

## Membrane Element Flushing - TB 109

Prior to first use, it is strongly recommended that the membrane elements be flushed. Seawater RO membrane elements must also be flushed following system or train shutdown to remove highly concentrated salts from the membrane elements.

### Remove Membrane Preservatives

The membrane elements are shipped after being immersed in a 1% bisulfite solution and drained.

After installation, the permeate produced for the first 10 minutes of plant operation should be discharged.

### Pre-Flush of RO System at Start-up

Prior to installing the membrane element(s), the system or train **MUST** be flushed to remove any entrained air in the pressure vessel.

Prior to initial flushing, please ensure that the elements are correctly loaded and that all O-rings and brine seals are properly installed. Ensure that the elements in each pressure vessel have been properly shimmed to remove any excess slack in the pressure vessels.

Initiate a low pressure flush at 1 - 1.4 bars (15-20 psig) to ensure that all air is purged from the membrane elements and pressure vessels prior to ramping up the pressure to achieve normal operation. The low pressure flush should be carried out with the permeate valves open to drain, the concentrate control valve fully open and a soft-start mechanism or variable speed drive.

## CAUTION

*Failure to remove entrained air can result in mechanical damage to the membrane elements due to high hydraulic forces resulting from water hammer.*

### **Notes:**

When flushing a membrane element, the permeate valves should be open to drain and the concentrate control valves should also be fully open to avoid damaging the membrane elements. For any flushing operation to be effective, the volume used for flushing should exceed the liquid hold-up volume of the membrane elements. For standard 8-inch x 40-inch elements, assume the hold-up volume is 37.85 liters (10 gallons) for each membrane element. For standard 4-inch x 40-inch elements, assume the hold-up volume is 11.35 liters (3 gallons) for each membrane element. To ensure the highest quality permeate stream, discard the first hour's worth of permeate after initial start-up.

## CAUTION

*System pressurization and depressurization should be accomplished slowly and should not exceed 0.7 bar/sec (10 psig/sec).*

### Post-Flush of RO System at Shutdown

For seawater systems, it is ***strongly recommended*** that highly concentrated salts be removed from the system by flushing after every shutdown.

Following system or train shutdown, it is **REQUIRED** that the membrane elements be flushed with RO feedwater to remove the high concentration of salts contained in the membrane elements. An RO system or train should never be shut down without immediately flushing the high TDS concentration from the membrane elements.

### CAUTION

*Failure to remove the high TDS concentration of the hold-up volume in the membrane elements may result in damage to the elements.*

#### **Notes:**

When flushing a membrane element, the permeate valves should be open to drain and the concentrate control valves should also be fully open to avoid damaging the membrane elements. For any flushing operation to be effective, the volume used for flushing should exceed the liquid hold-up volume of the membrane elements. For standard 8-inch x 40-inch elements, assume the hold-up volume is 37.85 liters (10 gallons) for each membrane element. For standard 4-inch x 40-inch elements, assume the hold-up volume is 11.35 liters (3 gallons) for each membrane element.

Notice: The use of this product in and of itself does not necessarily guarantee the removal of cysts and pathogens from water. Effective cyst and pathogen reduction is dependent on the complete system design and on the operation and maintenance of the system.

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