BraneWave™ FAQ

1. What is the maximum continuous duty flow rate for each BraneWave system?

   A: Normal continuous flow rates range from 4 to 10 gpm. Water temperature as well as contaminant type and concentrations can impact performance.

2. What is the maximum recommended daily duty cycle per tank and module based on up to 20 to 24 hours per day operation?

   A: This is also dependent on the temperature, contaminant type, and concentration, but a rule-of-thumb is 500 to 1000 gallons processed or at no greater than 15 psid (15 delta P).

3. What is the maximum recommended pressure drop differential for BraneWave?

   A: 15 psi.

4. What is the lowest practical pressure for BraneWave?

   A: It is 30 psi. With that said, you can pass water through the membrane at 10 psi but the output is minimal—that reference is best suited for the BraneWave UF Field Test Kit. Since most ground water systems provide 30 to 50 psi or 40 to 60 psi pressure switches, the minimum pressure shouldn't be an issue.

5. Is there a limit on the number of systems that can be installed in parallel using a balanced header manifold?

   A: There is no limit, but we recommend using either: flow controls, flow sensors, flow-through meter cells, or a damn good installer to provide an accurate, balanced flow per module.

6. What are the basic BraneWave UF flow patterns?

   A: There are five basic flow patterns:

   (1) Service Flow (outside-in)
   (2) Standard Raw Backwash (inside-out)
   (3) Microbiological Treated Backwash (inside-out)
   (4) Suspended Solids Disinfection Backwash (inside-out)
   (5) Tank Flush

   A cleaning protocol may include any or all of the four cleaning cycles based upon the results of pilot testing. Additionally, the cleaning cycles may be timed for a wide range of frequencies.

7. Why is the UF membrane rated for colloids but not clay (which is one of the largest contributors of colloids?

   A: The UF system is actually an absolute 0.01 micron hollow fiber membrane but is application rated at 0.02 microns. With that said, the physical size of the colloid and/or clay will determine application efficacy. We suggest using the BraneWave UF Field Test Module as a testing tool to verify performance and from that data you can extrapolate the required application details.

8. Can BraneWave filter endotoxins less than 10 EU/ml?

   A: Endotoxins are found in the walls of living or skeletal remains of bacteria with a size range that is larger than 0.05 microns. An endotoxin filter used in dialysis has an absolute rating of 0.05 micron. Since BraneWave has an absolute rating of 0.02 micron, it is a better (smaller pore size) filter than the standard endotoxin filter. If BraneWave is used for this purpose, it is absolutely essential that a separate treated source of water be used for backwash. Otherwise, the backwash cycle will put endotoxin inside the lumens.

9. Can BraneWave be used to treat Legionella in water?

   A: BraneWave UF will capture the Legionella pneumophila bacterium. Note that the bacteria will be filtered, not killed or deactivated.

SAFE WATER TECHNOLOGIES, INC.
996 BLUFF CITY BOULEVARD, ELGIN, IL 60120 USA
TELEPHONE 847 888 6900 • FACSIMILE 847 888 6924
E MAIL: info@swtwater.com • WEB SITE: www.swtwater.com

FORM BWFAQ
EFFECTIVE
APRIL 2016

10. Is BraneWave capable of crossflow filtration with continuous concentrate flow?

    A: BraneWave UF is not designed for crossflow filtration. The hollow fiber UF is designed for dead-end (or dead head) filtration with periodic backwash and flushing cycles.

11. What about small unit greywater systems for laundromats? We are talking in the order of 1000 liters per day, which represents about 1 to 2 gpm of continuous treatment. So far, we haven't found a UF module that can handle such a low flow, and cartridge filtration doesn't give us the filtration degree we are looking for.

    A: We do not have a data specific to greywater, but we can speculate:

    (1) Pre-filtration at 5 microns
    (2) Pre-test with the BraneWave UF Field Test Kit for sediments
    (3) BraneWave UF will be fouled by oils and grease
    (4) Soap is dissolved and will go through the BraneWave UF
    (5) Some applications use carbon or gravity to remove oil and grease
    (6) Backwash more often—try every hour for 15 seconds on both sides

12. In the BraneWave literature the Silt Density Index is less than 6 (SDI < 6.0). Why is it so low?

    A: SDI < 6.0 is a guideline only, and we are sticking with it. The 6.0 Silt Density Index (SDI) spec is part of our original estimate of useful objective water measurements that can be used to qualify and/or disqualify a water source. The SDI is useful for silt measurement. For RO (polyamide) the suggested (upper) limit is 5.0, for RO (acetate) the suggested limit is 8.0. Freshpoint uses 6.67. Our comfortable estimate is < 6.0. We do not see this as necessarily disqualifying a water source, but as a sure indication that pilot testing is essential. At some point in the future, with more pilot experience, we may modify that limit.

13. Is it practical to use differential pressure (DP) for head-loss backwash initiation?

    A: A DP sensor can be used, but is rarely necessary. BraneWave control valves initiate regeneration via: water usage, time of day, external signal, or a DP switch.

14. What about backwashing?

    A: The standard cleaning protocol includes periodic backwash pulses by reversing the flow from outside-in to inside-out. If the untreated water contains tannins, then this pulsing should be done with UF-treated water. The "dirtier" the water, the more frequent the backwash.

15. What about flushing?

    A: The other cleaning protocol involves the bottom flush valve. It can be manufactured with a manual ball valve. Opening the flush valve removes any filter particles that have accumulated at the bottom of the UF. The frequency of this flush would be based upon the amount of particles that are being collected by the UF. You can use a motorized flush valve as well.

16. How often do you advise a cleaning procedure (Clean In Place or CIP) of the UF membrane?

    A: A cleaning procedure regiment will be dependent on the application.

