# Wallace & Tiernan® Basic Principles of Electrochlorination

## The importance of bespoke design of electrolytic chlorination for brine applications

Paper 2

### Introduction

The design of an electrolytic chlorinator should reflect the type of feedstock to be used. Specifically, designs should take into account the very different characteristics of seawater and synthetic brines made up from refined salt.

### Seawater System Design

Seawater systems are generally designed to overcome the problems which arise from precipitation of magnesium and calcium hydroxides at the cathodes.

Sectional View of OSEC® System Electrolyser

To overcome this problem seawater electrolysers are designed with a larger inter-electrode gap than brine electrolysers. Typically the gap may be between 1.8 and 3 mm for seawater compared with 0.8 mm for a brine electrolyser.

They are also designed to have a higher flow through the system to promote turbulence and thereby discourage scale deposition.

Because the feedstock for seawater electrolysis systems is essentially free the salt conversion efficiency is of little consequence and systems may be configured to generate quite low concentrations of hypochlorite at low salt conversion efficiencies.

## Seawater System Design

The low hypochlorite concentration and high flow enables the effect of back reduction of hypochlorite at the cathode to be minimised thus off-setting the reduced power efficiencies resulting from the large inter-electrode gap.

Utilising a seawater system for synthetic brine operation without modification can lead to problems with reduced salt and power efficiency.

The larger inter-electrode gap results in greater solution resistance between the electrodes. This requires the application of a higher voltage to drive the necessary current and therefore the overall power requirement is significantly increased.

Electrochlorination systems designed for seawater may also use different anode coatings from those designed for synthetic brine. Often a coating is designed to operate at lower temperatures when used with seawater. This would lead to less than optimal operation if used in synthetic brine applications.

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