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Smart shopping for an under sink water filtration system

by Dave Seagrim, CWS VI

If you're in the market for a water filtration system and have done any looking, you've probably found all kinds of systems at all kinds of prices. Some look archaic and others look really high tech. And if you've asked for advice at different water stores, you've probably heard a different recommendation from every person you've talked to. Frustrating, huh?

This paper is designed to help you sift through all the conflicting information and help you make an informed decision. Use it as a shopping list that you can take from dealer to dealer to evaluate the merits of their systems - and of their advice.

Here's what I'll cover:

1. Some health related decisions you have to make.
2. An "apples to apples" comparison of the components that most water systems have in common.
3. Some of the common sales "tactics" used by water treatment dealers.
4. What certifications water treatment systems should have
5. What credentials a water treatment dealer should have
6. What you should expect to pay for a quality under sink water filtration system

1. Health stuff

A good place to start is to recognize that a water filtration system is not a "one size fits all" appliance - just because your friend swears by her water system does not mean that it's a good fit for you. One reason for this is that not all neighbourhoods supply the same quality of water. But more importantly, the selection of a treatment method is a health-related decision. And not everyone shares the same perspectives about what is "good for you" or shares the same health concerns.

There are several subjective, health-related questions that a water treatment dealer should ask. And the answers you give should directly influence the recommendation he or she makes. In my opinion, these questions are the most important:

- What are your personal concerns with your water?
- Are you willing to remove all minerals from your water in order that it be really clean?
- Are you concerned about how alkaline or acidic your water is?
- Do you want to remove the fluoride from your water?

- Are you personally concerned about bacteria in the municipal water?

Not everyone would answer these questions the same way. And it's important you take time to answer them carefully - do your research. Talk to a doctor or natural health practitioner that you trust and get their opinion. Remember that a water filtration system is a long term commitment and that you have to be comfortable with the decision you make. Only after you are armed with your answers should a water system dealer have enough information to make an intelligent, personalized recommendation.

A relevant footnote here (and this may be news to many of the sales people in water stores): They are not health professionals and are therefore not qualified to answer these questions on your behalf. The salespersons' responsibility is ask the right questions and give the appropriate recommendations. Nothing more.

And that's the first tip: Beware of the salesperson who recommends a system without asking you these questions. Or worse, tells you what your body needs or does not need from water. If a dealer does so, it illustrates either an ignorance of these issues or a desire to sell you something that may benefit his company more than you.

2. The guts of the operation: Filter cartridges

It is the filter cartridges in a water system that make all the difference. These are what determine how clean the water will be. However, most of us don't know how to differentiate one filter cartridge from another (They all look pretty much the same). The unfortunate result: This is most often the place where manufacturers will cut corners. They figure that there is no sense in putting the highest quality materials here if no one knows the difference. The result is that often the water is not as clean as it could be.

Here are some questions to ask a dealer regarding their systems filter cartridges and components:

Are the filter cartridges used in your systems standard size?

Standard sized filters are absolutely essential. Having standard sized filters means that regardless of changes in makes and models, you will always be able to find replacement filter cartridges. Also, if the dealer you are using is charging an unreasonable price or goes out of business, you can always go elsewhere. In our industry, standard sized filters are known as "**10x2 double open ended**". Like the name says, these filters have a hole at each end. The actual dimensions, though, are roughly 2 7/8 x 9 1/2 (this can vary slightly according to make and model. 10x2 is just the conventional name).

What type of sediment filter(s) does your systems have?

These are usually the first filter(s) in any water system. Like the name says, these filters are responsible for any sediment, such as asbestos, aluminum, dirt, silt, rust, etc.

Sediment filters are usually made from one of three different materials. These are:

1. Cotton
2. Nylon
3. Polypropylene

Also, they come in a myriad of pore sizes - usually 20, 10, 5 and 1 micron.

