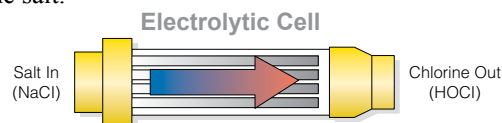


## Saltwater Pools

### SALTWATER POOLS ARE CHLORINE POOLS

Saltwater systems convert sodium chloride into chlorine via electrolytic chlorine generation (ECG). This conversion is accomplished by three main components: the electrolytic cell, the controller, and the salt.

ECG systems use a device called an electrolytic “cell”. The cell consists of alternating plates of opposite polarity. When the device is active, low levels of electric current pass between the plates into the pool water. This current causes electrolysis of the saltwater forming mainly hydrochloric acid, a precursor for free chlorine (hypochlorous acid).



The ECG system control unit sends power to the electrolytic cell to start chlorine generation. Most units include built-in pool water measurement and can vary the amount of chlorine produced. As salt cell plating regularly occurs, some ECG systems include a feature that regularly reverses the polarity on the cell plates to remove the scaling. Regular inspection of the salt cell, the controller, and pool water chemistry is still required.

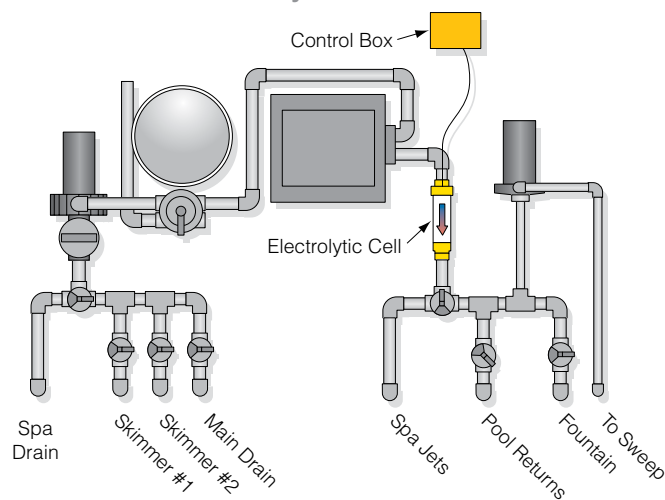
Salt is the raw material from which the chlorine (chloride) is produced. Salt makes the water conductive allowing low levels of electric current to pass between the plates of the “cell”. If the salt level is too low, then the chlorine production stops. While table salt can be used, purer salt (99%+ NaCl) is recommended. Regular salt may add other minerals which can increase cell fouling and non-salt TDS (Total Dissolved Solids).

### Going Green and Reduced Maintenance Costs

A saltwater system eliminates the need to purchase, transport and store the typical chlorine pool compounds (sodium hypochlorite, Tri-chlor, etc). For this reason alone, pool owners can boast a reduction in their carbon footprint. Except for the initial addition of salt, these systems also reduce the need for regular addition of chlorine chemicals as chlorine is generated automatically and on demand in the ECG “factory.”

Salt is cheaper and less is needed. Non-saltwater pools already have a large amount of salt present. In the course of sanitation, chlorine is reduced back into chloride ions. A common component of sweat, salt is also introduced by bathers during normal pool activity. Therefore, it is important to test the salt concentration before adding more salt. Minimal or no addition of salt may be required to bring it up to the generation level.

ECG System Schematic



### The Corrosion Risk and Increased Maintenance Concerns

Regular pool water chemistry measurements per local codes should be taken for any saltwater pool. This testing includes the salt concentration in addition to standard chlorine pool measurements. Additional chemical measurements and adjustments may be required to maintain a proper pool balance per CSI or LSI corrosion risk indicators.

Typical salt systems require 2,500-3,500 ppm salt concentration in the pool. Refer to the salt system manufacturer for recommended salt levels.

