

# The Effect of Pigment Volume Concentration on Silicone – Acrylic Based Paint by Electrochemical Methods and SEM observations

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Keywords: PVC; EIS; PTM; SEM; Mild steel panel; Coating resistance

## Abstract

The effects of pigment volume concentration (PVC) on the corrosion resistance of silicone-acrylic paint films have been investigated by electrochemical impedance spectroscopy (EIS) and potential-time measurements (PTM). Before EIS measurements, the samples were subjected to different temperatures ranging from 100 °C to 300 °C for 24 hours. After the samples have cooled to room temperature, parts of the samples were exposed to 3% NaCl solution for 30 days. Coating resistance data was obtained every 5 days by using EIS method. Different sets of samples were prepared for the PTM experiments. In these experiments the samples were dipped in 3% NaCl solution and the potential was measured 30 days. EIS and PTM data have clearly showed that samples formulated near to critical pigment volume concentration (CPVC) have best performance against corrosion. The microstructures of tested panels were also observed by scanning electron microscopy (SEM) to justify the above results. Fig. 1, Fig. 2 and Fig. 3 show the results of EIS, PTM measurements and SEM micrographs for the samples, respectively.

Keywords: PVC; EIS; PTM; SEM; Mild steel panel; Coating resistance

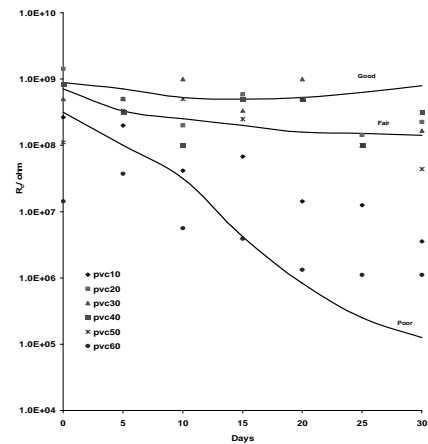


Fig. 1: Temporal variation of coating resistant,  $R_c$  after all samples have been heated at 200 °C for 24 hours

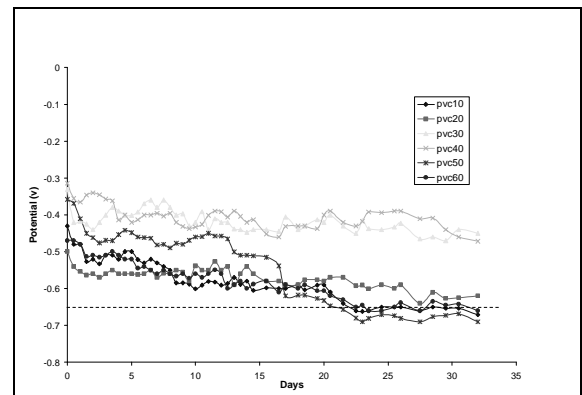


Fig. 2: Potential-Time measurements of samples Si40 with different PVC value in 3% NaCl solution for 30 days.

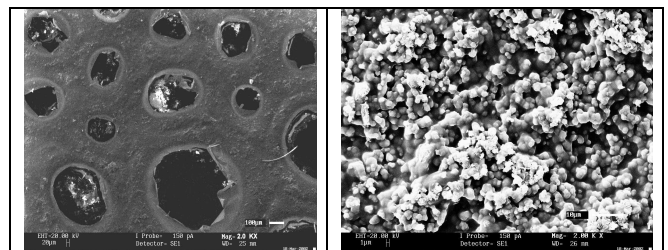


Fig. 3: SEM micrographs of samples Si40 with (a) PVC10 (b) PVC30 after heat treated at 250 °C for 24 hours.