

Anodic delamination and constant climate test for degradation of organic coatings

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To improve stability of metal sheets, they are often coated with different kinds of alloys. Additionally, organic coatings are used to protect steel components from atmospheric corrosion and give them long term stability. Different ways of de-adhesion of organic coatings of a metal substrate are known like cathodic or anodic delamination, filliform corrosion and blister formation. A broad range of experiments is known which can lead to the prementioned defects. This work focuses on two different ways of blister formation. Either a constant climate test is used that allows establishing a temperature gradient through the substrate and water condensing on the surface or anodic delamination is applied to form blisters at the surface. Each test leads to different case of damages of the samples. Anodic delamination generates blisters after 24 hours by applying an anodic current.

As chloride often plays an important role for corrosion processes chloride containing electrolytes are used. The constant climate test is a more gentle test and shows blisters after two weeks. Once a blister is formed there are different ways for investigation of the ongoing corrosion processes. Dotting of the blisters and removing of electrolyte gives important information about the formation of the blisters. A specially designed dotting system is employed to extract electrolyte from the blisters.

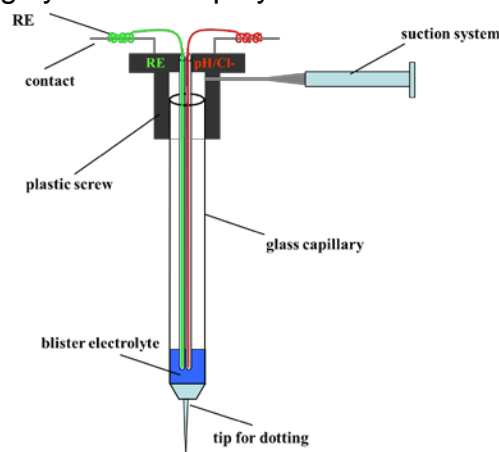


Fig.1 Sketch of the dotting system

As the available electrolyte volume is in the μl range ion selective μ -electrodes, more in detail μ -pH-electrodes and μ -chloridesensitive electrodes are used to investigate pH and chloride concentration in the blisters. Changing the pH during a corrosion process often gives an evidence for formation of precipitates. For the anodic delamination a shift of the pH-value to more acidic values can be proven. In the case of the constant climate test the pH-values do not change during the entire experiment, this proves the absence of corrosion processes in the blisters.