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**(This document is a continuing work in progress)**

Esperer.H2O Total on demand, under the sink, 150GPD Boosted Reverse Osmosis with double Coconut Carbon Block and pH neutralization is the most advanced system you can get for making clean safe water with no gimmicks! Only the industry certified #1 components for safe-clean-purified-consumable water.

1. Coconut Carbon Block pre and post filtration for its superior ability to absorb and trap chemicals, pesticides, pharmaceuticals, and chemicals of all kinds and why it is #1 in the industry.
2. CSM Reverse Osmosis for its superior ability of rejection of salts and chemicals, especially in low flow residential systems and why it's #1 in the industry.
3. AET (Advanced Energy Transfer) through advanced high amp dual polarity electrochemistry neutral ionics. The most advanced electrolysis restructuring generator for consumable water products and why it is #1 in the industry.
4. pH neutralization and ion balance to the lowest safe TDS levels for consumption

## System Specifications & Information:

### Stage 1: 5 Micron Pleated Sediment Filtration

#### **Initial system comes with:**

*Sediment Filter-10 inch sediment filter is made of 100% high purity polypropylene, surfactant free, binder free and adhesive free. This sediment has a special design to trap particulates. Four layers, with outside-in flow and step-by-step micron rating that effectively retain particles and extend the filter life with a much lower pressure drop. Sediment filters are in compliance with FDA requirements. Specifications; One (1), five (5), ten (10) or twenty (20) micron rating, up to 8 gallon flow rate, 10" length and 2 1/2 OD"*

*They have great particle holding capacity and are being used in a variety of applications such as pre-filters for reverse osmosis systems, pre-filters for water filtration units, aquarium pre-filters and being used as sediment collectors for whole house systems.*

*Specifications and Data Information - Sediment Filter:*

*Filter - Length 9 7/8" x 2.5" diameter (commonly referred to as 10" x 2.5")*

*Enhanced Dirt Holding Capacity*

*High Consistency Melt Blow Polypropylene*

*Easy and Safe Cartridge Incineration and Disposal*

*Free of Surfactants, Binders and Adhesives*

*Ideal for use as pre-treatment to a RO Reverse Osmosis Drinking Water System*

*Meets FDA compliance for food and beverage contact*

*Contains no wetting agents, solvents, antistatic agents or binders.*

Available Micron Ratings: 1, 5, 10, 20/25 and 50  
Bonded micro-fiber construction offers no fiber release  
Superior chemical resistance and is not prone to bacterial attack  
Performance Tested - FDA certified

**Replacement Filters Ordered through PBSWC are changed to:  
Unicel Filter Cartridges - T-0597-05-B 5 MIC. POLYESTER 4 SQ.FT**

Link: <https://www.unicelfilters.com/>

Flow-Max filter cartridges outperform wound, spun, melt blown, resin bonded and other depth type filter elements because our cartridges are pleated to provide increased surface area and longer life. Savings is realized with extended filter life from the 100% synthetic filter media, which is cleanable on filter cartridges 5 micron and up.

Features:

Synthetic filter media (cellulose free) is bacteria resistant and free of binders or additives which may cause foaming.

Cleanable (reusable) on cartridges with 5 microns and up

1 micron absolute and 0.35 micron ratings use a multi-ply laminate for particle retention. Ideal for Cryptosporidium and Giardia cysts reduction to 99.9%

Pleated for greater surface area, low pressure drops, extended life.

**Stage 2: 5 micron Coconut Carbon Block Filtration**

**Initial system comes with:**

*Coconut Carbon Block Filter-The carbon block filters are manufactured with high purity Coconut Shell activated carbon with extruded activated carbon block construction. They do not release carbon fines and they are FDA compliant. These solid carbon block filters have combined the adsorption capability of carbon, with the ability of a solid block material to selectively strain out particles from the water that is being forced through the filter.*

*Specifications: .5, one (1), five (5), or ten (10) micron rating, 10" length and 2 1/2 OD"*

*Activated carbon has an electro-positive charge added which results in this type of carbon attracting more chemicals and impurities. As the water passes through the positively charged carbon, the contaminants with their negative ions, are attracted to the carbon granules and thus extracted from the water.*

