



ON-SITE ELECTROLYTIC CHLORINATION SKID-MOUNTED OSEC® B-PAK SYSTEM

The OSEC® B-Pak system generates a 0.8% sodium hypochlorite solution through the electrolysis of brine, consuming only water, salt and electricity. By producing hypochlorite on-site and on-demand, the system eliminates concerns associated with transportation and storage of liquefied chlorine gas or commercial sodium hypochlorite solutions, making it ideal for any application requiring chlorination.

Due to its low concentration, the hypochlorite solution generated by the OSEC B-Pak system minimizes corrosion and degradation (loss of available chlorine during storage) issues typical of high-strength (12-15%) sodium hypochlorite solutions. In addition, the system offers lower operating costs than commercial hypochlorite, typically resulting in attractive payback periods.

System Features

Capacities to 1500 lb/day (28.5 kg/h)

The OSEC® B-Pak skid is available at the following equivalent chlorine generation capacities:

Model	Capacity	
OSEC B-Pak 250	250 lb/day	4.7 kg/h
OSEC B-Pak 500	500 lb/day	9.5 kg/h
OSEC B-Pak 1000	1,000 lb/day	18.9 kg/h
OSEC B-Pak 1500	1,500 lb/day	28.5 kg/h

Higher chlorine generation capacities can be achieved with multiple units.

The OSEC B-Pak skid is a fully automated, pre-packaged on-site hypochlorite generation system designed for fast and economical installation, safe operation, and easy maintenance. Skids are shipped intact and completely piped, wired and tested.

Evoqua Water Technologies is a global leader in chemical feed and disinfection solutions with thousands of electrolytic hypochlorite generation systems (brine and seawater based) installed around the world.

KEY BENEFITS

- Easy and fast design for consulting engineers
- Plug-and-play convenience
- Reduced system foot print
- Easy access to cell components
- Low cost installation
- Reduced replacement costs
- Accurate/reliable brine measurement for high efficiencies.

System Features (Cont.)

Compact Skid Design

The OSEC® B-Pak skid was designed to minimize system footprint and simplify installation, operation and maintenance. The overall dimensions of the skid (35" W x 96" L x 77" H) remain the same for all skid capacities from 250 to 1500 lb/ day.

Skid-mounted components are standard and sized to meet the rated capacity of the skid. Off-skid components, such as brine tanks and hypochlorite tanks, are sized and selected to meet customer specifications.

Installation Flexibility

The OSEC B-Pak skid is perfect for retrofit applications or installation in existing buildings since it can pass through a standard 36" doorway. The floor-mounted transformer/rectifier cabinet is typically installed adjacent to the OSEC B-Pak skid to minimize the length of interconnecting power cables. However, the rectifier can be located in a separate room (e.g., electrical room) if required.

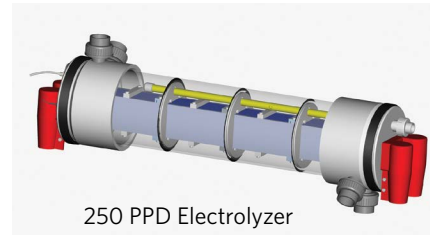
The 250 and 500 lb/day skids include duty and standby blowers for hydrogen dilution and removal piped directly to the hypochlorite tank. Since larger systems may require more than one hypochlorite tank or outdoor tank installation, blowers for the 1000, and 1500 lb/day skids are supplied loose to allow for installation at the base of the tank and meet requirements of multiple tank configurations.

Fully Automated Operation

The skid-mounted PLC-based control panel controls the entire process and monitors key variables to ensure reliable operation of the system. In automatic mode, the PLC starts and stops the system to maintain the desired level at the hypochlorite storage tank. Manual and service mode allow for testing and troubleshooting. The control panel includes a touch-screen human-machine interface (HMI) to provide user-friendly access to operators.

Improved Electrolyzer Design

The OSEC B-Pak unique electrolyzer design optimizes salt and power consumption while providing easy access to the cell components for maintenance. In addition, the improved end-connection cap design minimizes the potential for leaks commonly seen in flanged cells.

