

Small Water Filters for Taste, Odour and Sediment Removal

Activated carbon/sediment filters

Small water filters are relatively inexpensive and are intended for use at a single water outlet to remove specific contaminants. These are sometimes referred to as “Point of Use” (POU) devices. These filters are intended for use only with treated municipal water supplies or water that is free of microbial contaminants.

These filters should also be CSA (Canadian Standards Association) or NSF International certified and appropriate for the intended use.

These filters are usually a cartridge type with a filter housing containing a disposable or washable filter element (Figure 1). Some have a clear filter housing that allows you to see the condition of the filter inside. Another handy feature is a drain or flush valve on the bottom of the cartridge that allows you to flush sediment out of the bottom of the filter without taking the filter assembly apart.

Activated carbon is charcoal that has been cleansed by a slow heating process in the absence of oxygen and “activated” using temperatures up to 800 degrees Celsius. This process greatly increases the internal porosity, and one gram of “new” activated carbon can have a surface area of 500 to 1,000 m².

Many filters on the market contain activated carbon. Activated carbon works by adsorbing taste, odour and colour-causing substances (adsorption is the attraction and accumulation of a substance on the surface of another).

The effectiveness of taste and odour removal depends on the length of time the water is in contact with the activated carbon. Excessive flow through small amounts of activated carbon will drastically reduce filter effectiveness.

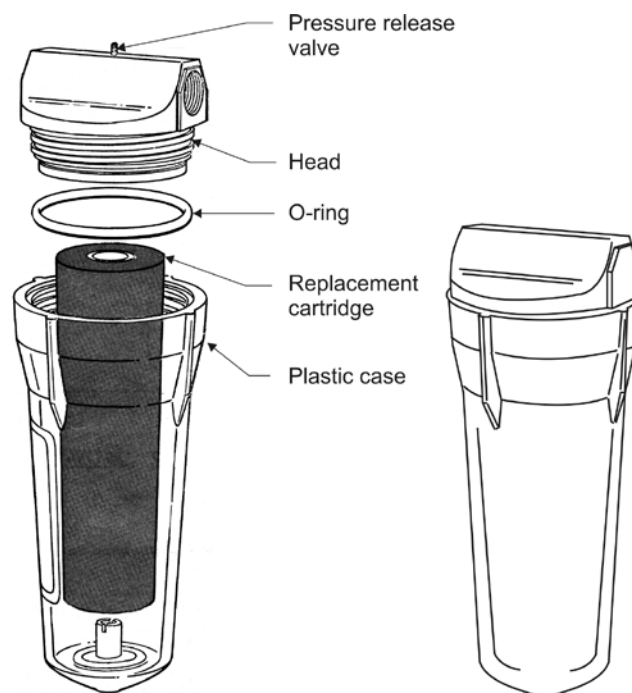


Figure 1. Activated carbon (taste and odour)

Activated carbon filters vary in size from large capacity units containing 15 to 20 kilograms of activated carbon (these larger filters are called point-of-entry filters) to small faucet-mounted types, which contain only a few grams.

Basically, the larger the filter, the greater its capacity. A large plumbed-in filter will operate longer and at a higher flow rate than a small faucet-mounted filter. Small filters can be effective if the flow rate through them is controlled and they are changed regularly.

Activated carbon filters are often used to remove the “chlorine taste” from municipal or other chlorinated water supplies. Activated carbon will remove many organic substances, tastes, odours and colours

from water. These filters do not remove hardness, ferrous (dissolved) iron, fluoride, sodium, asbestos fibres or other inorganic minerals from the water. For hydrogen sulphide removal, chlorination is required before the activated carbon filter.

Lately, considerable attention has been paid to suspected cancer-causing chlorinated organic materials (chloroform, polychlorinated biphenyls, polyvinyl chlorides, carbon tetrachloride, etc.) in water. Point-of-use filters have often been promoted on the basis of their ability to remove chlorinated organics.

