

# CORROSION

## GALVANIC PROTECTION

### TECHNICAL BULLETIN CTB-2

Rev 3, November 2003

This issue supersedes all previous issues

Galvanic or sacrificial protection of a steel substrate by an active metal coating relies on the existence of a galvanic cell and the resulting flow of galvanic current.

Different metals, when placed in the same electrolyte (*water, condensation etc*) adopt different electrode potentials. A galvanic cell is then formed and galvanic protection results when two dissimilar metals (*ie with different potentials, see Table 1*) are in electrical contact. In the presence of an electrolyte, electrons will

flow between the two metals and this is known as a galvanic current. This leads to increased corrosion of the more active metal and decreased corrosion of the more noble metal when compared to the metals corrosion behaviour when the two metals are not in electrical contact. The galvanic current (*Figure 1b*) produced by the corrosion reaction is a direct measure of the increase in dissolution of the more active metal and a reflection of the rate of corrosion.

Figure 1

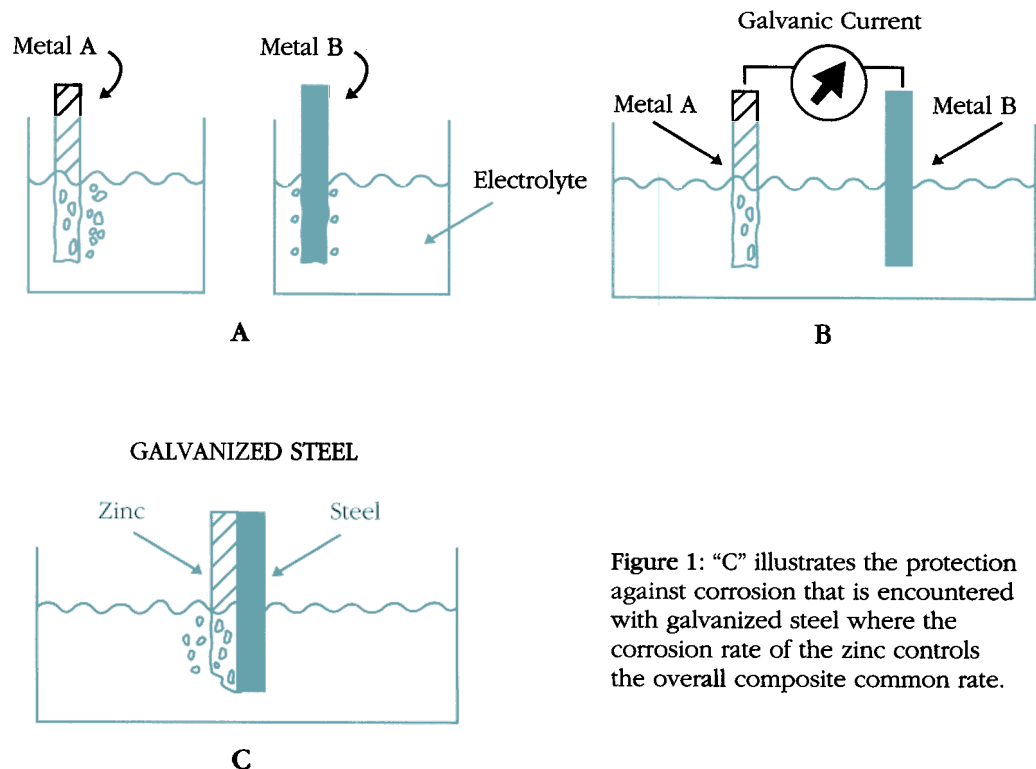


Figure 1: "C" illustrates the protection against corrosion that is encountered with galvanized steel where the corrosion rate of the zinc controls the overall composite common rate.

|         |  |
|---------|--|
|         | NOBLE (CATHODIC)   |
|         | Gold   |
|         | Platinum   |
|         | Titanium   |
|         | Graphite   |
|         | Silver   |
| PASSIVE | Stainless Type 316<br>Stainless Type 310<br>Stainless Type 304<br>Stainless Type 302<br>Stainless Type 430<br>Stainless Type 410   |
| PASSIVE | 80% Ni 15% Cr<br>Inconel<br>60% Ni 15% Cr<br>Nickel<br>Monel   |
|         | Copper-Nickel<br>Bronzes<br>Copper   |
|         | Brasses  |
| ACTIVE  | 80% Ni 20% Cr<br>Inconel<br>60% Ni 15% Cr<br>Nickel<br>Tin<br>Lead   |
| ACTIVE  | Stainless Type 316<br>Stainless Type 310<br>Stainless Type 304<br>Stainless Type 302<br>Stainless Type 430<br>Stainless Type 410<br>Cast Iron<br>Carbon Steel<br>Cadmium<br>Aluminium<br>Zinc<br>Magnesium Alloys<br>Magnesium |
|         | ACTIVE (ANODIC)  |

**Table 1: Galvanic Series of Metals and Alloys in Sea Water**

The information and advice contained in this Bulletin is of a general nature only, and has not been prepared with your specific needs in mind. You should always obtain specialist advice to ensure that the materials, approach and techniques referred to in this Bulletin meet your specific requirements.

BlueScope Steel Limited makes no warranty as to the accuracy, completeness or reliability of any estimates, opinions or other information contained in this Bulletin, and to the maximum extent permitted by law, BlueScope Steel Limited disclaims all liability and responsibility for any loss or damage, direct or indirect, which may be suffered by any person acting in reliance on anything contained in or omitted from this document.

BlueScope is a trade mark of BlueScope Steel Limited.

*Please ensure you have the current Technical Bulletin as displayed at [www.bluescopesteel.com.au](http://www.bluescopesteel.com.au)*

## BlueScope Steel

Copyright© 2003 BlueScope Steel Limited  
BlueScope Steel Limited ABN 16 000 011 058  
BlueScope Steel (AIS) Pty Ltd ABN 19 000 019 625



**TRAILIA**  
SYDNEY Telephone: (02) 9795 6700  
MELBOURNE Telephone: (03) 9586 2222  
BRISBANE Telephone: (07) 3845 9300

**IRSEAS**  
BlueScope Steel (Malaysia) Sdn Bhd  
BlueScope Steel (Thailand) Limited  
PT BlueScope Steel Indonesia

Telephone: (603) 3250 8333  
Telephone: (66 38) 685 710  
Telephone: (62 21) 570 7564

