Reverse Osmosis

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Applications

Overview

Purification of water is becoming important in both the commercial and domestic environment. Increasing awareness of the dangers associated with contaminated water, higher standards of health and safety legislation, water shortages and the increasing demand for recycled water are all contributing to the need for better water filtration. The method used to filter water is generally dependent on the purpose to which the product water is to be put, the degree of filtration required and the cost of treatment.
Filtration by the reverse osmosis process is an effective method of treating water to remove in excess of 95% of impurities. Applications include

- Borehole filtration
- Spring supply filtration
- Laser cutting pre filtration
- Semi conductor manufacture
- Laboratories and hospitals
- Food, hydroponics, pharmaceutical and beverage production
- Boiler pre filtration

The Reverse Osmosis Process

Reverse Osmosis is a process that is used to remove virtually all impurities from water to produce high purity precipitate. Osmosis is a natural process involving fluid flow across a semi-permeable membrane barrier. It is the process by which nutrients feed the cells in our bodies and how water gets to the leaves at the top of trees. The process makes use of the basic principle of osmosis by which a concentrated solution has a natural tendency to dilute itself by absorbing a less concentrated solution. If the two differing concentrations are separated by a permeable cross-flow membrane then the less concentrated solution migrates through the membrane, leaving behind the total dissolved solids. The increase in volume on the concentrated side of the membrane creates osmotic pressure.

Reverse osmosis occurs when external pressure is applied to overcome the osmotic pressure, resulting in the reversal of the direction of flow through the membrane, whilst at the same time preventing the passage of impurities. The purified water is separated as permeate whilst the impurities are flushed to drain.

Maintenance

The life expectancy of the filters given below is the maximum. If the quality of your water is very poor then the filters may need changing more frequently.

Filter	Maximum life
5 micron	6 months
Activated carbon	6 months
RO membrane	2 years

The life of the RO membrane is dependent on the quality of the incoming water. If your water exceeds any of the parameters set out overleaf then the membrane life may be significantly reduced. A change in the quality of the product water (an increase in the TDS reading) or a severe drop off in production rate is a strong indicator that the RO membrane needs changing.

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Installation Guidelines

There are several factors, which will affect the performance of your Springhill RO system. If your incoming water exceeds any of the parameters set out in the table at the bottom of the page then you must pre-treat the water before it passes to the Springhill system.

Failure to do so will affect the performance figures and significantly decrease the life of the RO membrane.

Boreholes

In situations where borehole water is hard it may be necessary to install a base- exchange water softener. This process will increase the levels of sodium in the water and reverse osmosis is a very effective method for removing sodium.

Where the levels of contamination are unusually complex then a properly designed reverse osmosis system can be highly effective. It is however important to make sure that the levels of contaminants entering the membrane do not exceed those shown below. Pre- filtration may sometimes be necessary.

Spring Supplies

Where springs are contaminated with surface water there may be high levels of discolouration present. Reverse osmosis is a very effective method for removing colour.

In some rural areas road gritting programmes sometimes mean that "salt" placed on the rain washes into a private water supply. The elevated sodium levels can cause serious concerns to those on low sodium diets or with poor immune systems. Reverse osmosis is a highly effective method from removing sodium from water.

Parameters for the quality of incoming water			
General quality of incoming water		Chemical content of incoming water (ppm & mg/l)	
pH range	2.0 – 11.0	Hardness ($CaCO_3$)	< 350
Maximum TDS	2,000 mg/l	Iron (Fe)	< 0.1
Turbidity	< 1.0 NTU	Manganese (Mn)	< 0.5
Silt Density Index	< 5.0 SDI	Hydrogen Sulphide (H_2S)	0.00

* The greater the TDS the lower the production rate.