

# Wallace & Tiernan® On-Site Hypochlorite Generation System OSEC® BP Model System

The OSEC® BP system provides for the continuous production of sodium hypochlorite solution from salt, water and electricity through the electrolysis of prepared brine solution. 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 significantly compared to the use of bulk hypochlorite. Operation is completely automatic making the OSEC® BP system ideally suited for unmanned locations. Systems are available in standard unit capacities ranging from 12 to 48 lbs. of equivalent chlorine per day.

## System Features

There are four capacity steps available to maximum of 48 lbs/day (22.7 kgs/day). These offer selection of a system as close as possible to site requirements. As the concentration is much lower than that of commercial hypochlorite, it is therefore far less corrosive and not subject to the same degree of decomposition.

## Proven Electrolyzer Design

The OSEC® BP System utilizes cost-efficient interleaved bipolar electrode technology which avoids the more costly approach of joining individual anode and cathode plates within the cell pack.

## Wall-Mounted Components

The basic OSEC® BP system components are suitable for wall-mounting by the customer. This flexibility enables the system to be configured to fit any installation constraints where space is minimal.

## Positive Hydrogen Removal

The electrolytic generation of sodium hypochlorite from saturated brine results in the production of hydrogen gas. The OSEC® BP system includes a duty and stand-by centrifugal blower that dilutes

## Key Benefits

- Easy to maintain and service. Electrolyzer design allows easy access to chassis for cleaning or replacement
- Greater electrolysis efficiency with an economical cell design
- Four capacities are available to match site-specific requirements
- Flexible installation with wall mounted components
- Limited operator interface through a fully automatic system
- Certified for use in drinking water systems according to NSF/ANSI-Standard 61
- Visual indication of cell operation
- Complete systems supply, and service with Siemens Water Technologies



## Product Sheet

the hydrogen and provides the forced ventilation of the gas to a safe discharge point. A differential pressure switch, interlocked to the system controls monitors blower operation and shuts down the electrolyzer if airflow is not present.

#### Automatic Operation

The production of sodium hypochlorite is controlled automatically from the level in the hypochlorite solution storage tank. System conditions are monitored continuously by the control panel, which provides an alarm in the event of a malfunction. The operator display identifies the type of malfunction. This assists in quick troubleshooting.

#### Anode Warranty

The anodes are warranted for two full years and five years pro-rated. This warranty is based on installation and start-up date, provided that the correct operating conditions of the OSEC® BP system are maintained.

#### Complete System Supply and Service

Siemens Water Technologies Corp. not only manufactures and supplies the hypochlorite generating system, but also the metering pumps for delivering the hypochlorite solution to the point of application, the analyzers for measuring and monitoring the chlorine



residuals in the treated water, and the automatic control systems to maintain the desired disinfectant residuals. No other equipment supplier can provide this level of service. In addition, through our worldwide service network, water softener recharge service, salt delivery, and saturator refill contracts can be provided to ensure continuous operator-free performance.

#### NSF/ANSI-Standard 61 Certified

Electrolyzer and generator are NSF/ANSI-Standard 61 certified for use in drinking water systems.

#### Operation

The supply water passes through the water softener (required if water hardness exceeds 17mg/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 into the dilution water line. Accurate brine flow, is important to establish and maintain efficiency. The softened dilution water flow is also measured into the electrolyzer by a flowmeter with controller to maintain the set flow rate. The dilution water is combined with the saturated brine solution to form the 2.8% weight by weight brine solution that enters the electrolyzer.

Within the electrolyzer, the brine solution supports a current applied between the positive and negative electrodes thus electrolyzing the sodium chloride solution. This results in chlorine ( $\text{Cl}_2$ ) gas being produced at the positive electrode (anode), while sodium hydroxide ( $\text{NaOH}$ ) and hydrogen ( $\text{H}_2$ ) gas are produced at the negative electrode (cathode). The chlorine further reacts with the hydroxide to form sodium hypochlorite ( $\text{NaOCl}$ ).

When the solution exits the electrolyzer, it is nominally 0.8% strength hypochlorite. A float switch and temperature switch (intrinsically safe), monitors the conditions within the electrolyzer to ensure the proper, safe operation of the system. The hypochlorite solution, together with the hydrogen by-product produced during electrolysis, discharges into a solution storage tank. To ensure that the hydrogen produced is diluted and removed, a blower is used to force vent the storage tank. 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 electrolyzer to maintain a hypochlorite supply.

#### Equipment

The OSEC® BP System consists of the following major equipment items.

