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Membrane Cleaning Procedures

1. Purpose

1.1. Defines the purpose for cleaning RO membranes. The purpose of cleaning membranes is to remove contaminants embedded in the membrane surface.

2. Scope

2.1. This procedure applies to Driessen Water 1 dba Ultrapure & Industrial Services located in Dallas Texas.

3. Equipment

3.1. Chemical Mixing tank, RO storage tank, Sterilant holding tank, Water holding tank and pump, RO cleaning skid with pump, filters, filter housing, RO unit, conductivity meter, and pH monitor.

4. Procedure

4.1. 1st Step Low pH Cleaning

4.1.1. Low pH RO cleaning solution is AVISTA L403 acidic membrane cleaner formulated to remove mineral scale & metal hydroxides from the membrane surface. The pH for membrane cleaning must range from 2.5 – 3.5.

4.1.2. Add low pH cleaning solution to RO product water in the chemical mix tank. (Desired pH 2.5 – 3.5) Water temperature should be 95 – 105 F and must have reached desired pH to start membrane wash sheet.

4.1.3. Once desired temperature and pH have been achieved circulate the chemical through the membranes to be cleaned for (1) one hour.

4.1.4. Log readings on CL064D Membrane Cleaning data Sheet.

4.1.5. After (1) one hour rinse the chemical out of the membranes by

running RO product water through the membranes until the pH comes up to 5.5 – 7.0.

4.2. 2nd Step Sterilant (ONLY IF REQUESTED BY CUSTOMER)

4.2.1. Sterilant is circulated for bacteria control.

(Sterilant is **Minncare Cold Sterilant**)

4.2.2. Remove filters from housings.

4.2.3. Add Sterilant to 50 gallons of RO product water then check concentration with 1% test strips. If concentration is not at 1% keep adding Sterilant until 1% is achieved.

4.2.4. Circulate Sterilant through the membranes for 2 hours.

4.2.5. After 2 hours rinse the Sterilant out of the membranes until the pH reaches 5.5 – 6.0.

4.3. 3rd Step High pH Clean

4.3.1 High pH cleaning solution is AVISTA P111 alkaline membrane cleaner formulated to remove foulants (grease, grime, & biological matter) from the membrane surface. pH for membrane cleaning must range between 10.6 – 11.4.

4.3.2. Add High pH cleaning solution to RO water in chemical mix tank. (Desired pH 10.6 – 11.4) Water temperature should be between 95 – 105 F and must have reached the desired pH to start membrane washing.

4.3.3. Once the desired temperature and pH have been achieved circulate the chemical through the membranes for 1 hour.

4.3.4. Log readings on CL064D Membrane Cleaning Data Sheet.

4.3.5. After one hour rinse the chemical out of the membranes until the pH comes down to between 5.5 – 7.0 pH.

5. 4th Step Testing

5.1. Testing refers to membrane performance after the cleaning phases (and sanitization phase if required) are completed in order to determine final membrane quality and if the membranes pass or fail. Pass or Fail criteria is to be based on final log readings for Flow, D/P, and Permeate Quality.

5.1.1 Place Cleaning Skid in Test Mode

5.1.2. Fill Storage Tank with City Water.

5.1.3. Using skid pump run water through the RO membrane at proper gpm for specific membrane size.

5.1.4. Take pre-readings for flow, pressure, and water quality.

5.1.6. Run test phase for 15 minutes.

- 5.1.7. Tank readings for permeate flow, pressure, and water quality and log on CL064D Membrane Cleaning Data Sheet.
- 5.1.8. One copy of the data is to be filed and one copy goes to operation manger for review.
- 5.1.9. Pass or fail information is to be noted on document.
- 5.1.10. Criteria for “Pass” or “Fail” varies from customer site to customer site. See detail below for specific location requirements.

6. 5th Step Preservative (ONLY IF REQUESTED BY CUSTOMER)

- 6.1. Sodium Metabisulfite is used to preserve the membrane until ready for use. Metabisulfite should be at a 1% concentration for most effective biological deterrent and preservation of membranes.
- 6.1.2. Add Sodium Metabisulfite to the chemical mix tank until a 1% solution is achieved.
- 6.1.3. Once you have reached concentration circulate for 30 minutes through the membrane.
- 6.1.4. After 30 minutes remove membrane from vessel, drain, bag & seal, box, and label according to membrane serial number and customer name.
- 6.1.5. Date the box and place in storage.
- 6.1.6. Log preservation data on Membrane Cleaning Data Sheet. Turn paperwork in to operations for review and proper filing.

Membrane Criteria for “Pass” or “Fail”

Flow Rates for 8” Membranes: Membranes are considered to have passed the flow criteria if the element flows 4.2 – 4.8 gpm of product water.

D/P (Differential Pressure for 8” Membranes: Membranes are considered to have passed the D/P criteria if the D/P is less then 7.5 – 8.2 psi.

Water Quality for 8” Membranes: Membranes are considered to have passed the water quality criteria if the permeate quality is at 94% rejection as read both in TDS and microsiemen.

Note – rejection rates are based upon incoming water quality vs. effluent water product.

Storage Criteria – Time

Membranes cannot be stored for longer then 6 months from date of last cleaning and must be preserved in Sodium Metabisulfite.

Storage Criteria – Temperature

Membranes must be stored in a location which has some form of temperature control. Temperature range must be within 40 degrees – 100 degrees F.

Humidity is not relevant when membranes are store in a sealed container.