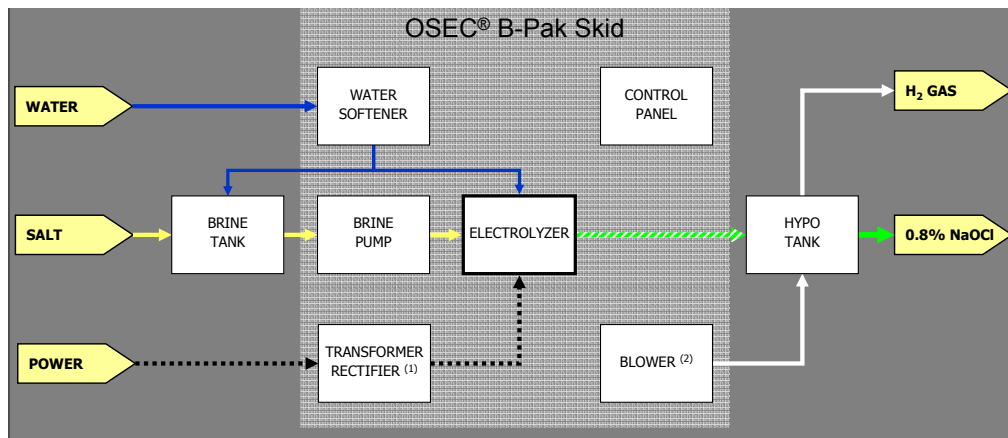


250 PPD Electrolyzer

Process Description

On-site electrolytic generation of sodium hypochlorite requires the following steps:

- Bulk solar salt is blown into the Brine Tank from the supplier hopper truck. Typically a 30-day salt inventory with a 10-day reorder point is maintained.
- Potable water passes through a twin-tank Water Softener to reduce hardness to less than 1 grain per gallon (17 mg/L).
- Softened water is fed to the Brine Tank to maintain a pre-set liquid level and produce a saturated brine solution.
- Saturated brine is fed to the Electrolyzer at a constant rate with a mechanical diaphragm Brine Pump.
- Softened water is fed to the Electrolyzer to dilute saturated brine to the optimum concentration.
- A liquid-gas mix of 0.8% sodium hypochlorite and hydrogen gas are produced at the Electrolyzer and conveyed to the Hypochlorite Tank.
- Air is blown into the tank at a flow rate high enough to dilute the hydrogen gas to less than 25% of its low flammability limit, force the diluted hydrogen out of the tank and vent to the atmosphere. Duty and standby Blowers are typically supplied.
- 0.8% sodium hypochlorite is stored at the Hypochlorite Tank to maintain a 1-day inventory.



NOTE 1: FLOOR MOUNTED. TYPICALLY LOCATED ADJACENT TO SKID.

NOTE 2: BLOWERS FOR CAPACITIES LARGER THEN 500 LB/DAY ARE NOT INCLUDED ON SKID ASSEMBLY.

TECHNICAL DATA

Water Requirements

- Potable water must be used
- Water hardness must be less than 1 gpg (17 mg/L)
- Manganese (Mn) content must be lower than 50 ppb (xg/L)
- Water temperature must be between 55 and 80°F
- Water pressure must be maintained between 30 and 75 psig
- Water consumption rate is 15 gal of water per pound of equivalent chlorine generated, at a nominal concentration of 0.8%

Power Requirements

- Power to the rectifier is used to feed the electrolyzer cell only. Power to the skid is used for control panel, brine pump and blowers.
- Maximum electrolyzer power consumption is 2.0 kWh (AC) per pound of equivalent chlorine.

Salt Requirements

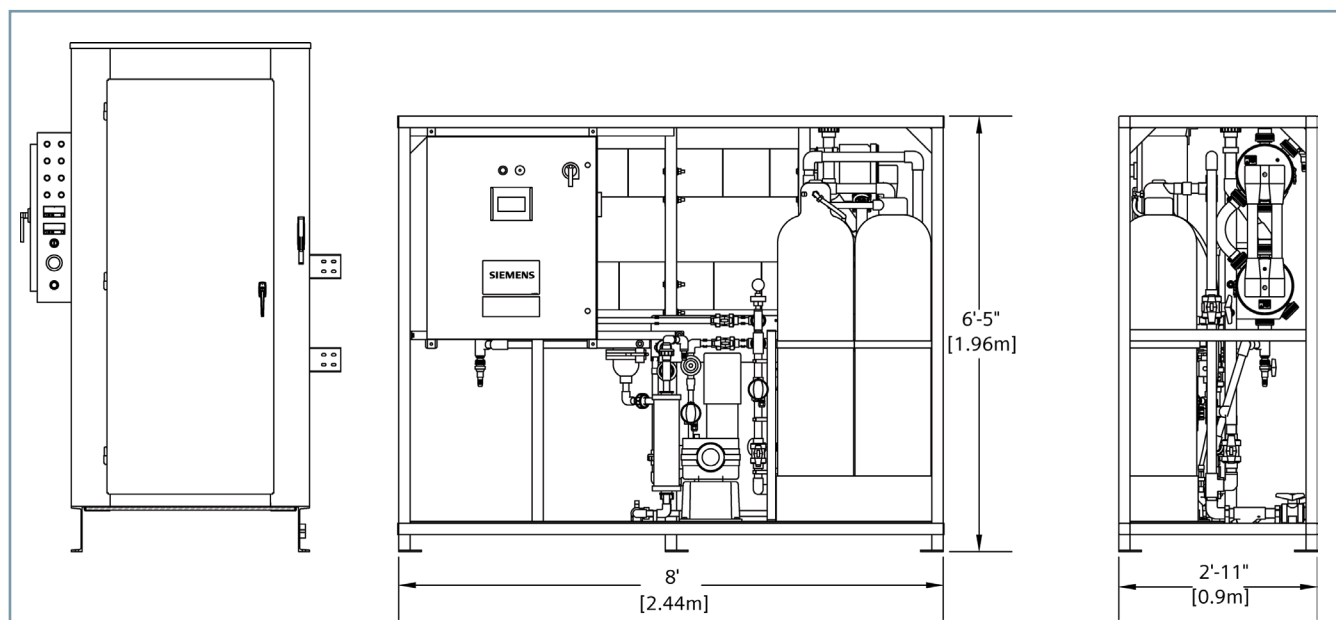
- Coarse solar salt, with a minimum Sodium Chloride content of 99.7% is required.
- Maximum electrolyzer salt consumption is 3.0 lb of salt per pound of equivalent chlorine.

