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Tech Note 306

Millenium HX™ RO System Waste Flow Rate

This Technical Note pertains specifically to the waste flow of the Millenium HX Reverse Osmosis (RO) System. It is intended to be used as a guide in understanding the dynamic flow process and in realizing other contributing factors impact output and readings. Per the Millenium HX RO Operation and Maintenance Manual, the waste flow should be 1.97 lpm (0.52 gpm) when the feed water temperature is at 25°C (77°F) with a +/- 20% variance (refer to Section 4.6.2).

The waste flow, as it is created from the RO element, leaves the machine by passing through the orifice in SV2, through CK1, and then through CK2. The flow orifice within SV2 is the primary factor in controlling back pressure on the RO element which in turn, regulates waste flow. The orifice is a fixed diameter. Therefore, the waste flow is expected to be extremely stable throughout the life of the Millenium HX RO System.

However, there are other factors that may impact waste flow. Most notably is feed pressure. In situations where the dynamic flow (as read on the Millenium HX) drops below 35 PSI, the RO machine will begin to recycle concentrate water back into the pump inlet using CK3. This is a normal expected function that will not adversely affect machine performance. Other factors that can impact the measured waste water flow include: 1) Water temperature. Lower temperatures may lead to higher waste flow values and higher temperatures may lead to lower waste flow values. 2) RO element flux. Reduced flux can lead to higher waste flow values. 3) RO pump pressure. Higher RO pump pressure values lead to higher waste flow values.

Furthermore, as the Millenium HX is operating with the dialysis machine, the unused permeate (i.e., product) water returns to the internal tank. As the internal tank fills, the RO system will switch its feed source from the incoming city feed water to instead draw on the unused permeate water from the internal tank. During this process, waste water is also recycled for a short period of time and will result in brief periods of no waste water being expelled through the drain line.

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As a result, there is not a specified minimum or maximum waste flow value that can be applied to all machines. Each machine is tested individually at the factory to ensure that the recovery percentage (permeate flow / permeate flow + waste flow) is equal to 45% +/-15%. Due to the several factors affecting waste flow, values listed in sales brochures and manuals are intended to be for reference only.

When waste flow on the Millenium HX RO System is measured for trending purposes,the measurement is best taken when all permeate water is being directed to the drain along with a dynamic feed supply of at least 55 PSI. Lastly, please note that previously mentioned factors, including water temperature and RO pump pressure, can significantly impact the waste flow measurement and should also be taken into account before any conclusions are made.

Ongoing monitoring of flow rates of the Millenium HX RO System can and should be measured and compared against original data gathered from the on-site location, both when operated at set-up and when operated connected to a dialysis machine. While measuring waste flow is not consider a critical system parameter, it can be useful to confirm the unit is operating within intended specifications and to assist in understanding overall system performance.

Contact us at 800-633-3080 if you have any questions or require any additional information. More information is available online at www.mcpur.com.