17. What cleaning agents are recommended?

    A: Typical cleaning agents include:

    (1) for microorganisms: chlorine or hydrogen peroxide,
    (2) for iron or other metals: Res Up or acid cleaner,
    (3) for organic particles: alkaline cleaner.

18. How many hours can BraneWave be fed with 1.0 ppm of free chlorine?

    A: Endless.

19. What is the maximum allowable concentration of hydrogen peroxide for sanitizing the UF membrane?

    A: We prefer chlorine rather than H_2O_2 and the maximum level is 2000 mg/L.

20. Can commercial cleaners can be used?

    A: Some customers with heavy tannin are using various commercial RO system cleaners such as MCT103 (phosphoric acid based, pH 3.4) and MCT511 (triethanolamine based, pH 10.9). These cleaners seem to be within the prescribed limits (pH 3 to 11) for BraneWave. As long as there is no specific threat against the four polymers involved (polypropylene-liner, polysulfone-membrane, polyethylene-potting, PVC-end caps), there should be no adverse effects. We believe that the normal membrane cleaning protocol can be followed using these chemicals. The MTC103 should release iron as well.

21. Is there any additional information for cleaning the membrane, particularly in bacteria and tannin applications?

    (1) For bacteria, we would suggest a feed of 5 ppm and a contact time of 2 minutes (a draw time of 3 to 4 minutes). For cleaning only, the requirement would be less, but to keep it simple, we suggest one guideline.

    (2) Please remember that the chlorine concentration and contact time are impacted by the method of introducing the solution to the vessel. With that said, if an eductor or injector are used (common to a stager or control valve arrangement) there is dilution of the chlorine feed solution as well as a contact time based on gpm draw rate. Household bleach is 52,500 ppm of chlorine, so achieving a 5 ppm solution strength at the membrane surface is easy, even when using an eductor or injector. Since those devices also have a low gpm flow, the contact time is no problem. If someone is using a chemical injection system, the solution strength will be controlled by a combination of the feed pump output (gph) and the chlorine solution strength. The contact time would be controlled by the flow path through the vessel in gpm.

    (3) We don't necessarily recommend chlorine to keep the membrane clean for all tannin applications. The pilot testing for tannins should define the best cleaning protocol. If chlorine is not necessary for cleaning (by oxidation), then there is no reason to introduce it. If chlorine is found to enhance the cleaning process during pilot testing, then we would suggest using the same dosage as with microbes.

    (4) Other cleaning solutions to consider when cleaning membranes are the same agents used for reverse osmosis membranes, with the added restrictions of the limitations for the BraneWave's Polymem S2 membrane. For example, the pH range for the BraneWave membrane is 3 to 11. The cleaning of membranes follows a similar pattern for reverse osmosis (polyamide) and for ultrafiltration (polysulfone). Tannin is an organic, so a high pH cleaner may prove more effective. When considering a candidate cleaning agent, look at the MSDS to determine the active ingredients. Then determine the effect of those ingredients upon the polymers used in the BraneWave: polysulfone, polyurethane, polypropylene and polyvinyl chloride (PVC). If they are okay and the pH is good, then consider it an acceptable candidate. Remember, low pH is for ionic (salt) contaminants, and high pH is for organic contaminants.

    (5) In most applications that we have seen, chlorine is the oxidant introduced to clean the membranes efficiently.

    (6) The best cleaning agent for organics is a high pH cleaner. We recommend using high pH agents which are marketed for cleaning reverse osmosis membranes. There are a number of them available. (Example, ROChemicals 67, and AVISTACLEAN MF1000) The agent should be applied to the membrane and circulated for a few minutes, let stand for 1 to 4 hours, and then flushed. The high pH cleaners work best at a temperature of about 100ºF, but the manufacturer's recommendation should be followed. If there is a choice of agent based upon membrane material, remember that the BraneWave membrane is polysulfone.

22. Should water be tested before installation?

    A: As with any visible particle, including tannin or sediment application, preliminary testing with the BraneWave UF Field Test Kit is essential.

23. What is the purpose of the BraneWave UF Field Test Kit?

    A: The purpose of the BraneWave UF Field Test Kit is to determine the answer to two questions:

    (1) Will the UF produce a filtrate that is acceptable to the user?

    (2) Is there a cleaning regimen which will return the UF service flow/pressure to its original starting point?

    If either question is negative, then the application is not suitable for the BraneWave UF.

24. Can the BraneWave UF Field Test Kit handle 24-hour operation and can it be backwashed?

    A: Of course, the BraneWave UF Field Test Kit was designed for application testing. However, in accordance with its spec, it can handle up to 0.8 gpm at 68ºF. To backwash, use the same flow rate in reverse. Also use a BraneWave UF Field Test Kit to test the application if it involves tannins, clay, or sediment.

25. Can the BraneWave UF Field Test Kit be used to treat applications with small capacities?

    A: Yes. Some dealers have used up to three field test kit modules in parallel to achieve the required flow for certain applications. This offers a cost-effective solution AND it allows them to sell the BraneWave UF Field Test Kits as replacement parts in one or two years.

26. What is the square foot area of the BraneWave UF Field Test Kit?

    A: 2.91 square feet.

27. Are there any additional thoughts that might be of interest?

    (1) Freshpoint has 4.5 square meters of membrane, inside/out flow with single skin filtration on the inside. BraneWave has 18 square meters (that's right—4 times Freshpoint), outside/in flow with double skin filtration (outside and inside filtration providing a sequential 0.02 barrier compared to Freshpoint's single filtration).

    (2) Membranes in some industrial applications are used to filter shoreline seawater for RO pretreatment and can last seven years.