Selcoperm electrolysis system (SES)

Safe and simple production of sodium hypochlorite solution (5-45 kg/h)

Composition

The Selcoperm electrolysis system is a modular system for the safe production of a 0.8 % sodium hypochlorite solution from a diluted brine solution. The Selcoperm electrolyser is the core piece of the Selcoperm electrolysis system. It comprises the electrolysis cells, hydraulic connections and a control cabinet with a 7“ multi-colour touchscreen for operating and monitoring of the whole electrolysis system.

In addition, a rectifier for the direct current supply, a water softener, a brine tank, a brine dosing station and a tank for degassing and storing of the sodium hypochlorite solution are required. The installation can be rounded off with a measuring and control unit for chlorine dosing.

Electrochlorination

Selcoperm systems produce sodium hypochlorite electrolytically, directly from a solution of common salt using electricity. On-site production of the disinfectant solution means maximum safety at minimum costs. The safety concept is evaluated with technical report by a third-party expert from TÜV SÜD Product Service GmbH.

In the electrolysis cell, caustic soda solution, hydrogen and chlorine are generated. The chlorine reacts immediately with the caustic soda solution, resulting in a sodium hypochlorite solution, which is the disinfectant.

The disinfectant can be dosed directly into the piping system with a dosing pump.

Benefits

- Safe and reliable method of producing sodium hypochlorite on-site
- Common salt is the base material - it is non-toxic, easy to store and easy to handle
- Only water, common salt and electricity are needed for the electrolysis - low operating costs, world-wide use
- Fresh sodium hypochlorite is always on hand and does not dissociate like commercial sodium hypochlorite solutions
- Low formation of chlorate as a by-product
- Less safety requirements than chlorine-gas-based systems
- Lower pH value than commercial sodium hypochlorite reduces scaling of injection units etc. in hard water areas
- Robust design for easy installation and maintenance
- Long service life, compared with membrane cell electrolysis

Applications

Typical disinfection applications for Selcoperm systems are especially in

- drinking water treatment,
- water treatment for industrial processes and cooling towers.

Remark: Legislation on the use of disinfectants in water treatment applications is country-specific. Please contact your local Grundfos sales office for further details on the use of our products in your application and area.

Technical Data

Preparation capacity	**Type**	**Capacity/hour [g Cl_2]**	**Capacity/day [kg Cl_2]**
	SES-5000	5000	120
	SES-7500	7500	180
	SES-10000	10000	240
	SES-15000	15000	360
	SES-20000	20000	480
	SES-30000	30000	720
	SES-45000	45000	1080
Electrical connection	380-415 V, 50-60 Hz		
Sodium hypochlorite concentration	8-8.5 g/l		
Salt consumption	3-3.5 kg NaCl per kg of Cl_2 (equivalent)		
Power consumption (DC/AC)*	4.2-4.6 / 5.0-5.4 kWh per kg of Cl_2 (equivalent)		
Soft water consumption	125 litres per kg of Cl_2 (equivalent)		
Soft water inlet pressure	3.5-5 bar For lower water pressures, Grundfos offers booster pumps		
Soft water temperature	10-20 °C (for higher or lower temperatures an external chiller or heater is required)		
Max. ambient temperature	40 °C		
Soft water quality for operation	Drinking water quality with low iron (< 200 µg/l) and manganese (< 20 µg/l) content, softened to: 1 °dH / 17.8 ppm $CaCO_3$ and less		
Salt quality	Food-grade common salt For drinking water disinfection, salt with a low bromide concentration must be used		
Drain	An on-site drain for maintenance is required		
Communication	Remote control and monitoring via PROFINET		

* System with air-cooled rectifier, excluding optional chiller and heater

The Selcoperm electrolysis principle

With electrolysis, sodium hypochlorite is produced directly from a solution of common salt using electricity.

The following reactions take place in the electrolysis cell:

$$2NaCl + 2H_2O \rightarrow 2NaOH + Cl_2 + H_2$$

The chlorine (Cl_2) produced reacts immediately with the caustic soda solution (NaOH) also formed, resulting in a sodium hypochlorite solution (NaClO):

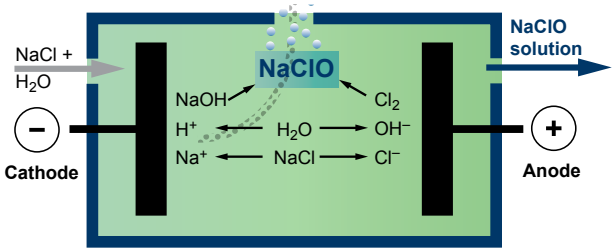
$$Cl_2 + 2NaOH \leftrightarrow NaCl + NaClO + H_2O$$

The sodium hypochlorite solution, which is the disinfectant, has a pH value between 8.5 and 9.5, and a chlorine concentration of 8 g/l. It has a half-life of several months, which makes it ideal for storage in a buffer tank.

After dosing the solution into the water flow, no pH value correction is necessary, as it is often required e.g. in electrolysis according to the membrane principle. The sodium hypochlorite solution reacts in a balance reaction, resulting in hypochlorous acid (HClO), the effective disinfectant:

$$NaClO + H_2O \leftrightarrow NaOH + HClO$$

The dosing quantity depends on the application as well as the local regulations. In general, the concentration after the injection unit is 0.3 to 2 ppm chlorine equivalent.



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GRUNDFOS Holding A/S
Poul Due Jensens Vej 7
DK-8850 Bjerringbro
Tel: +45 87 50 14 00
www.grundfos.com