All tap water contains unwanted particles and sediment that we would rather not consume. Whether at home or in a restaurant, water from the tap always contains millions of particles, such as dirt and rust. Sometimes water even contains harmful particles, such as protozoan cysts, that can cause flu-like illnesses.

Water filtration systems can remove most of these contaminants by using one of several filter types.

How does mechanical filtration work?

Water filters remove particles in two ways; through surface and depth filtration. Many particles are removed by surface filtration, a sieving process that traps large particles on the top or leading surface of the filter. Smaller particles pass through the surface layer and are subsequently removed through depth filtration. With depth filtration, smaller particles become trapped as they make their way through the increasingly smaller pores in a filter.

Finally, the smallest particles and dissolved molecules are removed through a process called adsorption, in which particles are attracted to the filter medium's surface and held there by weak electrical forces.

A filtering medium can be regular and controlled, like a woven mesh screen, or irregular and porous, such as a sponge, a mat of fibres or a bed of granules.

Only perfectly regular and strongly fixed filtering media are true "absolute" filters with 100 percent efficiency for a size range. The water treatment industry has adopted the definition of 99.9 percent removal of a given size as "absolute filtration".

Filters are rated according to the size of particles they can remove. The size of particles is measured in micrometers or "microns" – one micron being equal to one-millionth of a meter or 1/25,000th of an inch, the size of coal dust or a speck of baking flour.

The smallest bacteria are about ½ micron in size, protozoan cysts are about 3 to 20 microns, and "dirt" can be more than 40 microns, which is the limit of normal 20/20 vision.

Filter Maintenance

As filters remove particles from drinking water, they eventually fill up with trapped debris. When this happens, there are two possible outcomes; the filter will clog or it will channel and dump.

With clogging, debris builds up in the filter until no water can get through. This is the preferred occurrence since it forces the filter owner to replace the old filter with a new one.

Channeling occurs whenever a filter can get clogged beyond its dirt-holding capacity, and there is sufficient water pressure available to take the filter to the breaking point. Eventually, somewhere something 'gives' and a crevasse opens up, allowing quantities of previously filtered debris to "dump" into the effluent. This is both dangerous and unsanitary.

All filters that are certified by either NSF International or the Water Quality Association are tested to verify that turbidity will not channel and dump.

Filter Medium Types

There is a range of filter medium types available for "fine filtration" down to sub-micron size range. Sub-micron membrane filters are plastic, cylindrical-shaped filters with accordion-like pleats that are commonly used in laboratories and work well in low-pressure situations. Ceramic "candle" filters are porous unglazed

porcelain clay, cylindrical-shaped filters that are more susceptible to clogging because of their small surface area. Bonded carbon block filters are cylindrical shaped filters that utilize molded carbon for depth filtration.

Precoat filters use a powdered filter media, consisting mainly of diatomaceous earth or activated carbon, which is deposited on and retained by a rigid, yet permeable barrier, such as fabric.

With a precoat filter, water first encounters the leading face of the "cake", which acts as a surface filter by sieving out particles larger than the "pores" between the powder grains.

As water passes through the cake, which acts as a depth filter, smaller particles are removed by entrapment, and sub-micron particles are removed by adsorption. Finally, virtually particle-free water than passes through the septum and to the outlet.

Everpure precoat filters use Micro-Pure®, a finely powdered proprietary activated carbon mix. Activated carbon's chemical makeup enables it to remove chlorine, many synthetic organic chemicals and the waste products of microorganisms that produce off-tastes and mildew, fishy odors.

Finely powdered carbon also has enhanced chemical kinetics and can withstand greater flow rates than granular carbon that is commonly used in filters. Everpure precoat filters are NSF certified for the mechanical filtration of protozoan cysts, such as Cryptosporidium & Giardia Lamblia, in addition to turbidity. NSF International is an independent testing agency that sets product standards and certifies the performance of point-of-use (POU) drinking water systems.