# ACM Instruments

Non-metallic Coatings

Electrochemical testing of coated samples is achieved using the Paint Buffer accessory for the Gill AC 8 12 and Field Machine. This performs four important functions when dealing with very high impedance systems: Increases input resistance of the RE buffer; reduces input bias current flowing from the sample and RE; shifts the current measuring ranges down by a factor of 100 and reduces noise. When studying very thin films or films with holes LPR is sometimes used but in most other cases AC impedance is often the technique of choice. Cells can be of the limpet type where a cell with a waterproof seal is clamped onto the painted surface or dipped immersion of painted samples. Performing regular AC impedance tests during the exposure time will also show aspects of coated samples other than corrosion such as water uptake with respect to time. We built a forty channel instrument for a customer wanting to study water uptake in coated pipelines and it proved a valuable tool.
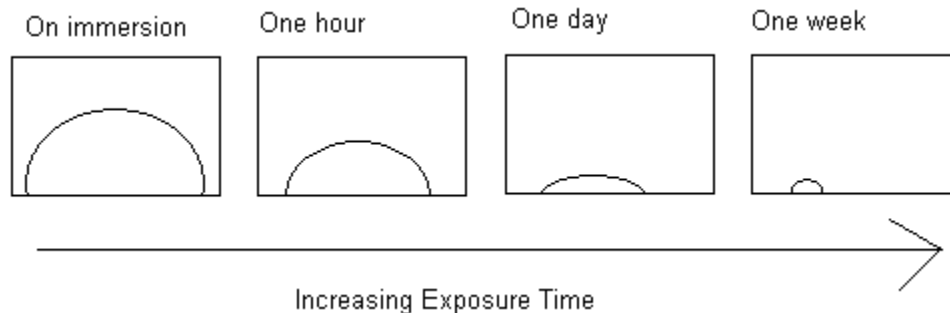
This represents a nyquist plot taken at the intervals shown for a painted sample that is suffering from water uptake. Note the diameter of the semi-circle decreases as the water is taken up.

Zimag

Rsol   Paint   Corrosion

Zreal
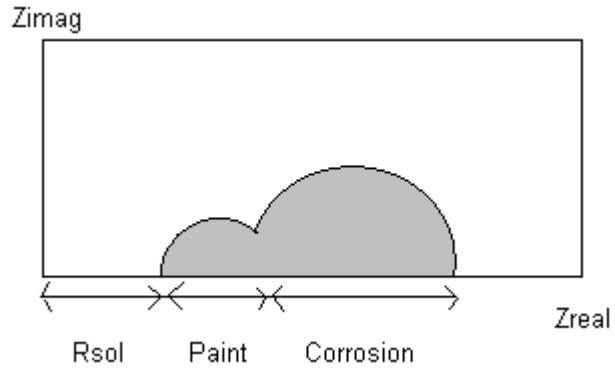
This is the classical nyquist plot for a painted sample. The first high frequency points show the solution resistance the diameter of the semi-circle is the paint and the large semi-circle the corrosion. In practice the nyquist curve can look like the plot below indicating a good capacitive paint layer.