



WATER TREATMENT SYSTEMS

PERMACHLOR SEAWATER ELECTROCHLORINATION

SAFE EFFECTIVE INDUSTRIAL BIOFOULING MANAGEMENT



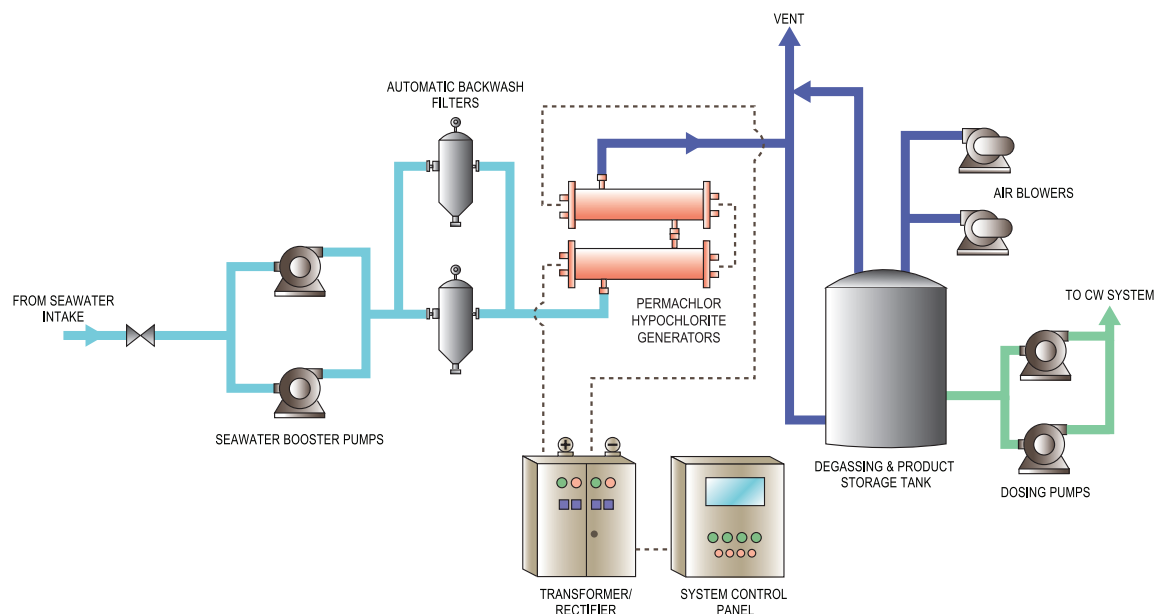
Coastal and offshore industrial facilities and oil/gas platforms need vast amounts of water for process cooling systems. The abundance and availability of seawater makes it the natural choice for power plants, refineries, desalination plants, fixed platforms and FPSO's (floating production storage and offloading). However, seawater contains many bio-species that can damage equipment & piping unless the incoming water stream is effectively treated with chlorine or other biocides.

Chlorine is most commonly used to kill macro-species (mussels, clams, oysters) and microspecies (bacteria, slime, and algae) but gaseous chlorine is a lethal chemical that must be handled and transported with strict safety procedures and local

government regulations. Sodium hypochlorite is now accepted worldwide as a safe and effective alternative disinfectant or biocide to control marine biofouling.

Electrochlorination is the process of generating low concentration sodium hypochlorite (500-2000 ppm) on-site using only seawater and electricity.

