.

If further information is required, please relay questions to the Technical Support department at our corporate headquarters.

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