

Electrochlorination Systems **CECHLO®**

De Nora CECHLO® electrochlorination systems unite the global electrochlorination leadership of De Nora and the technology know-how of Chlorine Engineers Corp., Ltd in Japan; leveraging the combined global assets, resources and capabilities of two recognised leaders in electrochemical technologies.

CEC Water Technologies Limited was formed in July 2012 as a result of the partnership and now is 100% a De Nora company.



Introduction

Marine biofouling is a common occurrence in many industrial facilities that use seawater as cooling water or heat source.

Electrochlorination systems use a simple and straight forward process, combining three common consumables (salt, water and electricity) to generate sodium hypochlorite for biofouling control as well as for disinfection, bleaching and deodorizing purposes.

Chlorine or sodium hypochlorite is generally used as a water disinfectant with the regulation of residual chlorine levels at water tap exit by the Water Supply Law in Japan. However, the purchase, handling and storage of liquefied chlorine and commercially available sodium hypochlorite come with associated risks like accidents occurring during transportation or storage. The CECHLO® electrochlorination systems for the on-site production of sodium hypochlorite is therefore a safe and economical solution. CECHLO® is a well-established product line in Japan. It was developed 40 years ago by Chlorine Engineers and is now owned by De Nora Water Technologies through CEC Water Technologies.

Features & Benefits

Extremely safe and economical

- No risks associated with delivery or storage of hazardous chemicals such as high-pressure chlorine
- No need to assign qualified staff required by law to handle hazardous chemicals resulting in cost savings
- Low production costs

High performance electrolyzer

- Low power requirements
- Special metal electrode resulting in high performance
- Durable
- Low operational costs

Easy maintenance and control

- Unique structure minimizes scaling by magnesium and calcium carbonates
- Even with scaling, the electrolyzer can be easily disassembled/ assembled and the anode can be easily replaced
- Long stable operation with acid cleaning required only once/twice per year

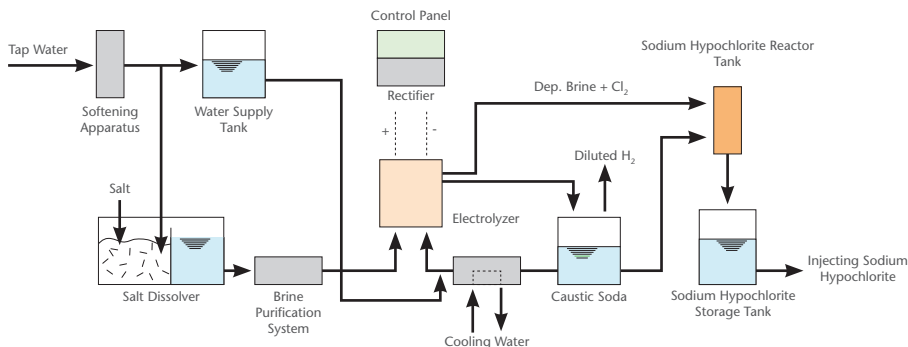


There are four types of De Nora CECHLO® systems depending on the concentration of sodium hypochlorite:

Generator type (Electrochlorination Plant)		Concentration	Production Capacity
Brine Electrolysis type	CECHLO®-MS (Membrane Technology base)	5~12% as Cl ₂	300 kg/d~ as Cl ₂
	CECHLO®-IS (Membrane Technology base)	5% as Cl ₂	30~2,400 kg/d as Cl ₂
	CECHLO®-NS	0.8% as Cl ₂	10 kg/d as Cl ₂ ~
Seawater electrolysis type	CECHLO®-M	100~2,500ppm 0.01~0.25% as Cl ₂	0.5 kg/h as Cl ₂ ~

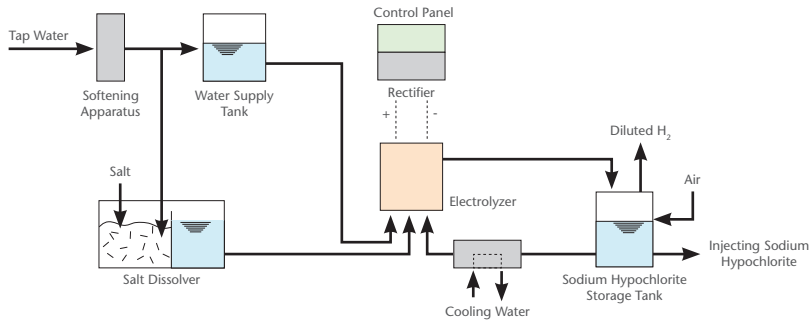
Using Ion Exchange Membrane Electrolytic Cell De Nora CECHLO®-MS (Brine Electrochlorination System at 12% strength of NaClO)

Saturated brine is fed to the anode chamber and pure water or soft water to the cathode chamber. Upon application of direct-current electricity, chlorine gas is formed at the anode and caustic soda at the cathode which react in the reactor tower, generating sodium hypochlorite at 12% strength.



De Nora CECHLO®-IS (Brine Electrochlorination System at 5% strength of NaClO)

Saturated brine is fed to the anode chamber and soft water to the cathode chamber. Upon the application of direct-current electricity, sodium hypochlorite is generated at the anode and caustic soda at the cathode through the ion exchange membrane which react at the non-diaphragm area and sodium hypochlorite at 5% strength is generated inside the electrolyzer.



