Comparison of accelerated electrochemical techniques with conventional salt spray test for industrial protective coatings

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Neutral salt spray (NSS) test (ASTM B117) of scribed coated metals is a very popular method for evaluation of coatings durability within several hundred hours. Although this test has demonstrated to be valid for quality control of a specific material or coating, it reveals inconsistencies if used to compare (or rank) coatings with different characteristics. Cyclic accelerated electrochemical technique (ACET) has shown to be an effective alternative to NSS, allowing to assess the protection performance in a rapid way also. ACET consists in performing consecutively a sequence of electrochemical experiments, namely cathodic polarization, potential relaxation and EIS. Conventional cathodic disbonding resembles both ACET and NSS because the extent of disbonding is quantified from the width of the scribed area after prolonged cathodic polarization. This work reports the investigation of the durability of industrial coatings by NSS, ACET and conventional cathodic disbonding techniques. Designed experiments based on Taguchi orthogonal arrays were carried out to optimize the experimentation time while performing a multifactor analysis. The generated data allowed to correlate or discriminate between factors that are significant in the evaluation of coating failure processes.