#### Electrolyzer

At the heart of the OSEC® system process, the electrolyzer contains a titanium chassis to which anodes and cathodes are fixed in a configuration that ensures maximum operating efficiency. The anodes are DSA-type and manufactured from a titanium substrate with a precious metal oxide coating. The cathodes are made from titanium and are fitted with ABS spacers that maintain a critical uniform distance from the anode. The vertical orientation of the anodes and cathodes provides for the quick removal of hydrogen from each cell pack and facilitates a two phase flow pattern. Indeed the vertical hydrogen gas removal results in a lift of no more than 4" while the electrolyte solution path is horizontal along the electrolyzer tube.

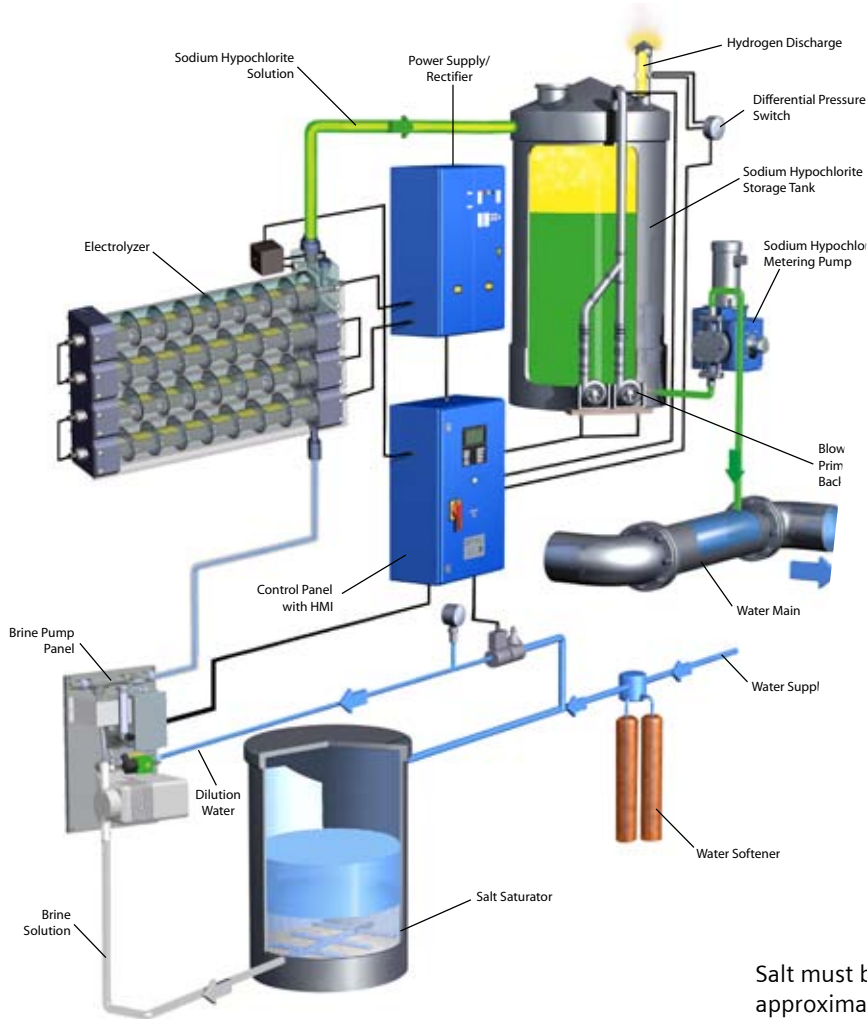
Each electrolyzer contains a minimum of eight cells electrically connected in series, containing sufficient anodes and cathodes to produce the desired quantity of chlorine. The electrolyzer chassis is encased in a 4-1/2" nominal diameter acrylic horizontal tube that has "O" ring sealed end connections.

#### Remote Mounted Salt Saturator

The saturator enables the salt supply to be stored indefinitely in sufficient quantity to provide for production continuity and economical refill cycles. The salt is stored wet with the make-up water entering above the salt bed. The water passes through the salt bed forming a saturated brine solution of approximately 26.5% strength.



## OSEC® Hypochlorite Generation System and Components



### Brine Feed & Dilution Water Metering

The system functions automatically to deliver a 2.8% brine solution to the electrolyzers during periods of operation.

### Transformer/Rectifier

A high-quality, solid-state controlled transformer/rectifier unit provides the necessary low-voltage/high-current DC supply required for electrolysis.

### Control Panel

For supervision and monitoring of the safe generation of sodium hypochlorite, the entire OSEC® process is automatically operated by a central control panel. The control panel includes an HMI (Human/Machine Interface) with LCD screen to allow for immediate visual indication of complete system status and parameters.

### Hydrogen Dilution Blower

The hydrogen blower dilutes and ventilates the hydrogen gas generated during electrolysis, reducing the concentration of Hydrogen gas in the product tank and discharged from the system vent below 25% of LEL. A duty and stand-by blower are provided as standard to ensure a continuous supply of dilution and ventilation air.