A good quality sediment filter is a "1 micron cold spun polypropylene depth filter" (see the picture below):



A typical 1 micron cold spun polypropylene depth filter

I know the name is a real mouthful. But here's what it means:

- 1 micron: This is simply the size of the majority of the pores in a given filter. In my experience, a quality 1 micron filter will easily last the average household at least a year before clogging. And having this smaller pore size protects the more expensive downstream filters.
- Cold spun: held together by virtue of the "clinginess" of the material - not by heating. This gives a filter a "sponginess" and contributes to its' depth (I'll explain this below). A quality sediment filter will feel "spongy" in your hand. Also, it should look like a solid tube (like the one above) - stay away from anything that looks like a roll of string.
- Polypropylene: This is the only material that doesn't require glues and anti-static agents to hold it together. In other words, it's not going to allow these things to leach out into the water.
- Depth filter: Water hits the outside circumference of a standard filter first and then makes its way through to the centre. The word "depth" simply means that the pores in the filter get progressively smaller as the water makes its' way toward the middle. This way the larger particles get trapped on the outside and the smaller ones get trapped more toward the middle. (This is opposed to "surface" filters whos' pore size is uniform throughout the body of the filter. Dirt just accumulates on the surface of this filter (thus the name). Because of this difference, surface filters have a much lower capacity than depth filters and must be changed much more frequently).

I usually use GE Puretrex sediment filters - but several different brands are available.

What type of carbon filter(s) does your system have?

Carbon filters are responsible for reducing organic contaminants in the water (such as pharmaceuticals, hormones, cosmetics, pesticides, industrial petrochemicals, etc). They will also reduce chlorine and chlorination by-products. Also, if you are using a system that does not contain a reverse osmosis membrane, you should make sure that at least one carbon filter in your system is impregnated with a media for removing lead. There are 3 popular formats of carbon on the market, these are:

1. Granular activated carbon (or "GAC")
2. Powdered activated carbon (or "PAC")

3. Extruded carbon block

All carbon filters in a system should be "extruded carbon blocks". (Extrusion is the method used to make pipes). Extruded carbon blocks have a mesh on the outside and are a solid carbon tube on the inside (like in the pictures below):



This is water extruded carbon looks like on the outside.



And this is what you'll find on the inside.

Extruded carbon has several advantages:

1. It has more surface area than the others. This give you more contact time with the water and they are therefore more effective.
2. It has a very condensed pore structure (the maximum size you should have is 5 micron for a filter early in the process and minimum of 1/2 micron at the end of the process). This way they don't promote the easy growth of naturally occurring non-pathogenic bacteria inherent to carbon (I'll explain more about this below).
3. There is no way that they can "channel" - no small rivulets will form allowing some water to go through the filter untreated. This often happens with granular activated carbon.
4. They have a longer life than the other formats (in some cases, up to four times as long).

I personally prefer KX Technologies brand carbon blocks. But there are many good brands on the market.

Reverse osmosis membranes

If you choose to use a reverse osmosis system, it will contain a component called a reverse osmosis membrane. This is the component that reduces inorganic material from the water. Years ago, there were a couple of different membrane formulations (just to be thorough, one was called a "cellulose tri-acetate membrane" and the other was called a "thin film membrane"). Today, however, virtually all membranes are thin film.

For the most part, all thin film membranes are created equal. However, one minor (and usually oversold) difference between thin film membranes is capacity.

Membranes are rated at capacities of 24, 36, 50, 75 or 100 gallons per day. (Given the average Canadian water temperature and pressure, cut these ratings in half to get a true estimate of what they will actually produce). In a home, however, this number is only relevant if you choose to use a great deal of water (more than 2 gallons) at one time. Using this much water will drain the reverse osmosis storage system and you will have to wait for it to fill up. Membranes with a higher capacity rating will fill the tank faster. But unless you plan on making a great deal of spaghetti, boiled potatoes and rice at one time, the rated capacity of a membrane is irrelevant.

3. Questionable sales tactics

A truly unfortunate thing about the water business is that it is rife with unqualified, commissioned, water system sales people who have access to an arsenal of misleading "tests", gimmicks, convincing statements and flashy brochures. And because our clients have neither the time (nor should they have the inclination - this is why they trust the "professionals"), they can't know they're being misled. Here are some common things I see in this business to look out for:

Don't use too many stages - more filters does not necessarily mean cleaner water

There is an understandable perception that the more "stages" or filters a system has, the cleaner the water produced will be. This is simply not the case. The rule of thumb is the following: Use as few stages as possible for each classification of contaminant (one for dirt, one or possibly two for organic contaminants, one for inorganic contaminants, etc). But be sure to use the highest grade filters possible. The reason: The more filters a system contains, the greater the likelihood of having microbial growth taking place within the system.

