

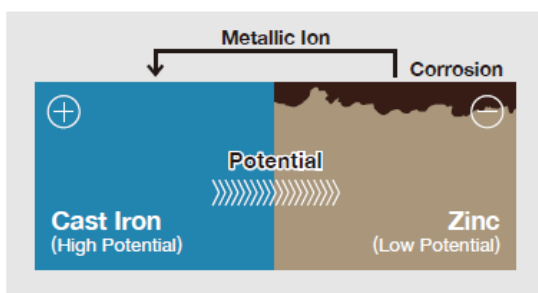
## SEAWATER RESISTANT DEWATERING PUMPS

The 316 grades stainless steel pumps are commonly requested for marine applications, but their corrosion resistance in seawater is limited and they cannot be considered fully 'corrosion proof'. They are susceptible to localized attack of corrosion, mainly crevice and pitting corrosion. Fully 316 grade stainless steel pumps are also expensive. Therefore, at Tsurumi, we have our own cost-effective solutions to these problem based on our well-proven standard pumps. Tsurumi provides seawater resistant kit, which can be ordered separately and be installed on standard KTZ, KRS and LH series pumps.

Let's begin, firstly, by talking about the mechanism of corrosion in metals under operation in seawater. Galvanic corrosion is the type of corrosion which occurs when two or more metallic materials are in contact with each other. This type of corrosion occurs rapidly, especially in high conductive environment. Seawater submergence fits the bill perfectly as an environment to quicken galvanic corrosion.

As shown in the illustration of <Bimetallic Corrosion in Seawater>, when metals of different potential contact one another, only the metal of lower potential will corrode while the metal of higher potential is protected from corrosion. The table of <Potentials of Various Metals in Seawater> shows the corrosion strength/weakness of various metals. As the potential difference increases, the metal of lower potential corrodes faster. For example, with a cast iron impeller and stainless steel shaft, only the impeller will corrode. With a 316 stainless steel impeller and 420 stainless steel shaft, corrosion attacks the shaft first. This is the most important point to be considered in handling seawater. Based on this principle, a galvanic anode is provided for Tsurumi's submersible seawater-resistant dewatering pumps to protect the pump body against corrosion. To prevent corrosion of the motor shaft, which may not be fully protected by only the galvanic anode, a seawater-resistant special cast iron impeller was developed exclusively by Tsurumi.

<Bimetallic Corrosion in Seawater>



<Potentials of Various Metals in Seawater>

Metal	Potential
Titanium	High (Corrosion-Resistant)
316 Stainless Steel	
304 Stainless Steel	
420 Stainless Steel	
Cast Iron	
Aluminium Alloy	Low (Corrosive)
Aluminium	
Zinc	
Magnesium	

Tsurumi's standard pumps can be combined with a seawater-resistant kit (optional) that adds a "galvanic anode" and "seawater-resistant special cast iron impeller," and enables about two years of service. (The service period depends on operating conditions.)

## Galvanic Anodes

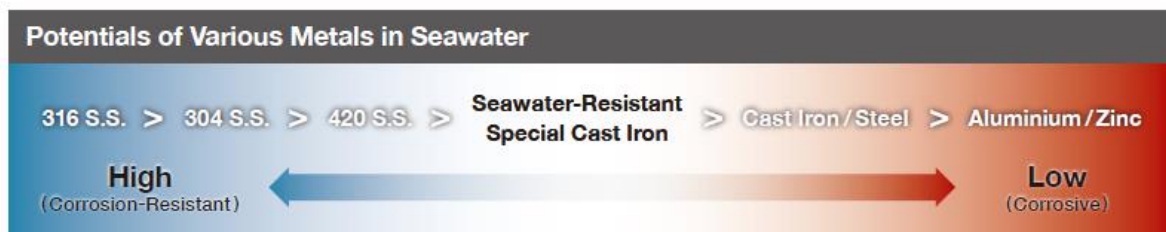
The galvanic anode is an electrolytic protective measure used with metals of differing corrosive potentials. Metals of a potential lower (aluminum and zinc) than the pump body (cast iron and steel) are brought into contact with the body via the galvanic anodes and allowed to corrode in order to protect the body. However, the full effect cannot be obtained unless the anodes are installed in the proper positions.

Tsurumi mainly utilizes aluminum because of its superior anticorrosive performance per unit weight, while utilizing zinc for only the strainer stand that is liable to be worn by water current. Since the galvanic anodes are worn by corrosion, they need to be replaced every two years. They can be replaced easily and used immediately after replacement.



## Seawater-Resistant Special Cast Iron Impeller

While the pump is running, the galvanic anode does not protect rotating parts. In seawater applications, the materials of the shaft and impeller must be carefully matched to avoid shaft corrosion and expensive repairs. After long years of research, Tsurumi developed an exclusive “seawater-resistant special cast iron impeller” suited to protect the shaft against corrosion by seawater. This material is made by specially treating chromium cast iron. Because its electric potential is slightly lower than that of the shaft, the impeller corrodes gradually, which helps to prevent the shaft from corroding. The impeller needs to be replaced every few years, depending on operating conditions. However, the impeller costs far less than the shaft to replace.



KTZ: [https://youtu.be/\\_gZEnL\\_MPB4](https://youtu.be/_gZEnL_MPB4)  
 KRS: <https://youtu.be/DrADdBCREP4>  
 LH: <https://youtu.be/Qw2jHJyUj9E>