Short Communication

Effect of Curing Temperature on Corrosion Resistance of a Chromium-free Coating on Hot Dip Galvanized Steel Sheet

Shan Liu¹, Zhefeng Xu^{2,3}, Jianhong Yi^{3,*}

¹ Department of Biological and Chemical Engineering, Panzhihua University, 617000, Panzhihua, P.R. China.

² PanGang Group Research Institute Co., Ltd., State Key Laboratory of Vanadium and Titanium Resources Comprehensive Utilization, Panzhihua 617000, Sichuan, P.R. China.

³ Faculty of Materials Science and Engineering, Kunming University of Science and Technology, Kunming 650093, P.R. China.

*E-mail: chuannong2010@126.com

doi: 10.20964/2018.07.09

Received: 26 February 2018 / Accepted: 16 April 2018 / Published: 5 June 2018

In this work, tannic acid powder, fluoro titanate acid solution and colloidal silica were used to prepare a coating on a hot dip galvanized steel sheet. The pH value of the passivating solution ranges between 2~7, and the curing temperature is 20 °C, 60 °C, 80 °C and 100 °C. The interface connectivity of the coating was investigated using a Fourier transform infrared spectrometer. Microstructures of the coating were observed using a field-emission scanning electron microscope equipped with an energy dispersive spectrometer and an X-ray photoelectron spectrometer. The corrosion resistance of the coating was studied using an electrochemical workstation. The results show that the coating thickness increased with increasing curing temperature. A coating thickness of 0.62 µm is achieved with a curing temperature of 100 °C; at this temperature, the corrosion potential E_{corr} is 410.5 mV, and the polarization resistance (R_p) is $2.13 \times 10^6 \text{ cm}^{-2} \text{ ohms}$. These conditions provided the best corrosion resistance of the coating.

Keywords: Curing temperature; hot dip galvanized steel sheet; coating; corrosion resistance; microstructure

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