Just to head this off: One may think that if your water source doesn't contain bacteria to begin with, that it would be impossible for it to grow in a water system that treats this water. This is not the case. Why? Because carbon filters cannot be disinfected initially (if you add any kind of a disinfectant into carbon, it will just consume that disinfectant and destroy the filter). This means that there is a tiny amount of harmless bacteria in the system to start with. Depending on system maintenance and filter quality, this bacteria will grow to a greater or lesser degree.

The reason why this bacteria grows is that every water system on the market reduces the city-added chlorine early in the process - and chlorine prevents bacteria growth. So with chlorine gone, that small amount of bacteria is free to grow inside subsequent filters. The growth is called a "heterotrophic plate count" (a very high-brow set of words meaning non-disease causing bacteria). If the system is not properly maintained, it can grow to high levels and there is some research that shows it may cause symptoms such as stomach upset, diarrhea & malaise.

To help prevent this, make sure that all carbon filters are extruded carbon blocks. Also, make sure these filters are changed regularly and that the system is properly sanitized every time this is done.

Avoid indicator lights

There are many systems available that have an indicator light on the faucet or elsewhere that supposedly shows when the filters are due to be changed. Although we do carry these lights and sell them if clients insist, these should not be trusted. The vast majority of these lights indicate one of two things:

1. The volume of water a system has produced
2. The level of something called "total dissolved solids"

I'll address both of these criteria separately.

1. Volume. Lets say a filter cartridge is designed to treat 500 US gallons of municipally treated water prior to changing. Now lets say that a family of four is using that water only for drinking. And lets say that every member of that family actually drinks the recommended 8 x 8 ounce glasses of water every day. This means that if they each drink the recommended 8 glasses of water every day of the year, they will consume 91 gallons during the entire year. In other words, it will take roughly 4 years for that indicator light to come on. This means that by the time the light tells them to change the filters, the amount of that bacteria I talked about earlier will reach "high school science experiment" levels.
2. Total dissolved solids. (This indicator applies only to reverse osmosis type water treatment systems). Total dissolved solids can be defined as any mineral salts that are in the water. The reverse osmosis membrane is the only component in a reverse osmosis system that removes mineral salts - not the other filters. The membrane's lifespan is anywhere between 3 & 5 years. This means that it may be 5 years before the light tells you to change the filters. And again, by this time, we've grown all kinds of bacteria in the system.

There is no substitute for simply cleaning & sanitizing the system and changing the filters when the time comes to do so (In most cases, if your system contains high quality filters and has been properly sanitized, this is once per year). Don't trust the light! Also, many companies (like ours) will call you to let you know that your system is due for service.

The total dissolved solids (or TDS) test

Many water equipment sales people will want to show you this "test". It is a small pen-like meter that is dipped in water (see the image below) and displays some numbers. You'll see that if it is dipped in the municipal water, it will usually show numbers somewhere between 120 & 250 parts per million (depending on where you live). The dealer will often dip the meter into his or her water and show you a number that will be anywhere between 0 and 10. This is usually followed by a statement like; "See...look how much cleaner the water from our system is". But what exactly does this meter measure?



A typical total dissolved solids meter.

Total dissolved solids readings are simply a measure of electrolytes - mostly naturally occurring minerals that conduct electricity. These are things like calcium, magnesium,

copper, iron, zinc, etc (Minerals that some would argue are good for your health - certainly not contaminants). Roughly 98% of all minerals (or dissolved solids) in Toronto municipal water are made up of calcium and magnesium. And most of the rest is iron, zinc, copper, etc. So a low dissolved solids reading means that there are fewer minerals - not necessarily that it is cleaner water. A case in point is that if you took water from a well in Antarctica, it would show a very high total dissolved solids count. Does this mean that it is dirtier than Toronto water that only has a count of 140. Of course not.

Now, does this mean that the water the dealer is showing you is not cleaner than the municipal water? No, probably not. But just don't be duped by a salesperson who is trying to convince you that this meter shows how much cleaner his or water is than what comes out of the tap.

