

ASK DR. GALV

Q. Dear Dr. Galv: What happens when I put galvanized steel together with aluminum parts or put aluminum sheets on galvanized steel studs?

A. This question is frequently asked when two dissimilar metals are placed in contact with each other. The chart below shows the electrode potentials of metals in sea water. If two metals with different potentials are placed in contact and there is a conductive medium, such as sea water or condensation, there can be a reaction, commonly known as a galvanic cell.

The higher the electrical potential difference the greater the possibility of a reaction. In the case of zinc and aluminum there is only a slight chance of a reaction because of the relatively small change in potential between the two metals and the forma-

tion of an insulating film on the surface of the aluminum.

One of the key factors in the reaction between dissimilar metals is the contact surface area. A severe reaction can occur when a large cathode (higher or more positive potential) is in contact with a small anode (lower or more negative potential). In this situation, corrosion rates can increase dramatically.

Another key factor in the determination of the corrosion of two dissimilar metals is the presence of a conductive substance. In many cases condensed water does not provide enough conductance to start the corrosion process. Whenever possible, the best solution to this type of corrosion is to provide

an insulating barrier between the two dissimilar metals.

TABLE 6.2 Electrode Potentials of Metals in Sea Water^a

Material	Potential (volts)
Magnesium	-1.55
Zinc	-1.10
Aluminium	-0.86
Cadmium	-0.77
Cast iron	-0.68
Carbon steel	-0.68
Stainless steel 18% Cr, 8% Ni (active)	-0.61
Lead	-0.57
Solder (50 Pb/50 Sn)	-0.52
Tin	-0.49
Copper	-0.43
Aluminium bronze	-0.41