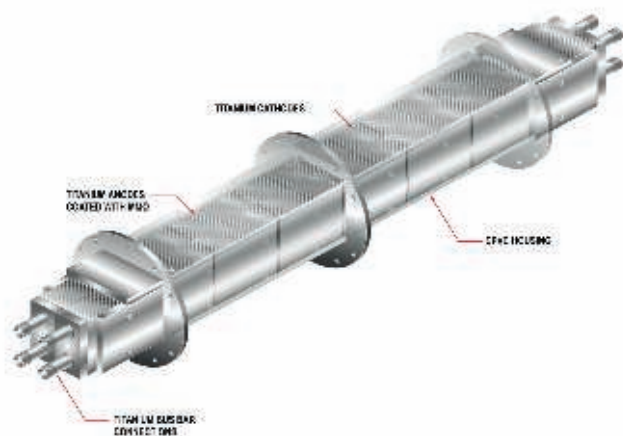
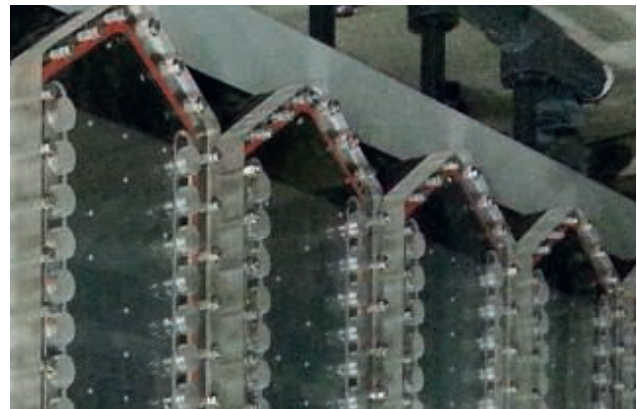
The salt from the seawater is electrochemically converted to sodium hypochlorite in an undivided electrolytic cell unit by passing direct current, as shown on the following simplified process diagram. Hypochlorite output is controlled by varying the applied current according to dosing demand so as to minimize storage required.



RELIABLE ELECTROLYZER TYPES FOR EVERY APPLICATION

Permascand has the in-depth know-how and experience to design, manufacture, and commission complete electrochlorination systems to suit every dosing application. Our team starts by assessing the site conditions to develop a customized a solution and select the optimum electrolyzer geometry. Permascand also supplies new electrolyzers, replacements units and spares parts for the most commonly used cell configurations including mesh-type, parallel-plate, and concentric tube type.

Permachlor Mesh type cells use a monopolar 1, 3 or 6 cell configuration with a PVC housing and acrylic covers for operator flow inspection. Expanded titanium dimensionally stable mesh anodes with Permascand Mix Metal Oxide (MMO) coating offer low power consumption and minimum build-up of calcareous deposits with only routine acid cleaning. Hastelloy-C cathodes are not susceptible to hydrogen damage to provide years of trouble-free operation. Electrolyzers can be removed for maintenance and servicing with minimal plant interruption.



Permachlor parallel plate type bipolar cells offer maximum efficiency and production with the minimum capital cost and space footprint. Each electrolyzer module consists of a number of passes of parallel plate anode cathode pairs intermeshed to provide sufficient electrolysis for the volume and strength of product solution required. The seawater is fed at the bottom of the cell assembly and flows upwards through the parallel plates where the sodium chloride (salt) is converted to sodium hypochlorite and hydrogen gas. Electrolyzer modules can be grouped in a vertical or horizontal arrangement depending upon the end-user specifications.

Permachlor SC (Self Cleaning) type concentric tube technology provides the advantage of self-cleaning electrodes and ease of cell assembly. Seawater flows through the annulus with high-velocity and turbulence at the electrode surfaces to effectively inhibit calcareous deposit formation. The self cleaning feature makes the Permascand SC the ideal choice for offshore installations without the need for acid storage, handling, and disposal.



CREATING CUSTOMER VALUE THROUGH COMMITMENT, COMPETENCE AND QUALITY

Permascand is one of the leading producers of electrodes and electrochemical equipment serving the chlor-alkali and sodium chlorate industry. Permascand is also a supplier of advanced equipment for the Offshore/Subsea market and a system supplier for the Water Treatment market with its own product line of Water Treatment Systems. With its headquarter and manufacturing site in Ljungaverk, Sweden, Permascand AB employs more than 130 dedicated professionals supplying innovative, high-quality, world-class products and services for over 40 years.

THE RANGE OF SERVICES INCLUDE:

- Manufacturing of water treatment systems for Industrial, Marine and Oil & Gas business areas
- Production of electrochemical cells and electrodes with catalytic coatings
- Refurbishment of electrochemical cells and electrodes
- Design, engineering and production of customized solutions utilizing lightweight, strong, corrosion resistant materials for various markets
- Research, development and innovation.

CERTIFIED ACCORDING TO:



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