Pitting Resistance of Cold-Worked Commercial Austenitic Stainless Steels in Solution Simulating Seawater

Electrochemical Impedance of Organic-Coated teel: Correlation of Impedance Parameters with Long'Term Coating Deterioration

Electrochemical impedance results are presented for 550 day exposures of organic-coated carbon steel samples.
Coatings consisted of translucent pigmented and unpigmented epoxy and conventional opaque epoxy polyamide systems.
Coating thicknesses ranged from 20 to 185 ~m. Specimens were exposed under freely corroding conditions and at
two cathodic polarization levels (-850 and -1250 mV vs. SCE) in ASTM artificial ocean water. The objective was to identify
impedance parameters which measure subcritical coated-metal system property changes at early exposure times that
predict significant long-term coating deterioration. Impedance data developed at early times, including coating resistance,
coat!ng capacitance, the increase in frequency for the coating's 45 ~ phase angle, and low frequency impedance data, are
compared to the coating system's performance after 550 days exposure. Coating performance at 550 days is visually evaluated
using ASTM Method D-610, and a modification of ASTM D-714. In particular, coating resistance, changes in the frequency
for the coating's 45 ~ phase angle, and low frequency impedance data determined at exposure times ranging from 2
to 200 days were found to predict the 550 day coating performance. Relative changes in the electrochemically active surface
area were correlated with the frequency of the coatin'g 45 ~ phase angle.