



Desalination

Water for life

Today, Norit technology purifies more than 15 million m³ of water per day, enough for the daily consumption of more than half a billion people or 8 percent of the world's population. Water is one of the most valuable commodities on earth. Clean water can turn desolation into hope in areas where the water supply is compromised by pollution or disaster. Each year, the world's population is growing by approximately 90 million to a projected total of 8.5 billion people by 2025. Only a very small portion of the world's total water, about 0.01 percent, is easily accessible for human use. Even this tiny amount would be sufficient to meet the world's need if only it was distributed evenly. Unfortunately, this is not the case. The availability of water is declining and more than 2.6 billion people around the globe do not have access to safe potable water.

Norit

Norit, headquartered in The Netherlands, is an innovative leading supplier to the water and beverage industries. With almost a century of experience, the Norit Group supplies consumables, components, systems, and solutions, based on proprietary technology in every step of the water and beverage value chain.

Norit's activated carbon, membranes, pumps, aseptic and hygienic valves, carbon dioxide systems, and quality control equipment rank among the world's best. Norit offers global coverage with production, engineering and manufacturing facilities in seven countries, and a network of dedicated Norit sales and service centers, business partners and distributors which serve customers in more than 150 countries around the world.

For more information on key offerings in desalination or any other water-related issue, please contact info@norit.com.



Haffmans BV

P.O. Box 3150 • 5902 RD Venlo • The Netherlands
T +31 77 323 23 00 • F +31 77 323 23 23
E info@haffmans.nl • I www.haffmans.nl

Nijhuis Pompen BV

P.O. Box 102 • 7100 AC Winterswijk • The Netherlands
T +31 543 547474 • F +31 543 547475
E info@nijhuis.com • I www.nijhuis.com

X-Flow BV

P.O. Box 739 • 7500 AS Enschede • The Netherlands
T +31 53 42 87 350 • F +31 53 42 87 351
E info@xflow.com • I www.xflow.com

Please visit our website to obtain information about your local support!



Desalination

Desalination

Seawater desalination

Desalination

Desalination is the process of removing salt and other minerals from water in order to produce fresh water suitable for human consumption.

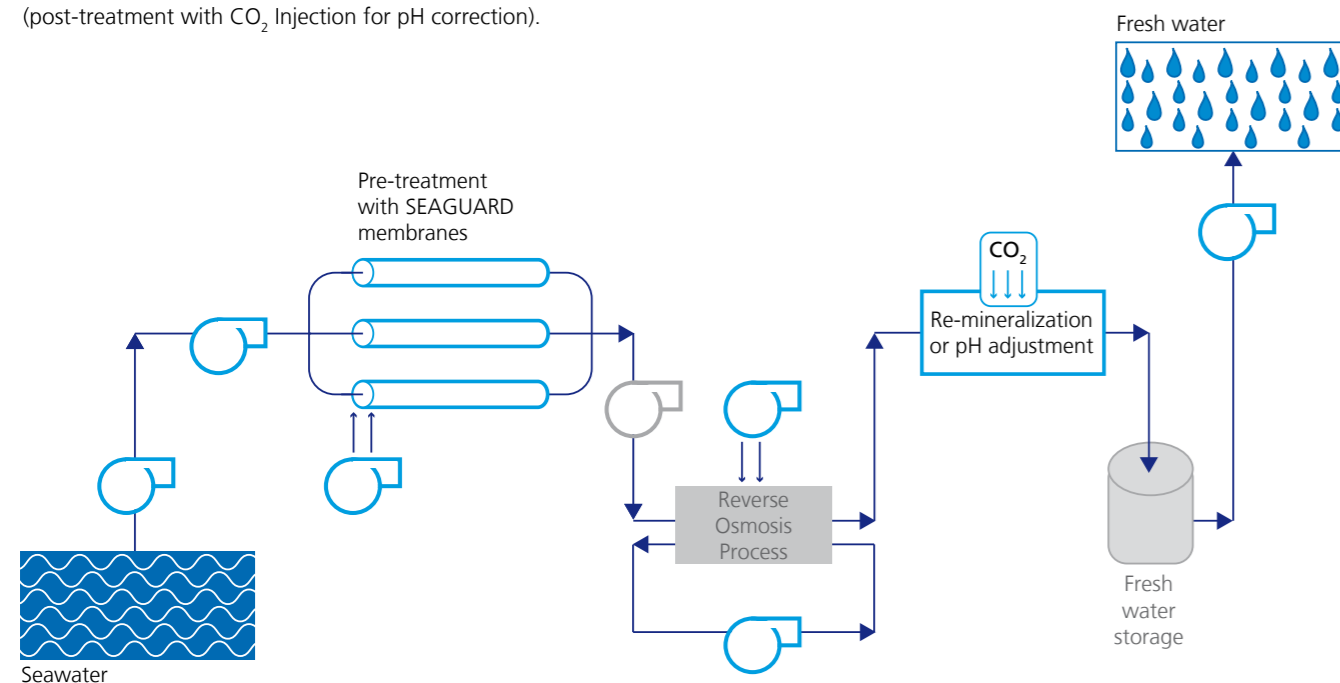
The rising population and living standards, growing economies and changes in climate patterns are putting a serious stress on the world's fresh water supplies. The earth's hydrologic cycle provides a fixed supply of fresh water while global demand is growing rapidly. With its pioneering focus on developing cost-effective, yet sustainable ways of providing fresh water for human use in regions where the availability of water is limited, the Norit Group has firmly established its desalination expertise and technologies.