Model	Power to Skid	Power to Rectifier
OSEC B-Pak 250	3.0 KVA @ 230/480 VAC 3ø 60 Hz	38 KVA @ 480 VAC 3ø 60 Hz
OSEC B-Pak 500	3.5 KVA @ 230/480 VAC 3ø 60 Hz	70 KVA @ 480 VAC 3ø 60 Hz
OSEC B-Pak 1000	5.7 KVA @ 230/480 VAC 3ø 60 Hz	133 KVA @ 480 VAC 3ø 60 Hz
OSEC B-Pak 1500	8.2 KVA @ 230/480 VAC 3ø 60 Hz	196 KVA @ 480 VAC 3ø 60 Hz

Hypochlorite Generation System Components

- OSEC® B-Pak Skid - includes the following major components: electrolyzer cells, control panel, brine pump, and water softener. The 250 and 500 skids include pre-piped and pre-wired duty and redundant blowers. Dimensions and weight as follows:

Model	Dimensions		Weight	
OSEC B-Pak 250	6' 5" x 8' x 2' 11"	1.96m x 2.44m x .9m	1200 lb	544 kgs
OSEC B-Pak 500	6' 5" x 8' x 2' 11"	1.96m x 2.44m x .9m	1350 lb	612 kgs
OSEC B-Pak 1000	6' 5" x 8' x 2' 11"	1.96m x 2.44m x .9m	1800 lb	816 kgs
OSEC B-Pak 1500	6' 5" x 8' x 2' 11"	1.96m x 2.44m x .9m	2100 lb	953 kgs



Hypochlorite Generation System Components (Cont'd)

- Transformer/Rectifier – SCR type rectifier in painted steel NEMA 1 enclosure. Dimensions and weight as follows:

Model	Dimensions		Weight	
	ft / in	mm	lbs	kg
OSEC B-Pak 250	6' x 2' 6" x 2' 6"	1829 x 762 x 762	1500	680
OSEC B-Pak 500	6' x 2' 6" x 2' 6"	1829 x 762 x 762	1600	762
OSEC B-Pak 1000	6' x 3' x 3'	1829 x 915 x 915	2200	998
OSEC B-Pak 1500	6' x 3' 6" x 3' 6"	1829 x 1067 x 1067	2800	1270

- Brine Tank – FRP tank with all connections necessary to receive bulk coarse salt via pneumatic transport. Insulation and heat-tracing may be required for outdoor installation. Typical selection as follows:

Model	Capacity	Dimensions		Weight	
		ft	m	lbs	kg
OSEC B-Pak 250	22 ton salt	8' Dia. x 15' H	2.44 Dia. x 4.6 H	2200	997
OSEC B-Pak 500	43 ton salt	10' Dia. x 15' H	3.05 Dia. x 4.6 H	3000	1360
OSEC B-Pak 1000	60 ton salt	12' Dia. x 15' H	3.7 Dia. x 4.6 H	3500	1587
OSEC B-Pak 1500	80 ton salt	12' Dia. x 20' H	3.4 Dia. x 6.1 H	4200	1904

- Hypochlorite Tank – FRP tank with all connections necessary for hydrogen removal, and hypochlorite storage. Insulation and heat-tracing may be required for outdoor installation. Typical selection as follows:

Model	Capacity		Dimensions		Weight	
	gal	l	ft	m	lbs	kg
OSEC B-Pak 250	4,000	1057	8' Dia. x 11' H	2.44 Dia. x 3.35 H	3000	1360
OSEC B-Pak 500	8,000	2114	10' Dia. x 15' H	3.05 Dia. x 4.6 H	4000	1813
OSEC B-Pak 1000	17,000	4491	12' Dia. x 20' H	3.7 Dia. x 6.1 H	4800	2176
OSEC B-Pak 1500	23,000	6077	13' Dia. x 23' H	3.96 Dia. x 7 H	5000	2267

Hypochlorite Feed System Components

Chlorine Analyzers

- Wallace and 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.UA.PS

Chemical Feed Controllers

- SFC PC Process Controller - see publication WT.050.590.010.IE.PS