

# Sawyer Filter Technology

The Nanotechnology which is derived from kidney dialysis is the next great leap in water-filtration system.

The hollow-fiber membrane is one of the latest revolutionary development in water filter technology.

Since its founding, SAWYER's water filter products have been incorporated and developed the water purification systems both for individual, household and commercial applications.

Hollow-fiber membranes are micro-thin tubules with porous walls. The tubules (fibers) are about 1mm thick. The pores that allow water to flow through the fibers are approx. 0.1 & 0.02 micrometer wide, which is about 600-800 times thinner than a human hair, too small for even the tiniest impurities to pass through.



In order to improve both the filtration rates and longevity of the filter, Sawyer developed a technology which makes the hollow fiber membrane is something even more precise and rugged. The fiber composition had to deliver exactly 0.1 & 0.02 micron filtration 100% of the time to ensure no bacteria would get through, and the membranes had to be sturdy enough to withstand backwashing which allows the filter to be cleaning and reused.

**Sawyer's Hollow Fiber Membrane filters** are small, portable, easy-to-use, reliable, inexpensive, and can last more than a decade without needing to be replaced.

The proprietary water filters are comprised of tiny "U" shaped micro-tubes that allow water to enter into their core through tiny micro-pores. The high number of those tiny tubes and their surface area allows the filter to have one of the fastest flow rates in the world. This high flow rate eliminates the need to store water, reducing the possibility of water contamination after the filtration process.

Each filter is certified for ABSOLUTE microns; that means there is no pore size larger than 0.1 or 0.02 micron in size. This makes it **impossible** for harmful bacteria, protozoa, or cysts like E. coli, Giradia, Vibrio cholerae and Salmonella typhi (which cause Cholera and Typhoid) to pass through the Sawyer PointONE™ biological filter. At 7 log (99.99999%) the filter attains the highest level of filtration available today.

If viruses are an issue, we offer the Point ZeroTWO Purifier (0.02 micron absolute pores), the first and thus far only portable purification device to physically remove viruses, which it does at a >5.5 log (99.9997%) rate, exceeding EPA and NSF recommendations.

All Sawyer filters have been tested by independent and qualified research laboratories according to U.S. EPA standards for water filters, and meet or exceed EPA standards. Sawyer's revolutionary technology has also been tested and verified by the United Nations, and is currently being used in more than 70 countries around the world.

## Sawyer filters remove:

|  | Waterborne Diseases   | EPA Requirement   | Exceeds EPA Recommendation | Removal Rate        |
|--|---|-------------------|----------------------------|---------------------|
|  | <b>Bacteria Which Cause:</b><br>I.E.: Cholera, Botulism (Clostridium botulinum), Typhoid (Salmonella typhi), Amoebic Dysentery, E. coli, Coliform Bacteria, Streptococcus, Salmonella | 99.9999%<br>6 log | Yes                        | 99.99999%<br>7 log  |
|  | <b>Protozoan (Cyst):</b><br>I.E.: Giardia, Cryptosporidium, Cyclospora  | 99.9%<br>3 log    | Yes                        | 99.9999%<br>6 log   |
|  | <b>Viruses:</b><br>I.E.: Hepatitis A (HAV), Poliovirus, Norwalk, Rotavirus, Adenovirus, Hepatitis E (HEV), Coxsackievirus, Echovirus, Reovirus, Astrovirus, Corona Virus (SARS)       | 99.99%<br>4 log   | Yes                        | 99.9997%<br>5.5 log |

\* Filter does not remove dissolved solids, including chemicals and heavy metals.

## Advantages Of Sawyer Hollow Fiber Membrane Filters

- *No need for chemicals (coagulants, flocculants, disinfectants, pH adjustment).*
- *Filtration of all mechanical impurities (clay, sand, rust) larger than 0.1 micron.*

Removal of these impurities, including colloidal iron particles, produces perfectly clear water. Water that has gone through a hollow-fiber membrane tastes and smells better, but most importantly, is significantly safer for human consumption. Certain small-particle pollutants, for example iron hydroxides, can irritate the epithelial wall of the intestines and bring about a range of digestive dysfunctions.

- *Filtration of microorganisms and bacteria.*

It's practically impossible to reduce the pore size in conventional filters (polypropylene or carbon-block cartridges) below 0.7- 0.8 microns. This is not sufficient to reliably filter out harmful bacteria, E. coli, for example, is between 0.3 x 1 and 1 x 6 microns in size, while Staph. aureus has a diameter of 0.5-1 microns.

- *Filtration of Giardia cysts.* The "cyst" form of Giardia is something like a cocoon, resistant to external factors, including most bactericides. Most household filters have no reliable anti-Giardia capability. The most effective method of removing Giardia cysts from drinking water is mechanical filtration through a hollow-fiber membrane.
- *Constant quality of the treated water in terms of particle and microbial removal.*
- *Process and plant compactness*
- *Environmentally sound production. Hollow-fiber membranes are made without the use of solvents.*
- *Non-reactive materials*
- *A huge filtering surface in a small volume of space*



Sawyer's filters are so powerful, they could not actually be used for kidney dialysis anymore, as they would remove too much from human blood. They've been field tested for years by dozens of companies and hundreds of thousands of individuals in over 70 countries.

For Sawyer, nothing less than 100% is good enough, especially when it comes to ensuring the safety of those who trust the filter will save them from sickness.

## Application

Sawyer developed a Hollow Fiber Membrane for water filtration based on ultra-filtration (UF) techniques which can convert non-potable water to potable water. The membrane can also remove bacteria and pathogens to make water fit for drinking.

The hollow fiber membrane micro filter does not require electricity as the pressure required to filter water through the membrane is only 1-2 kg/cm<sup>2</sup> (14.2 – 28.4 PSI). The membrane fibers have no pore size larger than 0.1 or 0.02 micron in size and are useful for water disinfection as they remove bacteria, viruses, turbidity, and colloidal matter thus making the water safe for drinking.

The hollow fiber membrane micro filters can be used not only in disaster-prone areas, but also in household use, commercial use, schools, clinics, hotels, remote rural areas and many more places where safe drinking water is often non-existent.

"One of the very interesting applications of this hollow membrane was in handy water bottles which could store water up to 1 liter and filter instantly so that drinking water can be made available to each individual instantly"

- Household Use
- Commercial Use
- Schools
- Clinics
- Hospitals
- Military
- Sports & Out door activities
- Micro Business
- Pre-filtration before RO process to enhance the life of RO unit
- Pre-filtration before softener process to enhance the purity & taste of the water
- Personal Use (at office, gyms, biking, running, camping, golfing, car trips, domestic, international travel and many more)
- Hotels / Restaurants
- Rural Villages
- Disaster Response
- Temples, Churches
- Charity
- Rotary