Norit's technologies, know-how and insights are specifically geared towards reducing energy consumption, withstanding the highly corrosive and aggressive nature of seawater as well as improving the water quality standard.

The desalination process

The growth in membrane technology has made reverse osmosis (RO) the most commonly used technology in desalination throughout the world. Seawater is pressurized and fed to a system that contains semi-permeable membranes. Clean water permeates through the membranes while dissolved minerals, such as salt and organic substances are retained by the membranes. This results in two water streams: one of clear, desalted water and one of reject water that continuously flushes the concentrated salt solution out of the membrane system. Approximately 35 to 50 percent of the feed stream is converted to clean water while the remainder of the feed stream, with all of the minerals, is returned to the ocean.

In order to optimize a desalination system for the best water quality with minimal energy consumption and maximum protection against corrosion one should pay close attention to system efficiency (pumps), system fouling (membrane pre-treatment) and re-mineralization (post-treatment with CO₂ Injection for pH correction).



High efficiency pumps

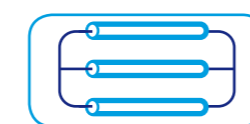
In order to achieve optimal system efficiency, specialized pumps are needed between the various steps of the desalination process. The system design must assure uninterrupted flows with minimal energy consumption and deal effectively with the corrosive and aggressive nature of seawater.

Since each desalination plant has a specific design and characteristics, Norit Nijhuis appropriates its pump design to deliver the specific capacity and head needed with maximum reliability, flexibility and durability. Coupled with its energy efficiency performance, Norit Nijhuis pump technology reduces energy consumption to the minimum required to consistently operate a specific desalination system.

Norit Nijhuis' desalination pumps are made of high quality duplex or super duplex to offer the durability needed for distributing highly corrosive- and abrasive seawater.

Benefits

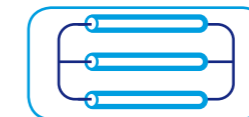
- Appropriate pump design to system specification
- Optimal energy efficiency
- Resistant to corrosive and abrasive material
- Reliable for consistent water flow



Seawater pre-treatment with membrane technology

Reducing system fouling is a key consideration for achieving efficient use of energy in desalination plants where pure water is produced from seawater and brackish water.

Because RO membranes are susceptible to biological fouling and plugging with fine silt pre-treatment of the water is necessary to prevent reduced RO efficiency, increased energy consumption, high maintenance cost, and production losses. Conventional pre-treatment methods such as sand filters and clarifiers are unable to meet the quality standards without applying multiple barriers. This increases the consumption of chemicals and energy as well as the system's footprint.



Norit X-Flow's SEAGUARD hollow fiber ultrafiltration (UF) membrane provides a highly effective single barrier to keep the RO membranes free from fouling.

SEAGUARD removes all fine silt and turbidity, and screens microbiology.

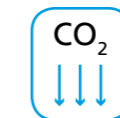
UF membranes typically operate at low pressures with low energy consumption while achieving high output of clean water. SEAGUARD provides the simple solution, and produces water that meets the highest standards for silt density index (SDI), turbidity and microbiology.



UF membrane is proving itself as the most cost-effective technology for seawater pre-treatment. The proven integrity of Norit's X-Flow membranes have made SEAGUARD the technology of choice for renowned desalination projects worldwide. Norit's standardized seawater skids equipped with Norit X-Flow membrane technology combine superior performance and proven expertise.

Benefits

- Energy reduction
- Compact footprint
- Low operating cost
- Improved water quality
- Increased life span of the RO membranes



Post-treatment: CO₂ injection, pH correction

Re-mineralization is the process needed to make the RO water drinkable. Conventional methods such as adding chemicals fail to deliver the required permeate water quality. Norit Haffmans' CO₂ injection system adjusts (decreases) the pH value and allows the calcium (Ca⁺) ion to re-create some hardness and alkalinity in the water as required by the World Health Organization standards. Furthermore, CO₂ is a non-toxic, non-hazardous additive to potable water.

Norit Haffmans offers both the CO₂ injection system as well as the complete CO₂ injection package for pH control including

- CO₂ combustion plant for an economic supply of CO₂
- CO₂ purification plant for food grade CO₂ for injection
- CO₂ storage facilities for uninterrupted CO₂ supply
- CO₂ injection systems for process optimization and good water quality
- CO₂ storage to CO₂ production units

Benefits

- Improved water quality
- Non-toxic, non-hazardous additive to drinking water
- Complete CO₂ injection package

Desalination