

Wallace & Tiernan[®] On-site Electrolytic Chlorination

OSEC[®]-LC System

SIEMENS

Introduction

The OSEC[®]-LC system provides for the continuous production of sodium hypochlorite solution from salt, water and electricity. This eliminates dependence on commercial chlorine suppliers and the problems inherent in the transport and handling of bulk hypochlorite, particularly in remote or residential areas. In addition, use of these systems could lower operating costs and disinfection by-products significantly compared to the use of bulk hypochlorite. Operation is completely automatic making the OSEC[®]-LC System ideally suited for un-manned locations.

The system may be a complete package for sodium hypochlorite production, or a basic system of electrolyser, power supply and control panel, to which peripheral equipment (storage and saturator tanks, blower, softener etc.) all provided by the customer is added to suit site requirements.

2 Capacities Available

There are two different capacities available to select a system as close as possible to your requirements. Sodium hypochlorite is produced at 0.8% concentration at the following equivalent chlorine capacities.

Chlorine Capacities

6 kg/day and 12 kg/day.

Basic Electrolyser



Positive Hydrogen Removal

The OSEC[®]-LC System includes a centrifugal blower that dilutes the hydrogen, produced as a by-product of the process, and force ventilates the gas air mixture, which is below the LEL, to a safe discharge point external to building.

Automatic Operation

The production of sodium hypochlorite is controlled automatically from the level in the product tank. System conditions are monitored continuously by the control panel which provides an alarm in the event of a malfunction and alarm lights which identify the malfunction type.

Benefits

- ATEX compliant in a single package, providing increased safety
- 0.8% available chlorine solution produced, minimising COSHH requirements
- Low cost of operation and ownership
- Compact size for ease and flexibility of installation
- Ease of use
- 5 Year parts and labour anode warranty provided correct operating conditions are maintained
- Level, flow & air switch interlocks providing increased safety
- In-house electrolyser anode manufacture ensuring continuity of spares/parts

OSEC® -LC System Components

- Duplex softener for uninterrupted softened water supply to minimise scaling.
- Remote mounted salt saturator that provides the saturated brine supply for the electrolytic cell.
- Peristaltic brine pump that feeds the brine solution to the electrolyser at the desired metered rate.
- Electrolytic cell, or electrolyser, that converts the dilute brine solution into sodium hypochlorite.
- Transformer/Rectifier unit that provides the low voltage/high current DC supply used for electrolysis.
- Control panel that supervises and monitors the safe generation of sodium hypochlorite.
- Centrifugal-type blower that dilutes and ventilates the hydrogen gas generated during electrolysis, plus air flow switch to ensure blower is operating.
- Product storage tank to hold the fresh sodium hypochlorite solution. Tank has high/low level contacts to control start/stop electrolyser operation to fill the tank.

In addition to the above, a metering pump is typically provided to meter the sodium hypochlorite to the point of application. Control of the pump can be manual or automatic (flow-paced or closed loop residual) to apply the proper chlorine dosage to the point of application.

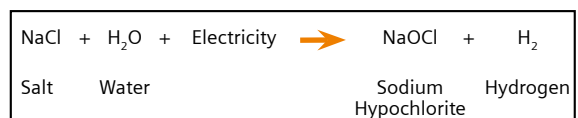
Electrolyser in Enclosure



Operation

Supply water passes through the water softener (required if water hardness exceeds 17 mg/l) to remove any calcium, magnesium, iron and manganese present. This provides the make-up water for the salt saturator and the brine dilution water. The saturated brine solution is pumped from the peristaltic pump into the dilution water line. Accurate brine flow, which is important to establish and maintain efficiency, is achieved with a calibration tube. The softened dilution water flow is measured by a flow controller to maintain the set flow rate. The dilution water is combined with the saturated brine solution to form a 3% brine solution which enters the electrolyser.

