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Episode 53 Whole House RO Show Notes

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Sizing the RO for Household Use

- The average usage has gone from about 75 gallons of water per person, per day, to about 50 or less with high efficiency components.
- Although preference is to size ROs on the small side, the cost of a 1,000 gpd RO is like a 4,000 gpd RO. Each system has:
 - Expensive pump
 - Same frame, hardware, gear, and installation.
- **Benefits of larger system:**
 - Fewer membrane changes outs over the life of the RO
 - For example, a 4,000 gpd RO produces 2 to 3 gpm. Generally, you don't need that much water. So, two years later if production is 1-1/2 gpm, there is still plenty of overhead. You don't have to change out the membranes yet. You can, but you certainly don't have to.
 - Greatly reduces the time between service calls and the problems with people running out of water.
 - Water temperature considerations. At 77°F, the RO is going to make ~ 2-3 gpd. At 50° F production is about half of that. A 1,000 gpd RO would be challenged with the cold water in the mid-west and east coast.
 - The larger RO saves space. 500 gpd and 1,000 gpd ROs are on the same frame with the same footprint as a 4,000 gpd RO. The storage tank size can be reduced. The most popular storage tank for the whole house RO right now is a 95-gallon tank. A lot of dealers still use 300-gallon tanks.
 - The 95-gallon tank is only 16 inches deep. It's a custom-made square, or rectangular tank, so it fits in the garage, on a side wall, where it doesn't affect parking of vehicles in the garage.
 - A 100-gallon tank is about 22-23" in diameter. It may protrude out into the parking space. On the west coast every house has a little side wall next to the garage that protrudes out about 16 inches.
 - Where there are basements, the equipment needs to fit through a 32" or 36" door, or Bilco® doors. Door Tanks (D Tank) are common. It's a rectangular tank with a hole in the middle. It looks like a square donut.
 - The smaller RO is cycling constantly trying to keep up. When the membrane starts to foul the production rate drops. Service calls increase and parts need replacement.
 - Larger system pumps run for 1 to 2 hours vs. up to 14 hours on the smaller system.



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- **Float options for storage tanks.**
 - What to do if the RO is in one room and the storage tank is in another and the plumbing is complete:
 - Go remote and use a dual-level mechanical float that starts and stops at completely different levels. There are several manufacturers, but they're simple mechanical floats. Add a small pressure tank, like an RO tank, and a pressure switch to turn the RO on and off instead of a flow switch.
 - On more complex controls use reed switches, which are little, tiny magnetic switches, super dependable, and very inexpensive. Simpler controllers are usually set up for a single flow switch.
 - Another other solution is a simple bobber style float, the rat tail floats, single switch float that comes up and down, and you just set the length to determine the flow, how much water it takes before it starts and stops.
 - Watch your materials or at least monitor the equipment on a regular basis. Sanitizing with ozone is a great option but, it will tear up things including the rubber sheathing on the SO cord of the floats. Not a big deal, because it's control wiring. It's not like it's 100 volts.
 - Putting that type of a bobber float on a simple mechanically controlled RO is not recommended, because of the higher voltage, 110 or 220, running through the float. The use of ozone obviously can create some pretty bad situations over time.
 - Floats are cheap. Change out the float as soon as you see even the tiniest bit of degradation on that flow cord. And don't over sanitize, don't sanitize every day. Thinking you must sanitize constantly is a common mistake.
 - Sonar floats are very good but rarely used on whole house applications. It's more appropriate for business applications where PCL systems are more common.
- **Maintenance**
 - Keep the design simple, use a computer control, not old mechanical controls, because you're already running voltage through the tank.
 - There are a lot of problems with mechanical controls. Using an old Square D pressure switch or a flow switch short cycling of the pumps bouncing of the pump motors because of switching issues.
 - Like the RO membranes, the computer controllers are now simple and very reasonably priced.