Purpose:

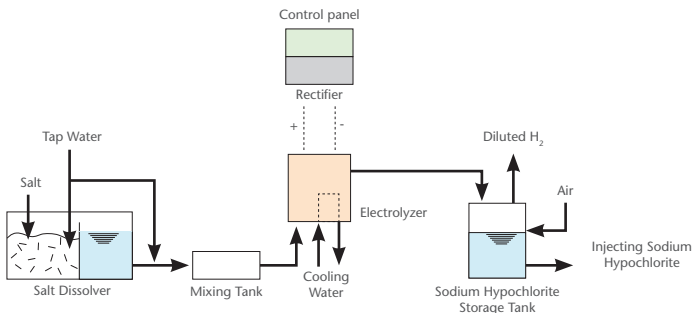
- Biofouling control
- Bleaching
- COD reduction
- Decolouring
- Deodorizing
- Disinfection

Applications:

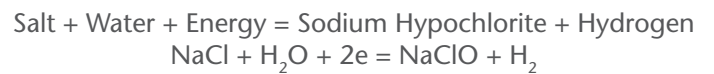
- Cooling towers
- Desalination plant
- Food & beverage processing
- Inland power stations
- On-site generation of NaClO
- Distribution of NaClO Solution
- Sewage treatment
- Water/wastewater treatment

Using Direct Electrolysis of Brine Water De Nora CECHLO®-NS (Brine Electrochlorination System at 1% strength of NaClO)

The salt is dissolved in the salt dissolver and the saturated brine is diluted into 3% concentration. When the diluted brine is fed into the electrolyzer upon the application of direct-current electricity, chlorine gas is generated at the anode and caustic soda at the cathode. Then they react with each other instantly and sodium hypochlorite at 1% strength is generated.



This overall chemical reaction can be expressed as follows:

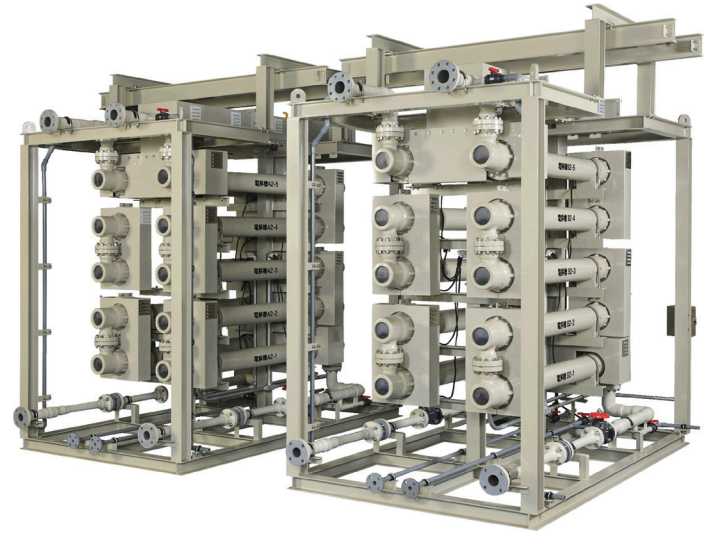
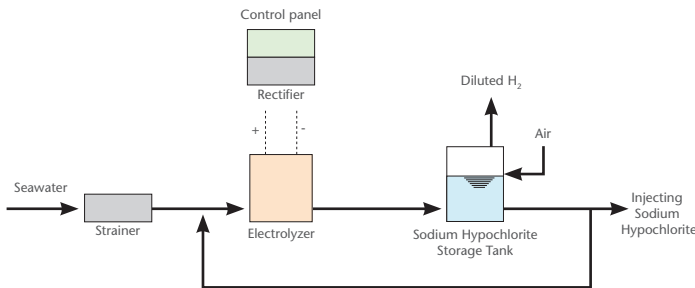


CECHLO®-IS ready for installation at Asaka Water Works in Saitama, Japan



Using Seawater Electrochlorination De Nora CECHLO®-M

The CECHLO®-M system is ideal for small - medium size requirements and can be easily customized due to the system's unique modularized cell design. The NaCl dissolved in the seawater is dissociated into Na⁺ and Cl⁻. When the seawater is fed to the electrolyzer upon application of direct-current electricity, the chlorine gas is formed at the anode and caustic soda at the cathode which react with each other instantly to generate sodium hypochlorite.



CECHLO®-M equipment to be installed in the Shimane nuclear power plant, Japan

SEACLOR®

SEACLOR® systems range in capacity from 20 to 900 kg/hr per train. The systems are supplied pre-assembled or pre-fabricated to the maximum possible extent compatible with transport and handling limitations. Systems are designed for continuous and unattended operation and require only periodic monitoring.

SEACLOR® systems consist of electrolytic cells of modular construction; these are combined in an electrical and hydraulic series and fastened together to form an electrode assembly, which is placed in a cylindrical electrolyzer body. A unique feature of the electrode assembly is the ease of replacement of the electrode package installed in the electrolyzers; it can be inserted or removed from the electrolyzer body in a short time without need for special tools or specialized mechanics.

Features:

- 5 year warranty
- De Nora DSA® coating
- Titanium cathode
- Bipolar anode/cathode
- Power consumption typically less than 4.5 dc kWh/kg Cl₂

Purpose:

- Biofouling control
- BOD/COD reduction
- Disinfection



SEACLOR® installation in Keppel Merlimau Cogen power plant, Singapore

Applications:

- Cooling tower
- Desalination plant
- Iron works
- LNG terminal
- Nuclear power plant
- Offshore platform
- Petrochemical plant
- Refinery
- Thermal power plant
- Wastewater plant

WATER MADE EASY

MARINE

ENERGY

MUNICIPAL

INDUSTRIAL



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