

Reverse Osmosis

Reverse osmosis is a water purification process used in industrial, medical, and domestic applications. Pressure is used to force water through a semi permeable membrane during reverse osmosis, filtering out impurities and producing clean water. The pure water can be transferred to its desired application, or it can be re-filtered to reach an even higher purity standard.

The Process

The Reverse Osmosis process begins with pre-filtration of the source water. Pre-filtration allows large particulates and contaminants in the water to be easily removed before reaching the membrane used in the RO process. By removing these objects, the membranes in the RO process are spared unnecessary wear and tear, resulting in a much more efficient process. The filters to be used are determined by the source water employed in the RO process. A carbon filter, a green sand filter, and a 5-micron filter are commonly employed. Chlorine is particularly damaging to the membranes in the RO machine, so it is important to ensure water is properly de-chlorinated before entering the process. The source water is also heated before filtration. The more the water is heated prior to filtration, the higher the output of the RO Unit. Increases of 20degrees in the water temperature can double the RO production.

Once the source water has been filtered, it is ready to move into the RO process. The water is passed through a semi-permeable filter, commonly constructed of polyimide. Polyimide is highly permeable to water, but relatively impermeable to various dissolved impurities, including salt ions and other un-filterable molecules. These properties make it ideal for use in the RO process. The source water moves through the filter due to the high pressure employed by the RO unit. Depending on the size of the unit, the PSI used to transfer water through the filter can range from 30 PSI all the way to 1000 PSI. The extreme high PSI units are often employed in large desalination plants, while the lower range is more suited for small applications and personal units.

After the filtration, pure water is collected and often stored. If the source water is particularly contaminated, or the purified water needs to reach a very exacting standard, it can be re-filtered through the machine an unlimited number of times. While re-filtration will result in increasingly pure water production from the RO unit, it is not always necessary or desirable. Re-filtering the water slows the down the production of the unit, as smaller and smaller contaminants are filtered. If the water is re-filtered too much, efficiency decreases. When deciding if re-filtration will be necessary, it is important to closely examine the specifications for the filtered water to determine if one pass through the unit will meet the needs of the water, or if multiple filtrations are necessary. Filtering water past specification levels leads to decreasing returns on time and energy necessary to run the unit.

The RO Unit and Maintenance

The RO Unit is a relatively low maintenance piece of equipment. The unit is automated, and does not require an attendant to be near the machine in order to run.

Maintenance of the unit is simple. Filters need to be inspected and cleaned regularly, in order to maintain highest levels of production. The machine will continue to run with dirty or clogged filters, but it will not run at maximum efficiency. Filters should be checked on a regular schedule, and often are able to last 2 to 3 months before needing to be cleaned or replaced. A drop in pressure at any point in the RO process is often a sign of a clogged filter.

Benefits of RO Water

In Industrial Parts Washing, RO Water is an effective way of increasing efficiency. By employing RO water in a parts washing unit, the bath life and efficacy of the machine are improved. When using standard water, the cleaning chemistry in the machine must work harder in order to clean parts. The chemistry has to first clean the water, and then the part. This process is comparable to the effect of hard water in a laundry machine. If a laundry machine uses hard water, the detergent in the machine must work harder to clean the water and clothes, often resulting in an unsatisfactory wash. Over time, the stains from the hard water build up on the clothes. This same principal applies to cleaning parts with hard water. By using RO water, the problem is eliminated. RO water is far more pure than water usually employed in the wash machine, so the cleaning chemistry is more effective and focused on the parts.

Further, RO water extends bath life. Since the cleaning chemistry is more effective and the water more pure, the bath in the machine can last much longer than previously. In testing, a machine that once required a bath change every month was able to go three months before needing a change. Changing the bath in the machine is a process requiring 20 hours of labor and downtime. By extending the life of the bath, labor is saved and production downtime is significantly reduced.

Summary

Through the use of RO Water, companies can increase the efficiency and quality of their industrial parts washers. By filtering the water through the RO unit, water enhances the effectiveness of cleaning chemistry, allowing for cleaner parts. Since the efficiency of the washing process is raised, the machine needs to be cleaned fewer times which increases the production time of the machine and decreases manual labor time needed for cleaning work.