The consumer should be aware that the effectiveness of these filters in removing these organics is limited. Some filters tested by the U.S. Environmental Protection Agency increased the chloroform levels in the water from test filters that had been left on line for 10 to 20 weeks. When a filter has reached its maximum capacity, it can “dump” increased levels of chemicals back into the water.

The chance of groundwater in Alberta containing these substances is remote; treated water from Alberta rivers contains very low concentrations of these chemicals.

The major potential problem with activated carbon filters is that the carbon can become fouled with organic nutrients, which may allow the rapid growth of bacteria. It is important that these filters be used only on chlorinated water supplies and that the cartridges be changed regularly.

Silver is sometimes used as a bactericide in activated carbon filters. Health Canada has indicated that the effectiveness of silver is questionable. There is no way of knowing when the silver is used up or whether the silver has been deactivated by hydrogen sulphide or iron in the water. In addition to this situation, many pathogens are resistant to silver. Since disinfection with silver requires a long contact time, silver can, at best, only be expected to reduce bacterial growth in the filter itself, not to disinfect the water flowing through it.

The removal of chlorine is not an adequate indicator of the continued acceptable operation of these filters. Activated carbon does an adequate job of removing chlorine after it has failed to remove chlorinated organic compounds or has become bacterially contaminated.

Activated carbon filters are not recommended for producing drinking water from lakes, rivers, sloughs, etc. unless the water is disinfected first.

Additional information is available through Health Canada’s web site.

Sediment filters (dirt and rust)

Some water supplies contain small amounts of fine sediment, which can be removed by a sediment filter.

The cartridge in a sediment filter can be made from pleated polyester, cellulose fibre or porous ceramic materials. If iron is present in the water, specialized iron removal equipment is usually required. Cartridge filters are rarely effective in solving iron staining problems.

A variety of cartridges can be purchased, depending on the size of the sediment and the flow rate required. Common sizes include the following:

- 0.5 micron cartridges with a capacity to remove particles as small as 0.5 microns. If protozoa such as giardia and cryptosporidium are suspected, the filter needs to be capable of filtration to less than 0.1 micron. The flow rate is usually less than 5 litres per minute. A higher flow rate can be achieved by using a larger filter or by installing two or more filters in parallel.
- 5.0 micron cartridges with a capacity to remove particles as small as 5 microns can remove fine silt, oxidized iron (rust particles) and suspended solids. These filters have a maximum flow rate of about 10 litres per minute.
- 25.0 micron cartridges with a capacity to remove particles as small as 25 microns will remove coarser materials such as sand and dirt. They can be used for flow rates up to about 20 litres per minute.

Sediment filters may control the symptom of a problem, but do nothing to correct the problem itself. Sediment is often a symptom of a problem at the water source, and sediment filters are often not required if the source of the problem is corrected.

For example, sediment from wells is often associated with poor well construction or design. A properly selected and installed sandscreen in the well may solve the problem without the need for sediment filters. Increased sediment in dugout water can indicate the floating intake has fallen to the bottom. Solving the problem at the source is usually a better long-term solution.

Maintenance

These filters should be flushed for at least 30 seconds before each use.

Most of these cartridge-type filters are designed to be used and discarded. Some filter assemblies have a device that indicates when the expected life of the filter is over and the cartridge needs replacement. The actual filter life

expectancy will vary with water quality and cartridge design, but the filters must be changed on a regular basis because they will plug, release the contaminant being filtered or become biologically fouled.

More information

Additional information is available through health inspectors, agricultural water specialists or on the web.

The Rural Water Quality Information Tool (<http://www.agric.gov.ab.ca/app84/rwqit>) on the Alberta Agriculture and Rural Development website can help assess water test results and provide links to additional fact sheets and websites regarding water treatment.

Additional information is available through Agricultural Water Specialists or on the Alberta Agriculture and Rural Development website.

Agricultural Water Specialists can be contacted through the Alberta Ag-Info Centre at 310-FARM (3276).

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