

Activated Carbon Filters

The Media

Activated Carbon is a specialised filter media used principally for removing Chlorine or organic compounds from water. Most of the activated Carbon used for water treatment is made from baking crushed coconut shell until it produces a charcoal type material. This is then activated with high pressure steam, leaving the carbon with many minute active pores on its surface. The ability of Activated Carbon to remove contaminants from raw water is dependent upon the length of time the water spends in contact with the media. Therefore sizing the filters correctly is crucial for effective performance.

Organic

Organic compounds are often responsible for taste, odor, and colour problems in surface waters. Contamination may occur from dead, decaying vegetable matter, agricultural runoff containing herbicides & pesticides or leakage of underground gasoline containers. With organic removal, the contaminant molecules are trapped and retained on the Carbons surface, and eventually all of the media will become “blinded” and will need to be changed. The frequency of changing will again depend upon the level of water contamination. The effectiveness of Carbon at removing organic compounds such as pesticides and solvents varies according to the precise nature of the contaminant.



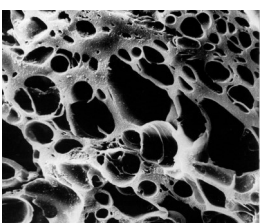
Chlorine Removal

Chlorine removal with Carbon is a “Catalytic” process in which the media does not become blinded or exhausted, but instead it acts as a trigger to the dechlorination process. The active sites on the surface of the media do eventually become blinded by other contaminants in the raw water (such as Iron or organic material) which means that the media will need to be changed every 1 to 3 years depending on the water quality. Carbon filters are often used to remove Chlorine on the inlet to reverse osmosis systems, avoiding potential oxidation of the membrane flat sheet.

Specifying and Sizing

The table overleaf shows flow rate information for each size of filter. These figures are based on removal of organics which is a slower process than the removal of Chlorine. A range of different vessel sizes are available along with a range of valves from Fleck and Clack. If the Carbon filter is being used just to remove Chlorine then it's possible to use a manual system with no backwash. This consists of a manual head with either 3/4" or 1" female ports, vessel and internals. For small flow rates a cartridge system can be used. These can be bought in 10" and 20" lengths along with standard and “big blue” widths.

GAC Structure



The picture to the left shows Activated Carbon under the microscope. The numerous cracks and crevices are responsible for the adsorption of organic molecules onto the surface.

Carbon Types

Acid washed: A premium ‘cleaner’ Carbon

Standard: for general use

Silver impregnated: the Silver acts as a biocide, preventing microbial growth

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System management

During service the filter media will need to be backwashed to remove debris that accumulates on the surface of the Carbon and to 'reclassify' the media to prevent channelling of water through the media bed. The backwash and rinse cycle takes approximately 20 minutes in total.

Backwashing frequency is usually controlled by a timer which will backwash the system at pre-set intervals.

For sites where there is high organic contamination of the water, the Carbon media may need to be changed frequently. In this case an organic scavenger may be a better option. On larger systems, special tanks are available with additional ports to speed up the replacement process and eliminate the need to disturb the internal distribution system.

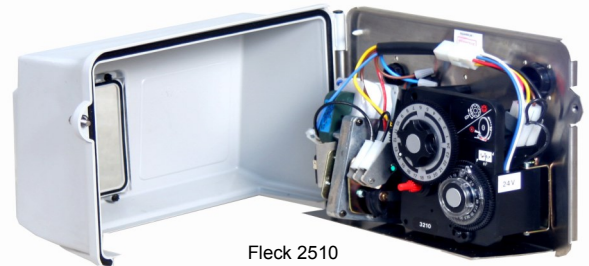
Valve examples



Clack WS1



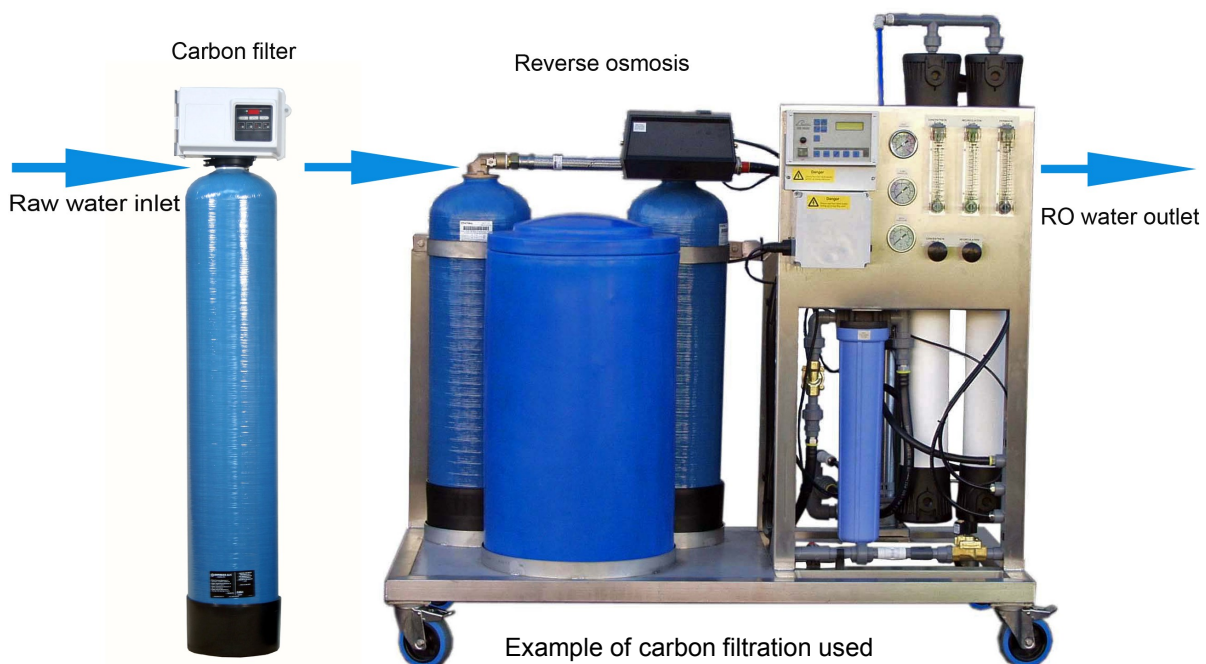
Clack WS2



Fleck 2510

Technical details

Carbon filter size	1054	1354	1665	2160	3072	4272	6367	55130
Flow rate m3/h	0.4	0.7	1.4	2.25	4.5	10.0	14.5	22.0
Backwash Flow Rate m3/h	0.5	1.0	1.50	2.6	5.3	10.50	24.68	18.80
Connections Fleck	1"BSP	1"BSP	1"BSP	1"BSP	1.5"BSP	2"BSP	2"BSP	3" frontal manifold
Connections Clack	1"BSP	1"BSP	1"BSP	1"BSP	1.5"BSP	2"BSP	2"BSP	3"BSP
Total Height (mm)	1607	1601	1988	2038	2512	2338	2981	3725
Diameter (mm)	254	330	406	533	762	1067	1600	1397



Example of carbon filtration used before an RO system.