

### Membrane Start-up, Shutdown, and Preservative Flushing Guidelines

This Technical Service Bulletin provides information related to starting up and shutting down an RO/NF system with Hydranautics membranes, and for flushing composite elements prior to use.

#### Preservative Flushing Introduction

To preserve elements from biological growth and to help maintain performance over time, Hydranautics Composite Polyamide type membranes are stored in dionized water, a 0.99% sodium bisulfite solution, or a combination of 0.99% sodium bisulfite and 10% propylene glycol solution (Please see product specification sheet to determine preservation solution for each specific product). It is therefore advised to flush membranes prior to use to eliminate residual preservatives in the product stream.

Once the elements have had the preservatives flushed from them, they would need to have preservatives re-applied for long-term storage. Please refer to TSB108 which details our short-term and long-term storage procedures for our composite membranes.

#### Preservative Flushing during Start-up

Hydranautics has received NSF61 approval of our RO and NF products. These approvals are contingent on 30 minutes of low pressure flushing of new elements to ensure that sodium bisulfite (SBS) preservative is sufficiently removed from the element prior to 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. If the elements are to be used in systems requiring ultrapure water, a minimum flushing time of 24 hours is recommended to reduce the TOC concentration to below 50 ppb (assuming zero TOC in the feedwater).

Warning: For potable applications using models that are preserved with both sodium bisulfite and propylene glycol, discard the product water for at least 24 hours prior to drinking or using in food applications. Ingestion of the preservative may cause irritation to the gastrointestinal tract, colic, diarrhea, or other similar symptoms.

For potable applications using models that are preserved with sodium bisulfite only, discard the product water for at least 30 minutes prior to drinking or using in food applications.

### **RO/NF System Start-up**

It is important to be sure that the elements are loaded and shimmed correctly to remove any excess slack that may cause disconnects (see TSB122 - Element Loading Guidelines). 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 RO/NF 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.

### **RO/NF System Shutdown**

#### ***Brackish Systems***

Upon shutdown for brackish systems, a flush with the feed water at low recovery (brine valve wide open) is usually sufficient to remove the high concentration of salts from the membranes. The permeate valves should be open to drain during this flush to prevent damage to the membranes.

#### ***Seawater Systems***

Upon shutdown for seawater systems, a flush with RO/NF permeate is recommended to remove the high concentration of salts from the membranes. The permeate valves should be open to drain during this flush to prevent damage to the membranes. If RO/NF permeate is temporarily unavailable, the membranes should be flushed with RO/NF feed at low recovery (with brine valve wide open). The membranes should then be flushed with RO/NF permeate as soon as it is available. The seawater RO/NF system should not be left unflushed with a high concentration brine on the membrane surface.

#### **NOTE:**

The quantity of water used in both normal *RO/NF System Start-up* and *RO/NF System Shutdown* flushing should be equal to or greater than that which is retained in the system.

For standard 16-inch X 40 inch elements assume thirty-four (34) gallons (130 L) per element. 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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