

PASSIVATION OF ZINC PLATING

It is necessary to apply a passivation film to zinc plated product to protect the zinc from corrosion. Zinc is a reactive metal on which a white (zinc) oxide layer would form otherwise. Traditionally the best results for corrosion resistance were achieved using a hexavalent chromium compound. European legislation is imminent that will effectively prohibit hexavalent chromium passivation on automotive and electrical products due to it being classified as a class 1 carcinogen.

Existing process

➤ **Hexavalent passivation** gives the zinc surface protection to white corrosion products for up to 96 hours in a salt spray to ASTM B117. The process is sensitive to temperatures above 60 degrees centigrade and will fail prematurely if exposed to elevated temperatures. This is also cause for concern due the high temperatures now achieved under automotive bonnets. New emerging specifications require parts to be subject to a heat treatment of 150 degrees centigrade before corrosion testing. This causes premature failure of hexavalent chromium passivates.

Hexavalent Free alternatives currently available are:

No extra cost option

1. **Trivalent chromium passivation.** This process will only give at best up to 24 hours protection in salt spray. In barrel plating applications this can be reduced to only around 5 hours due to mechanical damage (trivalent passivates do not benefit from “self healing” properties as in hexavalent passivation). Resultant coatings are silver (with blue tint). **It will not meet GME 00252.**

2. **Trivalent chromium passivation plus organic topcoat.** This will give superior protection in salt spray than hexavalent chromium. Application of the topcoat however can prove difficult, and as it is a separate post-plating operation, **it is more expensive.** These processes are available in solvent based and water based systems. Resultant coatings are silver to opaque or can be tinted by introducing pigments to the lacquer system.

3. **High build trivalent passivation with or without silicate sealer. “EPOBOND™ 2000”**

TWBayston process.

➤ This process is **capable of meeting the requirements of GM 00252.** Tests have passed GME 00252. Resultant coatings are silver with a pink/green iridescent tint. **This process is more expensive than conventional trivalent passivates.**

4. **Thicker Zinc Deposits with trivalent passivate.** Some organisations have decided to accept a reduced salt spray resistance to white corrosion but have increased the zinc coating thickness to maintain corrosion resistance to red rust. **This is expensive** and fails to prevent premature white corrosion. The increased thickness can also lead to dimensional difficulties on certain products.