The precipitator test: the king of water treatment equipment sales scams

The sales person fills a container with water and then immerses two electrodes into the water. The unit is then plugged in. Slowly, a dark sludge begins to appear in the water. The sales person then says; "look at the filth your family has been drinking!" (or some such thing).



A typical precipitator test

Here's what's really happening: As mentioned above, naturally occurring water contains minerals. These minerals are able to conduct electricity. When the unit is plugged in, current travels through these minerals from one of the rods in the jar to the other. One rod is made from a material that does not corrode easily (such as aluminum) and the other is made from one that does (such as iron). What you then see appearing in the jar is iron oxide - iron being released into the water from the iron rod itself - not filth magically appearing from the water.

The Water Quality Association - our trade body has the following to say about precipitator tests:

"The Water Quality Association recommends against the use of the electronic (electrode) precipitation test as a means of demonstrating water quality. The electronic precipitator test causes a release of metal ions into the water, which form a precipitant that is clearly visible in the water. The mere appearance of this precipitant in the drinking water will lead the viewing consumer to question the quality of his or her drinking water, even though the presence of the precipitant has no relation to the water's quality. Therefore, the likelihood is considerable that the use of the test will mislead the public."

4. A word about NSF Certification

The National Sanitation Foundation (NSF) is a body that certifies both entire water filtration systems and water filtration system components. The argument for using certified systems and components is that they will meet some basic benchmarks. In my opinion, the NSF has done our industry both a service and disservice. On one hand, in order to have a product certified by the NSF, a product must achieve a minimum standard to back up its claims. This is great: It gives the consumer a tool to differentiate some higher quality components and systems from some that are of lower quality. However, there are two potentially problematic issues the consumer should be aware of:

1. Some NSF standards are very low (A case in point is that those fridge based water filter pitchers many of us use are certified by the NSF).
2. The certification is prohibitively expensive - the most basic certification is more than \$40,000.00 USD. This means that only large companies can afford certification. And because large companies (and please pardon the generalization here) are very concerned about the bottom line, NSF certification is often treated the same way that construction companies treat the building code: Do as little as possible to simultaneously achieve certification and save money. IE - cut corners.

So where does this leave the consumer? My advice is to ensure that all components used in any given system are certified - this ensures everything meets at least a minimum standard. But it also allows a well educated and experienced dealer to mix and match components to achieve what they feel are the best results.

If the system itself is certified as a unit, there is a good chance that the company that produced it cut some corners that may matter to you (the most common place to cut corners, like I said earlier, is in the filter cartridges). It may be a mistake to believe that just because a system as a whole is certified, that it is superior to a system whose components are certified. More often than not, the opposite is true.

5. Look for qualified people with experience

Our industry does not have educational guidelines or criteria for water store owners or salespeople (if you had the inclination, you could open a water store tomorrow). There are, however, voluntary levels of certification offered by the Water Quality Association that those in the industry can (and should) achieve. I suggest you look for someone who is at least a Certified Water Specialist Level 3. This means that they not only have a handle on the basics, but have explored and been tested on some of the specifics.

Also, be sure the person you are talking to has been in the business for several years and preferably has field experience as an installer and service technician. This way you know that they've seen the equipment in action and know about it in more than a theoretical sense.

6. The final word: Don't pay too much!

Price is very often a factor in marketing. And this holds true for the water business as much as any other. Most big box stores are aiming for the "economy market" - less expensive and lower quality. They sell something simple for the "do-it-your-selfer" who isn't particularly concerned about the quality of the drinking water - but who figures that something is better than nothing.

However, what I've found is that the inverse isn't often true. I've seen drinking water

systems priced at over \$1000.00! And they have incredible looking brochures, videos and websites. But in my experience, there is no reason that an under sink drinking water system should cost you more than \$700.00 installed. After this threshold, it is my opinion that you are paying only for those glossy brochures and videos.

And that's it. I hope this short paper will help you wade through the masses of contradictory information offered by dealerships and the internet alike - and let you make some objective comparisons between different water systems.

Please give us a call anytime if you have other questions. Our number is (905) 886-7233.

Sincerely,



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