Technical Service Bulletin

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Water Profile (Permeability) Test for HYDRAsub®-MBR Membranes

A water profile test is performed when the membranes are new or at any point to test the permeability, or temperature corrected specific flux (TCSF), of the membranes.

1. Fill membrane tank to the recommended level (see HYDRAsub®-MBR Instruction Manual) with clean tap water or treated water filtered through 600-1000 µm screen.
2. For new or previously stored membranes, let the modules soak for at least 30 minutes. Open permeate valves and air vent (if available) to allow air to escape from the inside of the fibers. Turn on aeration at the nominal value during the soak.
3. After priming the permeate pumps, initiate the filtration cycle (7 min on, 1 min off) at a flux of 5 gfd (8.5 lmh). Run the filtration cycle for 30 minutes to remove all air from the permeate lines. Aeration should be constant during this time.
4. Once air is visibly removed from the lines or the trans-membrane pressure (TMP) seems stable, operate at a flux of 5 gfd (8.5 lmh) for 2 full cycles. Measure and record the filtrate flow, water temperature, and TMP, accounting for any water level corrections (refer to TSB407).
5. Repeat Step 4 at a slightly higher flux. Take at least four readings like this, until 20 gfd (34 lmh) is reached. For example, take readings at 5 gfd (8.5 lmh), 10 gfd (17 lmh), 15 gfd (25.5 lmh), and 20 gfd (34 lmh).
6. Calculate the TCSF at 20ºC at each data point according to Equation 1-1.

$$TCSF_i = \frac{J_i}{TMP_i} e^{(-0.031(T-20))} \qquad (1\text{-}1)$$

Where: $TCSF_i$ = instantaneous temperature corrected specific flux in gfd/psig at temperature, T (gfd/psig or lmh-bar))

J_i = flux at data point i at temperature T (ºC), (gfd or lmh)

TMP_i = TMP at data point i at temperature T (ºC), (psig or bar)

T = water temperature, (ºC)

7. For new, unused membranes, the average TCSF over all data points should be between 10-30 gfd/psig (246-740 lmh-bar). If these values are not reached, there are a few possibilities. If the membranes are new and unused, there may be air in the permeate lines from pump cavitation. Ensure the pump has the required suction lift to operate in the current arrangement. Alternatively, the membranes may have lost their hydrophilic coating, meaning they are not fully wetted and must be treated according to TSB 401.
8. For used membranes, they may need to be cleaned more thoroughly and should be cleaned according to the CIP procedure outlined in the HYDRAsub®-MBR Instruction Manual. There may also have been some irrecoverable fouling that

occurred during operation. If the membranes still do not achieve the required TCSF in clean water, please contact Hydranautics' HYDRAsub Technical Team.

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