



## Water Filters - Selecting the Right Material for POU/ POE Filters by Robyn Gordon

In an increasingly crowded world, the need for clean water concerns everyone. RV consumers should carefully consider the various types of water cartridge medias when choosing pre-filtration and post filtration for their water systems.

Most filters are made from selected materials to form a barrier against suspended dissolved solids. Filter designs include: loose media filters with grains, resins, particles lying in beds or loosely packed in column form; and cartridge-type filters that may contain membranes, fabric bonded ceramic, pre-coat, or cast solid-block media.

### ***We will look at the different types of sediment filters:***

#### **1. Pleated Filters**

The pleated filter is manufactured from one of three materials.

Pleated paper is the most economical material but cannot be effectively reused. These filters tend to feed on the cellulose portion of the media. What also can happen is that bacteria can get trapped in the pleats which can cause harm.

The second type of pleated filter is a cellulose/polyester, which is the next most economical material and a better medium because it offers the filtering ability of a cellulose with the strength of polyester.

The third choice of pleated filter is polyester and polypropylene, which are the most expensive filter materials, yet they are strong enough to handle repeated washing and reuse.

#### **2. Depth Filters**

Depth filters usually have a 3/4" to 7/8" porous wall

that captures particles winding their way through the material. The most common materials are polypropylene, cotton, or resin-bonded cellulose. These materials are spun, string-wound, or vacuum and machined.

String wound polypropylene cartridges are manufactured from polypropylene, and fine fibers are bonded and spun to form a solid structure. Water flows through the twisted paths, and sediment is trapped within the filter.

These cartridges are used to filter large amounts of sediment or fine sediment. They have graded densities, with a lower density at the surface and a higher density in the center. Sediment is trapped throughout the entire cartridge since water is forced through the path between spaces in the cartridge.

Pleated and depth filter cartridges are generally used as a pre-filtration in point-of-use (POU) installations. Depth filters cost less and capture particles smaller than the filter's hole size. The advantage of pleated filters is that the surface area may be eight to 12 times greater than the surface area of depth filters. The decision to choose between these styles of filter cartridges may come down to personal preference or the application desired.

### **POINT OF ENTRY WATER SYSTEM**

*Unit is portable and delivers up to 4 gallons of filtered water per minute. 5 micron sediment filters remove small debris. Half micron carbon filters remove chemicals and small parasites. Then the water is exposed to a high intensity UV lamp to destroy bacteria and viruses. Clear filter housings aids monitoring of the filters.*



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*Point of entry water system*

### 3. Carbon Filter

Activated carbon is found in block, granulated, powdered, and with silver. It is produced by heating carbonaceous substances-bituminous coal or cellulose-based substances such as wood or coconut shell-in the absence of air, creating a highly porous material.

These cartridges are available in several forms, including Granular Activated Carbon (GAC) or Pulverized Activated Carbon (PAC). Carbon filters can either be used as pre-treatment or post-treatment filters. Both filter medias also have advantages and disadvantages.

GAC is best known for its ability to improve water aesthetics, such as reducing bad taste and odors caused by chlorine. It is a popular choice for many different POU/POE applications. Most GAC beds start out with almost 100 percent removal rates, regardless of the water flow rate. However, the faster the flow rate per unit volume of GAC, the sooner the break-through.

For GAC to act as an absorbent, the attraction forces between the GAC and the contaminant. It must be stronger than the forces of the water that holds the contaminant in the solution. Some water conditions, PH, and temperature can increase the solubility of organic contamination and reduce absorption. If that occurs too slowly, the breakthrough results in the media loses its ability to function.

Another way activated carbon is used is by impregnating it with silver. Another name for it is bacteriostat-

ic water treatment. Bacteriostatic treatments inhibit growth of bacteria without destroying bacteria. After about six months of use, bacteria will adhere to the outside, causing the filter to plug up and become ineffective. Back in 1990, the EPA removed silver from its list of 83 water contaminants that can cause adversely affect people's health. These filters must have an EPA registration.

PAC cartridges are available in three configurations: paper-wound, wet-molded or extruded, and dry-molded blocks.

Paper-wound cartridges are made by spiral winding paper loaded with PAC around a perforated inner core. The outer surface uses a polypropylene netting. The end-caps are "potted on" or plastic type. This filter media is usually one of the lowest-price units available.

Wet-molded cartridges are made of a water slurry of fibers and PAC from which the filter medium is formed on a perforated inner core. The wet tubes are formed, dried and cured to form porous cylindrical structure that consist of PAC fibers locked in place. This style of cartridge places them on a par with the typical GAC cartridge.

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Another type of wet molded cartridge is a modified block that incorporates a similar amount of fibers and PAC as the traditional wet-molded cartridge but has a density structure that is 25 percent greater. With this style, it has a better chance in reducing more contaminants.

Extruded carbon blocks are designed by a continuous extrusion process, using approximately 80 percent mesh and a thermoplastic binder, which under the influence of heat, fuses carbon particles into a rigid and porous structure. The tubes are cut to length and are usually wrapped with a non-woven fabric and polyolefin netting before being capped.

Dry-molded block cartridges are produced by forming the annular cartridge from a mixture of PAC (usually 200 mesh) and a thermoplastic binder in a mold under pressure and elevated temperature. The cartridge is then wrapped with a non-woven fabric and a polyolefin netting before being end-capped.

GAC cartridges, depending on their form and size reduce levels of volatile organic compounds (VOC's), Trihalomethanes (THM's), and other organic chemicals. PACs have good sediment-holding capacity and

they are well-bonded to create a cartridge that won't channel or bypass.

### Premature Clogging

Several factors can cause premature clogging in all types of filter cartridges. For instance, sand and silica, which is present in almost all minerals and freshwater. In a range of one to 100 milligrams per liter (mg/L), the sand and silica can cause media filters and Reverse Osmosis (RO) membranes to plug up and have their o-rings quickly wear out.

Turbidity, which generally is in the 3 to 40-micron range, can be made up of fine silt, iron oxide, magnesium oxide, or a combination of materials. While not as abrasive as silica, turbidity can cause premature clogging. Extruded or dry-molded blocks are especially susceptible to premature clogging from turbidity since they are very low in permeability. GAC can plug from particulates and debris. Over time, accumulation of debris and organics also provide a sufficient nutrient to support the growth of many kinds of bacteria and algae.

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