Within the electrolyser, the brine solution - which is a good conductor of electricity - supports a current applied between the positive and negative electrodes thus electrolyzing the sodium chloride solution. This results in chlorine (Cl_2) gas being produced at the positive electrode (anode), while sodium hydroxide (NaOH) and hydrogen (H_2) gas are produced at the negative electrode (cathode). The chlorine further reacts with the hydroxide to form sodium hypochlorite (NaOCl). This reaction can be simplified as follows:



When the solution exits the electrolyser, it is approximately 0.8% strength hypochlorite. A float switch (intrinsically safe), monitors the fluid level within the electrolyser to ensure the proper, efficient operation of the system.

The hypochlorite solution, together with the hydrogen by-product produced during electrolysis, discharges into the detrainng column mounted inside the OSEC®-LC system enclosure. Hypochlorite will then fall under gravity into a storage tank, diluting it to below the LEL, before exiting the building at high level. A flow-sensing orifice prior to discharge monitors the airflow.

This is interlocked with the system controls to insure that airflow is established before the electrolysis process is begun. The hypochlorite solution is fed to the point of application by a metering pump. Level probes (intrinsically safe) in the storage tank start and stop the electrolyser to maintain a hypochlorite supply.

Technical Information

Capacities:

6 & 12 kg of equivalent Cl₂ per day.

Salt requirements:

Salt must be high quality, preferably pure vacuum dried (food quality). Salt usage is approx 3.5kg/kg of equivalent chlorine.

Supply water requirements:

Min. water pressure: 2 bar

Max. water pressure: 5 bar

Min. water temperature: 10°C*

Max. water temperature 25°C*

*consult Siemens Water Technologies for temperatures outside of this range.

Total water consumption:

6 kg/day Capacity - 64 l/h

12 kg/day Capacity - 94 l/h

Nominal power consumption:

4 - 4.5 kW DC per kg. of equivalent chlorine.

Electrical requirements:

6 kg/day @ 115 VAC - 3.5 kVA

12 kg/day @ 115VAC - 6.5 kVA

6 kg/day @ 240VAC - 3.5 kVA

12 kg/day @ 240VAC - 6.5 kVA

Temperature requirements:

Ambient temperature requirements 5°C to 40°C

Control panel:

Environment protection IP66

Alarms 5 Alarms for system monitoring, contacts rated for 250VAc or 125VDC. Power rating of 2500VA, 300W:- Low water flow, low electrolyte level, improper voltage, air flow fault & low storage level.

Core Equipment:

Electrolyser assembly

Control panel

Transformer/rectifier power supply

Brine pump

Ancillary Equipment:

Air Blower plus air flow switch

Storage/product tank - 6 to 48 hour capacity, high density polyethylene construction with inlet and discharge fittings. Also fitted with blower inlet and vent connections plus level controls

Salt saturator - Up to 30 day capacity, consists of a heavy duty plastic tank with a filter and a float-operated water inlet valve.

Water softener - required when water hardness exceeds 17mg/l. Twin tank design with automatic changeover for regeneration, or single tank with manual regeneration available.

Hypochlorite metering pumps

Encore® 100 Diaphragm Metering Pump

Encore® 700 Diaphragm Metering Pump

Overall dimensions (mm) H x W x D:

Basic Electrolyser: 810 x 415 x 190

Electrolyser in Enclosure: 1130 x 850 x 380

Control panel: 600 x 600 x 300

Power supply: 675 x 560 x 335

Basic Electrolyser: 20 kg (dry)

Control panel: 29 kg

Power supply: 6kg/day unit 27 kg

12kg/day unit 37 kg

Directives conformance:

**Explosive Atmospheres Directive (ATEX) 94/9/EC

** All OSEC® System equipment has been examined by Sira Certification Services to assess its compliance with the Explosive Atmospheres Directive (ATEX) 94/9/EC. The relevant certificate number is Sira 04ATEX4277X. The equipment will now be marked accordingly:



EEx nA II T6
Ta = +5°C to +40°C

For detailed information request ATEX product sheet.

