Short Communication

Effect of Phosphating and Post-sealing on the Corrosion Resistance of Electro - galvanized steel

Kai An¹, Chengqiang An^{1,2}, Chuanning Yang¹, Yongquan Qing¹, Yan Shang¹, Changsheng Liu^{1,*}

¹ Key Laboratory for Anisotropy and Texture of Materials, Ministry of Education, Northeastern University, Wenhua RD 3, Shenyang, 110819, China

² School of Environmental and Chemical Engineering, Shenyang Ligong University, Nanping RD 6, Shenyang 110159, China

*E-mail: csliu@mail.neu.edu.cn

doi: 10.20964/2017.03.39

Received: 19 December 2016 / Accepted: 15 January 2017 / Published: 12 February 2017

To improve the corrosion resistance of electro-galvanized (EG) steel, the EG steel was initially treated by utilizing the phosphating with phosphate and then sealed by the technique of post-sealing with silicate solution. The surface morphology and elemental composition of the three samples were analyzed by scanning electron microscopy (SEM) and energy dispersive spectroscopy (EDS). The effect of the phosphating and post-sealing treatment on the corrosion resistance of EG steel was investigated by neutral salt spray test (NSS), potentiodynamic polarization and electrochemical impedance spectroscopy (EIS) measurements. The results showed that, after phosphating, the porous phosphate crystals formed on the surface of the electro-galvanized steel, and additionally, due to the existence of sodium silicate which adequately filled into the phosphate pores, a complete layer of silicate film formed on the phosphate coating, the corrosion resistance ability of EG steel was enhanced further. The phosphating and post-sealing treatment reduced the corrosion current density of EG steel by one order of magnitude, besides, the impedance values were increased obviously. In particular, the anodic oxidation and the cathodic reduction of zinc were inhibited during corrosion process, the active dissolution of zinc was much lower, improving remarkably the corrosion of the EG steel.

Keywords: the electro-galvanized steel; Phosphating and Post-sealing; potentiodynamic polarization; EIS; corrosion resistance

[FULL TEXT](#)

© 2017 The Authors. Published by ESG (www.electrochemsci.org). This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).