Limitations of The Salt Spray Test©

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The salt spray test (SST) was originally developed to rapidly evaluate materials for use in marine environments [1]. It was adopted in the late 1930's as a standard corrosion test, ASTM B117, and has become the most widely used test for assessing the corrosion performance of materials.

SST can be a useful tool for quality-control of a specific product or for qualitative comparison of similar materials in some environments such as the splash zone of a sea coast. However, it is a nonrealistic test for assessing corrosion performance in atmospheric environments [1,2]. There is no reliable correlation between the result of SST and the life of a product. Furthermore, SST generates materials performance rankings which are different from or opposite to those observed in the real environments. Thus, it can be very misleading to use the results of SST to evaluate the real life performance of different materials as demonstrated clearly in Fig.1 for bare metals and in Fig.2 for painted metals.

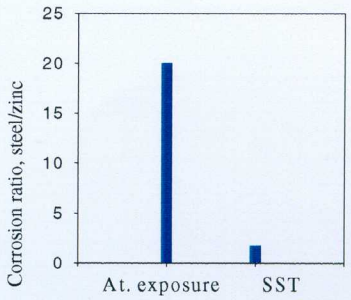

Fig.1 Corrosion ratio of steel to zinc [3]

One important reason for the unrealistic results of SST is the use of concentrated salt in the spray solution compared to the salt content in the moisture formed in atmospheric environments which is much lower [3]. Another reason is the lack of cyclic drying which is a part of natural atmospheric environments. Salt content and drying effect are both very important to the protectiveness of the corrosion products which determine the long term corrosion rate of exposed metals. In particular, the effect of periodic drying increases the adherence and compactness of the corrosion products of zinc but not those of steel, and therefore, greatly increases the corrosion resistance of zinc relative to steel [5].

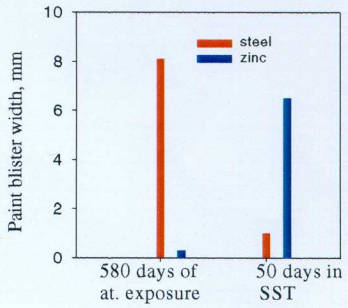

Fig.2 Corrosion of painted black steel and zinc coated steel [4]

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