*The block of carbon strains out sediment, dirt, bacteria, microscopic worms, algae, asbestos, and cryptosporidium. With just water pressure, this compacted solid carbon block is designed to filter sub-micron size particles. This micro-straining of the water will provide the cleanest and clearest drinking water available.*

*Activated carbon bonds to thousands of known chemicals. As water is forced through this solid block of carbon, it is forced to slow its flow speed and thereby increase the contact time with the carbon. This slowing of the flow allows the carbon bonding to take place and remove chemical pollutants like toxins, THM's, chlorine, pesticides, bad tastes, odors, etc.*

*Solid block carbon filters are very uniform and do not channel or bypass as conventional granular activated carbon (GAC) filters are known to do.*

*Because of the density of the solid block carbon filters, there is no room for bacteria to grow, so these filters do not become an incubator for bacteria as GAC filter are known to be.*

*These carbon block filters will fit most types of 10" filter housings on the market today and as noted previously, they will fit into the housings on nearly all water filtration and reverse osmosis systems. CTO carbon block filters perform well in both commercial and residential applications and they are the most widely used carbon filters on the market today.*

*Specifications and Data Information - Carbon Filter:*

*Filter - Length 9 3/4" x 2 1/2" diameter (commonly referred to as 10" x 2 1/2")*

*>99.5% Reduction of Particles (5 micron filter)*

*Enhanced Dirt Holding Capacity*

*No Release of Carbon Fines*

*Significantly Exceeds Performance of Traditional GAC and PAC Filters*

*6,000 gallons of chlorine removal capacity*

*Performance Tested - FDA certified*

### Replacement Filters Ordered through PBSWC are changed to:

Omnipure OMB934-MAX5 is a 5 micron coconut carbon block filter cartridge perfect for chlorine and taste or odor reduction used in many residential and commercial applications.

Omnipure Filter Company offers three series of replacement filter elements for use in systems or as standalone units. They are the OC-Series, the CS Series, and the OMB Series.

The OMB Series of replacement cartridges feature the new OmnipureBlock™ media. This high quality carbon block media is manufactured from raw materials to precise specifications entirely at the Omnipure manufacturing facility. Filter elements are available in 10 micron, 5 micron, 1 micron and 1 micron lead reduction formulations. Elements are finished with a single layer of spun-bonded polypropylene netting.

9-3/4" x 2.5" - 5 Micron

Rated capacity: 10,000 Gallons

Max operating pressure: 125 psig

Reduction: Chlorine, taste, odor

Filter length: 9.75 in

Flow Rate: .75 gpm

Operating temp: 40-100 °F

Filter outer diameter: 2.87 in

Micron Rating: 5 μ

### Stage 3: CSM Reverse Osmosis

CSM reverse osmosis membrane elements for home drinking water are the among industry's most reliable. Advanced membrane technology and automated fabrication allow these elements to deliver consistent performance that equipment suppliers, water treatment dealers, and residential customers can rely on. CSM elements are shipped dry for convenient handling and long shelf-life. Dry type elements are vacuum leak tested using the San Diego Protocol so that the performance shall satisfy their specifications. These elements are NSF/ANSI Standard 58 listed.

Model	Flow	Rejection	Diam	Len	Test Conditions	Temperature
RE2012-150	150GPD	93%	2"	12"	50psi/100ppm	25C/77F

Spec sheet link: [https://www.csmfilter.com/upload/csm/swe/RE2012-150\\_v2.0\(22\)\\_1.pdf](https://www.csmfilter.com/upload/csm/swe/RE2012-150_v2.0(22)_1.pdf)

*"csmfilter.com: "CSM Reverse Osmosis Membranes - Water is one of the most essential elements for sustaining human life. However, we face health risks from exposure to microbial & various contaminants that may be present in the water we drink. With the use of CSM's Residential RO Membranes, 100% of viruses and over 99% of chemical substances are removed meaning we can enjoy clean, great tasting and most importantly safe water at home."*

*The reverse osmosis membrane is a thin layer that does not let certain ions permeate through it. Due to its ability to remove ions from solutions, it is mainly used to remove salt from aqueous solutions. Before the 1990's, cellulose acetate was used as the membrane material but was replaced by a polyamide compound because it offered higher salt rejection and lower energy costs. Because of its ability to remove dissolved ions in a solution without phase inversion, it is used to remove salt and TDS in water.*