Salt concentrations in excess of 3,500 ppm can cause or exacerbate the following problems in pools:

- Turbidity issues (cloudy water)
- Increased risk of wet-metal surface corrosion
- Increased piping/Salt cell calcification (scaling/fouling)



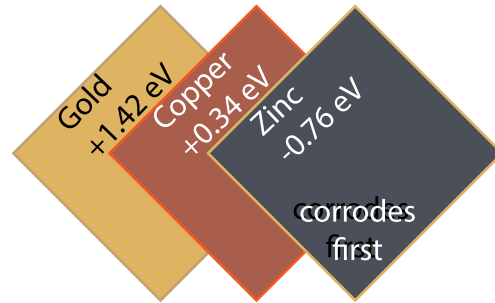
*Dilution is the only way to reduce TDS. Draining of the pool is recommended by pool professionals when TDS are 4000-5000 ppm.*

## Galvanic Corrosion and Proper Pool Bonding

Galvanic Corrosion is an electrochemical process in which one metal corrodes preferentially to another when dissimilar metals are in electrical contact in the presence of an electrolyte. As mentioned above, the higher conductivity of the saltwater (electrolyte) to allow electric current also aids in corrosion of pool surfaces and equipment.

Corrosion risks are reduced with a good Pool Bonding System. Bonding means connecting all of the wet-metal surfaces (pumps, ladders, heat exchangers, etc) together and then to ground. A good pool bonding system results in all surfaces being at the same electrical potential. As a result, stray currents introduced by pool equipment are removed.

If there is concern that the pool bonding system is at fault or has poor grounding, test for galvanic corrosion by using a Sacrificial Anode. Use of a sacrificial anode involves placing a metal with lower electrical potential in electrical contact with the previously less noble metal such that the dummy metal will corrode first.



Preventing Saltwater Pool Corrosion:

1. Check that the salt water concentration is below 3500 ppm and that the water is properly balanced.
2. Do a survey on the pool bonding system and repair any faults immediately.
3. After #1 and #2, use a sacrificial anode. The sacrificial anode needs to be checked regularly for corrosion and replaced as needed. The sacrificial anode is no substitute for proper management of pool water chemistry or proper pool design.

*Human threshold for tasting salt in water is 3500 ppm. If the pool tastes salty, there is probably too much.*

## Recommendations

Saltwater pools are chlorine pools and therefore regularly require chlorine pool management that includes pool shocking and pool water testing. Learn more about chlorine pools with the PoolPak article "Indoor Pool Water Chemistry."

An easier and green solution for pool sanitation, saltwater pools work when pool water chemistry is accurately balanced and maintained. Properly managing the corrosion risk is imperative to a successful operation.

Salt water pools by themselves may have difficulty keeping up with larger bather loads. In conjunction with a UV or other supplemental system, salt water pool owners have found success by managing lower levels of free chlorine. Less chlorine means less chlorine pool complaints while having the peace of mind of a safe well-sanitized pool even under the heavier pool loads.

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## Read More:

1. "Indoor Pool Water Chemistry." PoolPak.com. <http://www.poolpak.com/index.php/poolpak-downloads/viewcategory/23-pool-water-chemistry>
2. Herman, Eric. "Managing Saltwater Pools Requires a Cocktail Approach." AquaMagazine.com. April 12, 2012. Accessed on Jan 13, 2015. <http://aquamagazine.com/content/post/Managing-Saltwater-Pools-Requires-A-Cocktail-Approach.aspx>
3. Williams, Kent. "What is the Fuss Over Total Dissolved Solids?" Professional Pool Operators of America. ppoa.org. Accessed on Jan 12, 2015. <http://ppoa.org/pdfs/What%20is%20the%20Fuss%20Over%20Total%20Dissolved%20Solids.pdf>
4. "UV Light: Supplemental Swimming Pool Treatment." PoolPak.com. <http://www.poolpak.com/index.php/poolpak-downloads/viewcategory/23-pool-water-chemistry>



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