

# Carlson

## HEAT EXCHANGER

- since 1982 -

### Titanium for salt water pools



Custom Titanium 5.0 ST with 1 inch flanges

Salt water pools provide a silky smooth experience and may have less chemical maintenance, but there are issues in using a salt particle rich electrolytic solution with a stainless steel heat exchanger.

#### What makes these metals corrosion resistant?

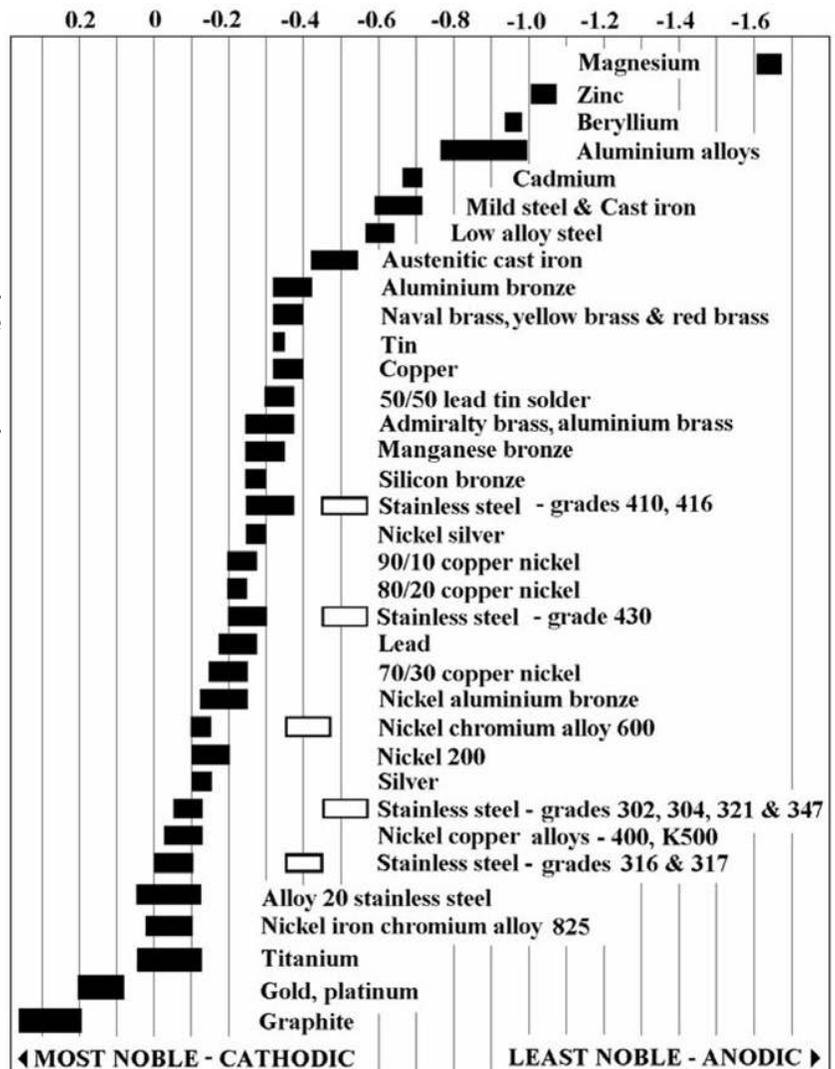
Corrosion resistance in stainless steel and titanium is maintained by a very thin oxide film on the metal. This oxide film is the result of oxidation from the exposure of the base metal to oxygen (chromium oxide/titanium oxide). This oxidation is not a type of corrosion. It is known as a passive oxide film.

#### What's the issue with Stainless?

316L Stainless Steel is generally very corrosion resistant. However, when used as a heat exchanger with a salt particle rich electrolytic solution, the passive chromium oxide layer is susceptible to penetration by the solution and erosion by the particles. When this oxide layer is penetrated and removed, the exposed stainless is then active. This active area is less noble than the passive stainless. Galvanic corrosion occurs when less noble metals are in electrical contact through an electrolyte with more noble metals. This is the whole concept behind using a sacrificial zinc anode. In addition, the smaller the less noble metal is in area compared to the more noble metal, the more aggressively it will be attacked. So when there are areas of stainless that are active, these areas are less noble than the majority of the passive stainless surrounding it. In this environment, there is a high probability for corrosion to occur. Standard chlorinated pools will contain some salt; we recommend not using a stainless unit in more than 200ppm salt.

#### What's good about Titanium?

The oxide film formed on titanium is more protective than that on stainless steel, and it performs well in solutions that cause pitting, crevice, and erosion corrosion (seawater, wet chlorine, organic chlorides). Due to the extreme stability of the passive film, titanium is generally not affected by galvanic corrosion and will exhibit noble behavior.



Galvanic Table

Unshaded symbols show ranges exhibited by active stainless steels