

# Corrosion

Very large amounts are lost every year due to corrosion. Therefore, there is reason in taking a closer look at the causes and try to eliminate the risk of corrosion as effective as possible. To choose the right material and surface finishing for the screw/rivet is essential for the strength and safety in a corrosive environment.

## What is corrosion?

Steel corrodes, copper becomes coated with verdigris and other metals are broken down in similar ways. Exceptions are the most noble metals, for example gold. Corrosion takes place when the material reacts with the environment and creates corrosion products. Oxygen and moisture are necessary components for the creation of corrosion products. Salts, particles of dirt and dust are examples that increase the pace of the corrosion process. In practice all corrosion in normal environment is galvanic corrosion.

## Galvanic corrosion

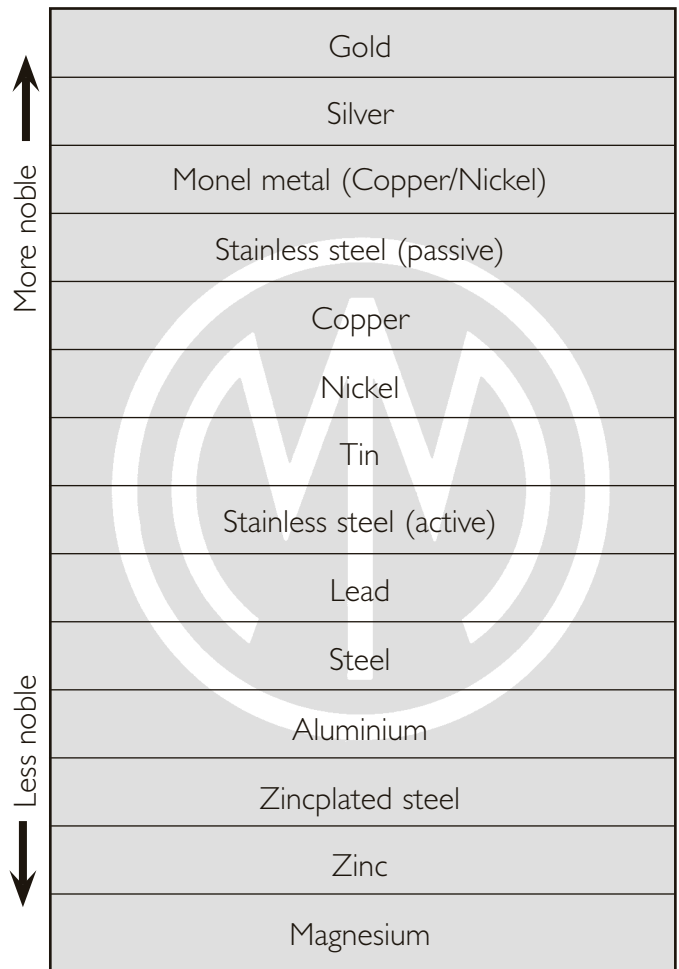
Of two jointed metals exposed to couple action, the one with the lowest potential is the one that corrodes and dissolves. It acts as anode - sacrificial anode. The other metal, the cathode, gets protected at the corresponding level, which prevents it from corroding.

Therefore, in a design you ought not to join materials with electrode potentials that differ too much. This is not very important in dry air, but if the air is humid and particularly if the materials are exposed to water it is preferable to use only one material in a design.

If the anode area is small in comparison to the cathode area, i.e. if the metal lower in the electrode potential chain has a small area compared to the metal higher up, in the chain the damages will be especially great. When creating joints of different metals attached to each other, it is preferable to arrange them so that the less noble metal has a larger free area than the nobler one. Consequently the fastener should be nobler than the plate.

If, for example, a small steel screw is assembled in a large copper sheet the corrosion pace is increased by the screw. A small copper screw in a large steel sheet lives longer.

## Galvanic series for different metals in seawater at a temperature of 20°C.



↑ More noble	Gold
	Silver
	Monel metal (Copper/Nickel)
	Stainless steel (passive)
	Copper
	Nickel
	Tin
	Stainless steel (active)
	Lead
	Steel
↓ Less noble	Aluminium
	Zincplated steel
	Zinc
	Magnesium

Always choose a screw/rivet of a nobler material than the material it should be jointed with. The screw/rivet then has the smaller area and the risk of damages due to corrosion is reduced. Try to use a screw/rivet that has as small electrode potential difference as possible compared to the surrounding material. If possible, use the same material for the screw/rivet as used in the surrounding material.

## Surface treatments

*Mattssons's has the possibility to offer the most existing surface treatments. Some examples are given below.*

Anodizing  
Anti-friction coating  
Antique appearance  
Blasting  
Brassplating  
Chemical tin  
Chromating  
Chromating blue, yellow, green and black  
Copperplating  
Delta  
Duplex nickelplating  
Electrolytical tin  
Ferlite coating  
Ferrolblack  
Galvaspin  
Geomet

Gold coating  
Hot dip galvanizing  
Lacquering  
Leading - Pollution load - not performed by Mattssons  
Mechanical zincplating  
MW 4-20  
Nedox coating  
Nickelplating chemical  
Nickelplating electrolytic  
Nickelplating FNB  
Nikrolite coating  
Nilite coating  
Oxidation  
Phosphatising  
Pickling  
Polishing

Post-sealing  
Ruspert  
Sandbond-z-coating  
Sherardizing  
Silverplating  
Teflite coating  
Teflon coating  
Termosil  
Thread locking  
Thread sealing  
Tufram coating  
Waxing  
Ytox coating  
Zinc-iron coating  
Zinc-nickel coating  
Zincplating FZB