*From converting seawater into fresh water, production of ultra-pure water for washing electronic parts and medical and pharmaceutical purposes, use in the food and beverage industries, to recycling of wastewater and sewage the applications of CSM RO membranes are truly diverse.*

*Based on 15 years of experience and technology accumulated through manufacturing and marketing of our reverse osmosis membranes, we aim to provide better technical service. Also, we are doing our best to ensure finer quality, competitive prices, and on-time delivery for our customers.*

#### Stage 4: pH Neutralization

After RO the medium(water) needs additional basic minerals to balance the removal of salts. This filter simply puts trace amounts of minerals back into the water for pH balance and compatibility for human consumption as well as the requirement for electrolysis. Contrary to clever TV marketing, the information that "zero water" is perfect and pure is misleading. The human body is not engineered for zero water, it is looking for salts to balance our pH. Our body pH is regulated and balanced by hydration (H<sub>2</sub>O) and salt (NaCl), without the 2 in combination absorption is not efficient, same reason most put a little salt in the water when cooking noodles... More electrolytes, better absorbency. The reason gets complicated.

#### Stage5: Esperer.H2O Functional Electrolyzed Water electrolyzation

The main importance is a restructuring by dual polarity essentially using a combination of hydrogen (electrons) and Ozone (protons) reactionary results.

Reduced ORP - Active Dissolved Hydrogen - Active Dissolved Oxygen - 6.45 Ionic Product - Neutral pH. All information of Esperer.H2O Technologies available on the web site pH3cleanscents.com

#### Stage 6: Post 10 micron Coconut Carbon Block Filtration Finishing

The initial system comes with standard supplied 10m coconut carbon block.

#### Replacement Filters Ordered through PBSWC are changed to:

**Omnipure OMB934FX is a 10 micron coconut carbon block filter cartridge.**

[https://www.espwaterproducts.com/content/Omnipure\\_OMB934-10m\\_Carbon\\_Block\\_Data\\_Sheet.pdf](https://www.espwaterproducts.com/content/Omnipure_OMB934-10m_Carbon_Block_Data_Sheet.pdf)

Omnipure's OM-Series filters contain the new OmnipureBlock media, a high quality carbon block made entirely at Omnipure's manufacturing facility. As a 9.75" cartridge, the OMB934-10m fits most standard 10" housings. Sediment up to 10 microns, chlorine, taste, and odor are reduced by the carbon block core.

Micron Rating: 10 microns

Dimensions: 9.75" X 2.87"

Replace every 6-12 months

Reduces chlorine, taste and odor

NSF Certified

#### Additional back up information on component selections:

#### WHAT NO Ultraviolet Light????!!

We do not include this useless gimmick. AET is the strongest oxidation system available. UV utilizes a very weak AOP system (Advanced Oxidation Process) using Ozone produced by UV.

*AET utilizes a more advanced ozone produced by direct positive electrical charge to the water from the water in a controlled chamber. This method produces a perfect dissolved ozone molecule in infinite amounts. We have the smallest (important – the smaller the more powerful), strongest (important-water sanitation is tuff stuff!), and most stable (important for ½ life to OH) dissolved ozone gas bubbles in water and why it's #1 in the industry.*

EPA - Reducing PFAS in Drinking Water with Treatment Technologies (AOP Direct & Indirect Oxidation by electrochemistry)

<https://www.epa.gov/sciencematters/reducing-pfas-drinking-water-treatment-technologies>

#### On Demand - Point-of-use (POU) systems

POU filters should not be confused with POE (*point of entry-main line*) systems. They are generally less expensive and offer a more consistent experience. POU filters can be installed at one fixture to treat water right where it is needed, usually under the sink in the bathroom or kitchen.

## **WHY ACTIVATED CARBON FILTERS?**

### **WHAT DO THEY REMOVE FROM WATER?**

You should be looking into different water treatment options if you are concerned about your water quality. Water filters are generally very effective in reducing contaminants, unpleasant odors, and bad taste from water. Activated carbon filters have extraordinary abilities, which are not available in ordinary filters. However, activated carbon water filters can target and remove specific contaminants in water. It is important to know what contaminants it removes or reduces.