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- **Sanitization**

- For 90% of applications, Impact does not filter the air going into and out of the tank, mainly because of cost, extra maintenance and the type of filtration required - A membrane type of filter or pharmaceutical grade sediment filtration, 0.2 micron, are suggested but expensive and require a non-vented lid.
 - Most atmospheric storage tanks have an option for a vented or non-vented lid. Using a non-vented lid without an air filter will implode the tank.
 - Unless it's a properly designed, high-end stainless-steel tank for pharmaceutical use, or for electronics manufacturing, these tank lids won't seal well. Even with the non-vented lid, they're still breathing air through them.
- If the air is nasty, e.g., if you're putting an atmospheric tank out in a cow pasture, put a vent on it and a filter. Don't rely on sanitization processes.
 - If the basement has mold, install a 1-micron filter post-RO to capture dust and other particles which may be present as the air enters and exits. Ultraviolet to kill anything that got in there is very important.
 - Recirculating RO water through the UV isn't practical because you're only killing what is inside the chamber, so whatever's in the tank is going to still be dirty.
- Sanitize the tank on a regular basis. There are simple ozone injection systems - a simple solenoid opens a valve and pressurized water goes through the vent or injector, and sucks a little ozone in.
- The sanitization process is not complex. But if it is well water going into an atmospheric tank, sitting in 100°F weather outside, you will need a lot of ozone and to dose it regularly.
 - Impact Water does a lot of bacterial testing in warmer climates where bacterial issues are much more prevalent, Florida and California in particular. Impact suggest ozonating once a week. It may be too much but there's no reason not to do it once a week. And it doesn't take long.
 - A general rule of thumb is one minute per gallon. It's been tested at about a quarter of a minute per gallon, 25% of the recommendation, and it still maintains non-detectable levels of any bacterial issues, for the most part. This needs to be monitored if you're in an area where you're not sure.



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- pH
 - RO water tends to be aggressive because the minerals aren't present. RO water can be slightly lower in pH, and water, being a universal solvent, wants to re-mineralize.
 - Be careful with copper plumbing, especially older copper where there could be lead components in the solder and fixtures. Use a simple calcite upflow filter post RO.
 - Impact typically runs .5 per cubic foot or .25 per cubic foot, minimum, per gallon, per minute on a calcite upflow, because it's going after the RO, on the way to the atmospheric tank. This will prevent calcite bricking.
 - Do not install a downflow system.
 - Test for copper and lead but not for the first month or two. Initially, a light layer of copper oxides will come off the pipes. (Similar to a softener application where iron is stripped from the pipes post treatment.)
 - When testing for copper - test once in the morning, when the water has been cooking in the pipes all night, and then any time after that. Let the water run for 10 minutes.
 - If copper is in the sample prove that it's from the pipes by taking a sample post RO.
 - If you see copper, test for lead. Most modern houses will be all PEX, or CPVC with modern fixtures. Good quality faucets don't have any lead components.
 - Back east and in the old Midwest there are some very questionable piping systems -copper or galvanized piping, lead joints. Urbans suggests using a very low output Stenner pump with some soda ash in the finished water, because people don't want hard water, they want the softness of the RO water.
 - Neutra 7 can bring up that pH, lower your LSI, to set the corrosivity index.
 - Stay away from drinking the water for at least a month or two, as the pipes are being cleaned out. You don't know what's being cleaned out of the pipes.

Repressurizing

- DAB® makes a very smart submersible pump that keeps the atmospheric tank pressurized. It's inside the tank and almost dead silent. They don't have the VFD (variable frequency drive) but do have all the smart controls. DAB also sells external pumps, which take up more space.
- When installing in a large house or commercial application, 2,3, or 4 DAB easy boxes can be installed. They communicate with each other wirelessly and stage up to accommodate higher water flow.
 - For example, if you have nasty water and want to do the lawn with RO water, these pumps can bring on two or three at a time, to stage it from 15 gallons, to 30, to 45, etc. Impact uses DAB submersible in 95% of houses. Of that 75% go out with the submersible smart pumps.



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Miscellaneous

- RO Water for lawns – Not a problem and it's the preferred method for watering for most plants.
- Pools -
 - If you use soft or RO water calcium can be purchased from a local pool supply store and added to the pool.
 - There is no reasonable way to get calcium out of a pool other than dilution, taking water out and putting lower calcium water in.

<https://www.wqrf.org/map.html>

USGS Water Data Map

<https://dashboard.waterdata.usgs.gov/app/nwd/?region=lower48&aoi=default>

WQA National Convention

<https://www.wqa.org/convention>

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