

## Crevice corrosion resistance of Zn-Al-Mg and GI coated materials

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**Abstract :** Crevice corrosion is one of the most serious corrosion forms in automobile. It usually occurs in connection parts of the car. For example, the interior and exterior panels of car doors wrapped edges, spot welding parts, rivet connections, bolt and screw connections, decorative strips bonding and other connection parts[1,2]. The crevice corrosion resistance of Zn-Al-Mg coating (ZM) and hot dip galvanizing coating (GI) was studied by GMW14872 cyclic salt spray test. SEP1160 standard method was used for crevice corrosion sample preparation. After 28 cycles of cyclic corrosion test, only a small amount of red rust appeared in ZM70 plate, while there are a large amount of red rust appeared in GI100 plate. The maximum corrosion pit depth of ZM70 is 7.8 $\mu$ m and that of GI100 is 13  $\mu$ m. Therefore, ZM coating material shows better perforation resistance under crevice corrosion environment. During the cyclic corrosion test, the crevice surface and the open surface are under different conditions. The inner surface of the gap dries much more slowly than the open exposed surface. In the drying stage, the metal surface at the gap position is still covered by electrolyte. The rate at which reactants move from the air into the confined space will determine the rate of corrosion. Due to the evaporation of water, the concentration of electrolyte will increase, resulting in faster corrosion. The cathodic oxygen reduction reaction occurs near the electrolyte boundary, causing the local pH value to rise and forming a large amount of zinc oxide, which is a corrosion product with poor protection. The dissolution of Mg ions in Zn-Al-Mg coating can inhibit the increase of pH value, which promote the formation of protective corrosion product  $Zn_5(CO_3)_2(OH)_6$  and improve the corrosion resistance of the material.

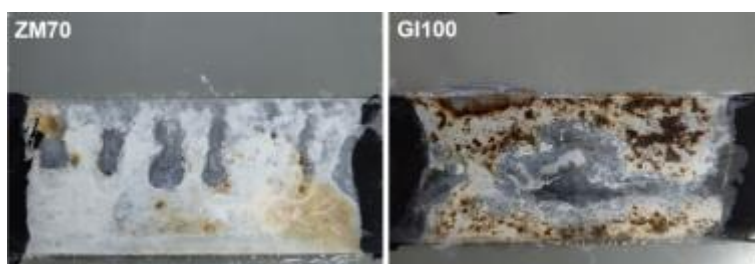


Figure 1 Crevice corrosion photographs of ZM70 and GI100 after 28 cycles of GMW14872

**Keywords** : Zn-Al-Mg alloy coatings ; Crevice corrosion; Corrosion products

### **Reference**

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