### Sodium Hypochlorite Storage Tank

The hypochlorite storage tank is designed primarily to hold the fresh sodium hypochlorite solution. However, it is also used to provide for the dilution and removal of hydrogen gas produced by the generation process.

The tank has a pressure level transmitter control, overflow, and low storage level alarm to start/stop electrolyzer operation.

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

An optional water softener can be provided for the dilution water and brine make-up water to eliminate build-up of deposits on the electrodes during electrolysis. This maintains electrolyzer efficiency. Generally, if water hardness is greater than 17mg/l, a water softener is required.

### Technical Data

#### Capacities:

12 lbs./day / 5.4 Kgs/day of equivalent  $\text{Cl}_2$   
24 lbs./day / 10.9 Kgs/day of equivalent  $\text{Cl}_2$   
36 lbs./day / 16.3 Kgs/day of equivalent  $\text{Cl}_2$   
48 lbs./day / 22.7 Kgs/day of equivalent  $\text{Cl}_2$

#### Salt Requirements:

Salt must be coarse solar salt quality. Salt usage is approximately 3.0 to 3.5 lbs./lb. of equivalent chlorine.



PLC based control panel

## Technical Data (Cont'd)

### Supply Water Requirements:

Minimum water pressure: 30 psi  
Maximum water pressure 75 psi  
Minimum water temperature 50°F / 10°C\*  
Maximum water temperature 80°F / 26°C\*  
\*consult Siemens Water Technologies Corp. for temperature outside of this range.

### Water Consumption:

0.6 - 0.9 gph per lb of chlorine  
5 - 7.5 l/h per kg of chlorine

### Nominal Power Consumption:

1.8 - 2.2 kW (DC) per lb. of equivalent chlorine.

### Electrical System Capacity Requirements:

12 lbs./day / 5.4 Kgs/day	2530 VA @230 VAC 1ø 60Hz or 2390 VA @230 VAC 3ø 60Hz
24 lbs./day / 10.9 Kgs/day	3680 VA @230 VAC 1ø 60hz or 3660 VA @230 VAC 3ø 60hz
36 lbs./day / 16.3 Kgs/day	5290 VA @230 VAC 1ø 60hz or 4775 VA @230 VAC 3ø 60hz
48 lbs./day / 21.8 Kgs/day	6670 VA @230 VAC 1ø 60hz or 6370 VA @230 VAC 3ø 60hz

### Ambient Temperature Requirements:

40°F to 105°F / 5°C to 40°C

### Control Panel:

NEMA 4X Cabinet  
Programmable Logic Controller  
General Alarm for system monitoring with contacts rated for 5A 250 VAC or 30VDC.

### Standard Equipment:

Electrolyzer assembly, Control panel, Transformer/rectifier power supply, Air Blower. Storage/Products Tanks - HDPE construction with inlet and discharge fittings. Also fitted with blower inlet and vent connections. Salt Saturator - MDPE 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.

### Overall Dimensions:

#### Electrolyzer Panel:

12 lbs./day: 15 -3/4" x 39" x 6-5/16" (H x W x D)  
24 lbs./day: 15 -3/4" x 39" x 6-5/16"  
36 lbs./day: 25-1/2" x 39" x 6-5/16"  
48 lbs./day: 25-1/2" x 39" x 6-5/16"

**Control Panel:** 25-5/8" x 20" x 8-13/16" (H x W x D)

**Power Supply:** 32-1/5" x 24-1/2" x 17-1/2" (H x W x D)

### Overall Weights:

**Electrolyzer Cell:** 12 lbs./day, 35 lbs.  
24 lbs./day, 45 lbs.  
36 lbs./day, 70 lbs.  
48 lbs./day, 95 lbs.

**Control Panel:** 55 lbs.

**Power Supply:** Steel: 1ø/290 lbs.  
3ø/182 lbs.  
Polyethylene: 1ø/270 lbs.  
3ø/162 lbs.

**Dimensions:** For complete dimension see Catalog numbers WT.085.070.101.UA.CN through WT.085.070.401.UA.CN

### Additional Literature:

Wallace & Tiernan® Hypochlorite metering pumps -  
Encore® 100 metering pumps - see publication  
WT.440.050.000.UA.PS

Encore® 700 metering pumps- see publication  
WT.440.400.000.UA.PS

Chem-Ad® metering pumps - see publications  
WT.440.600.001.IE.PS through WT.440.600.004.IE.PS

Wallace & Tiernan® MFC Analyzer/Controller - see publication  
WT.050.580.000.UA.PS

Depolox® 3 Plus Analyzer - see publication  
WT.050.560.000.UA.PS

Micro/2000® Residual analyzer-see publication  
WT.050.585.003.IE.PS

SFC single function controller - See publication  
WT.050.590.000.IE.PS

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