Today, carbon filters are a leading player in water filtration. It is possible that activated carbon block filters have unique properties that can effectively remove up to 99 percent of total suspended solids, volatile organic compounds, sediment, heavy metals, chloramines, and other contaminants from drinking water.

### **What is a Carbon Filter?**

Activated carbon filters, also known as activated charcoal filters, are not like traditional water filters. They are made up of small, porous sponges or black beads that have been processed to better trap impurities. It is first injected with heat or steam to increase the carbon's surface area. The activation process opens up more pores to allow carbon to absorb and trap a wider range of contaminants. This makes carbon far more effective as filter media.

The carbon particles have a large surface area, which allows them to be exposed to as many active sites in the filter media as possible. This ensures that the pollutants are absorbed/removed at their maximum potential. A pound (450g), of activated carbon, has a surface area of approximately 100 acres. This is nearly three times that of The Pentagon.

This, along with other amazing properties, makes activated carbon a great medium for removing impurities from water by adsorption. It is also used to create respiratory masks and in exhaust fans and air conditioners to remove unwanted odors such as animal and smoke fumes.

### **What do Active Carbon filters do to Water?**

Water is treated by carbon cartridges filters using a process known as adsorption. The activated carbon acts as a sponge and absorbs contaminants in water by absorbing them. Simply put, activated carbon acts like a sponge with a large surface area and absorbs the contaminants.

The liquid's dissolved impurities move to the areas with the strongest attractive forces. Because the attractive forces that keep the contaminants dissolved in the fluid are stronger than their attraction, the contaminants are attracted to the carbon surface. The filtered water then flows to the next stage, if necessary.

Activated carbon filters are used to remove chemicals such as chlorine or other chemicals that don't adhere to carbon. Activated catalytic carbon, which is more reactive than regular carbon, chemically alters chlorine molecules and converts them into salt.

### **Are all Carbon Filters the Same?**

Although activated carbon filters can remove much more pollutants than regular carbon, there are some differences. Some filters have more activated carbon than others. This can affect their filtering ability, absorb speed, and other factors. A high level of activated carbon can extend the filter's lifespan. It will therefore require fewer replacements and produce filtered water longer.

### **Different Types of Activated Carbon Filters**

Activated carbon filters are available in two types: granular activated charcoal (GAC) and carbon block filters. GAC filter contains loose, millimeter-sized granules made of activated carbon. These filters can detect and filter contaminants that might otherwise go unnoticed by other types. These filters use coconut shell, coconut shell, wood, coal, and other media, with coconut shell carbon being the most renewable. GAC filters have many great benefits. However, contaminants can sometimes get through GAC filters.

**Carbon block filters** on the other hand are made from finely ground granules, usually less than 1 micron in size, and a binding agent. This holds the granules together so that they don't move around. The pellets are combined with the binding agent and heated to form blocks. There are three types of media that can be used in a carbon filter: coconut-shell media and bituminous coal.

GAC filters have 7-10 times the surface area of carbon block filters, and they prevent channeling. The granules' compact structure may result in a slower flow rate. This could be a problem for some.

### **What Contaminants Do Carbon Block Water Filters Remove?**

Activated carbon filters are excellent at removing many contaminants from water. This includes chemicals, gas, and physical impurities. NSF International and the Environmental Protection Agency (USA) claim that activated charcoal filters can remove 60 to 80 chemicals from water and reduce 30 more. They also moderately reduce 22 other contaminants. Two things are important to consider when determining the system's ability to remove or reduce these contaminants.

### **Type of activated carbon (GAC & Block)**

The quality of activated carbon. You must make sure that your tap water is free of any problem-causing contaminants. The EPA recommends activated charcoal filtration technology for water treatment. This technology can eliminate almost all known herbicides, pesticides, and inorganic contaminants.

These are just a few of the water contaminants that activated charcoal filters can remove or reduce.

### **PFAS – PFOS/PFOA – Forever chemicals**

Perfluorooctanesulfonic acid, or PFOS for short, is a water and stain-resistant synthetic compound that is widely used to make carpets, fire-fighting foams, furniture, paper packaging for food, clothing fabric, and other materials that are resistant to water, grease, or stains. PFOS chemicals can be difficult to break down, which means they can remain in the environment and water sources for many decades. Exposure to PFOS chemicals at higher levels can cause adverse effects. This includes congenital disabilities, cancers, and liver effects. Activated carbon filters can effectively reduce PFAS including PFAS and PFOS as well as PFNA significantly.

