

A Comparative Analysis of Traditional and Advanced Methods in Evaluating Anti-corrosion Performance of Sacrificial and Barrier Coatings

Authors : Kazem Sabet-Bokati, Ilia Rodionov, Marciel Gaier, Kevin Plucknett

Abstract : Protective coatings play a pivotal role in mitigating corrosion and preserving the integrity of metallic structures exposed to harsh environmental conditions. The diversity of corrosive environments necessitates the development of protective coatings suitable for various conditions. Accurately selecting and interpreting analysis methods is crucial in identifying the most suitable protective coatings for the various corrosive environments. This study conducted a comprehensive comparative analysis of traditional and advanced methods to assess the anti-corrosion performance of sacrificial and barrier coatings. The protective performance of pure epoxy, zinc-rich epoxy, and cold galvanizing coatings was evaluated using salt spray tests, together with electrochemical impedance spectroscopy (EIS) and potentiodynamic polarization methods. The performance of each coating was thoroughly differentiated under both atmospheric and immersion conditions. The distinct protective performance of each coating against atmospheric corrosion was assessed using traditional standard methods. Additionally, the electrochemical responses of these coatings in immersion conditions were systematically studied, and a detailed discussion on interpreting the electrochemical responses is provided. Zinc-rich epoxy and cold galvanizing coatings offer superior anti-corrosion performance against atmospheric corrosion, while the pure epoxy coating excels in immersion conditions.

Keywords : corrosion, barrier coatings, sacrificial coatings, salt-spray, EIS, polarization

Conference Title : ICCSET 2024 : International Conference on Corrosion Science, Engineering and Technology

Conference Location : Vancouver, Canada

Conference Dates : August 05-06, 2024