### **Pharmaceuticals**

High-quality activated charcoal filters can remove pharmaceutical residue from drinking water. The World Health Organization describes pharmaceuticals as "synthetic and natural chemicals that can potentially be found in prescription medications, over-the-counter therapeutic drugs, and veterinary drugs." They can also get into water sources via human waste, improper disposal of drugs (e.g. flushing drugs down sinks or toilets), or agricultural runoff containing livestock manure. Pharmaceutical residues can have a significant impact on aquatic life if they are allowed to accumulate in the environment. Even worse, they can leach into water wells.

### **Phosphate**

There are many sources of phosphate in water, including runoff, pet, human sewage, chemical manufacturing, and other sources. Although phosphate is essential for plant growth, excess phosphate can cause water to become cloudy from algal bloom. Premium charcoal filters can remove as much as 90% of the phosphates from the water.

### **Chlorine**

American water disinfectant of choice is chemical synthetic chlorine. Nearly every U.S. water provider uses this chlorination before dispensing water to customers. To kill bacteria and other pathogens that can make water taste and smell bad, chlorine is used. However, despite its amazing disinfecting power, studies show that people who consume chlorinated water are at least 93% more likely to get sick than those who drink water without it. Some activated carbon filters can be used to remove chlorine and the unpleasant smell and taste that it causes. Premium activated carbon filters can remove 95% of free chlorine from some water sources.

### **Chlorine Byproducts**

When chlorine used to treat water reacts naturally with compounds in the water, harmful chlorine byproducts can form, such as VOCs and THMs. The long-term exposure of some of these toxic byproducts can lead to cancer, birth defects, and other unwelcome diseases. The activated carbon filter is the best way to remove chlorine byproducts. According to the EPA, the technology eliminates 32 of the most well-known chlorine byproducts. This includes the most common tap water report byproduct: total THMs (TTHMs).

## **Chloride**

Chloride is a key ingredient in the chlorination of drinking water. W.H.O states that chloride levels above 250 mg/liter could cause a detectable salty taste in water ...". This is especially true for those on low-sodium diets and people with certain health conditions.

## **Pesticides**

Activated carbon filters have been tested and designed to remove 14 of the most common pesticides that could be found in water. These pesticides include Chlordecone/CLD/Kepon, Chlordane, and Heptachlor. Lindane is also included in the Round-up. The National Institute of Environmental Health Sciences defines Pesticides as any substance that is used to kill, repel or control certain types of plant or animal life considered pests. These substances include herbicides and fungicides. These agricultural chemicals can easily reach water-bearing groundwater aquifers because of their widespread use. Short-term adverse effects on health can be caused by pesticides, but long-term effects can persist for months or even years.

## **Herbicides**

Global agriculture has used herbicides for many centuries. This is primarily to control undesirable weeds and increase production. These chemicals can sometimes be uncontrolled and end up in water supplies, affecting non-target aquatic organisms as well as humans. Some herbicides may cause cancer in humans. Activated carbon has been tested and shown to be able to remove 12 common herbicides including 2,4-D weedkiller and atrazine.

## **Lithium**

Lithium, a trace metal naturally occurring in the earth's soil and mineral formations, can also be found in water. The presence of lithium in tap water can be used as a stress-relieving and antidepressant. We must be aware of the potential health risks that metal can have on our bodies, even if more research is done. The lithium content in drinking water can be reduced by charcoal filters up to 90%

## **Do You Need A Carbon Block Filter?**

The type and concentration of contaminants in your water will determine whether you should use a carbon or non-carbon filter in your home. If any of the harmful pollutants activated carbon filters remove, or reduce, it is possible to install one. Don't bother wasting time on testing, there is no "clean ready to use" water delivered to a home no matter municipal supplied or from a well. This just depends on how much money do you want to spend on testing.

***I Paul E. Seaver of PBSWC Inc. hear by submit I would never drink a glass of water that has not been filtered by Coconut Carbon Block filtration as at least 1 stage of a system.***

***I would never personally drink a glass of water that was not 1<sup>st</sup> run through this entire system.***

**Paul E. seaver**

**President – PBSWC Inc.**