

**Corrosion Protection of 2024-T351 by a Mg-Rich
Primer: Discrepancies between Field versus
Laboratory Exposures**

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Recent field studies have shown very promising results for an organic coating system containing a Mg-pigmented organic primer coating on 2024-T351. However, there are differences between field and laboratory results. This system is a candidate coating system to replace chromate type surface pretreatments as well as chromate pigmented primers. One of the likely corrosion inhibition mechanism(s) is sacrificial anode based cathodic protection of the aluminum alloy by the magnesium pigment. Hence, an important factor in the function of such a coating is its theoretical anode capacity as well as its “available” or useable anode capacity. The remaining, usable anode capacity provides one measure of the remaining functional capability of the coating. This parameter should aid in forecasting the lifetime of the Mg-rich primer in various environments in terms of the ability to perform its main corrosion function of protecting remote and local coating defects. This talk reports on preliminary progress involving laboratory full immersion, laboratory cabinet testing and field exposure results aimed at assessing sacrificial anode capacity and barrier properties. This was accomplished by determining the Mg-pigment charge capacity, residual coating barrier properties as well as other parameters related to sacrificial anode performance. Tests were conducted on primer and primer + top coat systems on PreKote™ treated 2024-T351. Various pigment volume fractions were explored in both model and commercial coatings systems and compared to other non-chromate primer coating systems. Changes in these parameters are reported after various laboratory-based exposures (full immersion, ASTM B-117, QUV, the HCL dip/humid air exposure and ASTM G-85) as well as long-term field exposure at Daytona Beach, FL, USA. Comparisons and analysis considered protection of both remote scratches and local buried defects. Preliminary findings suggest two possible modes of protection; long range Mg pigment-based protection of remote defects and local or short range Mg pigment-based protection of local and buried defects.

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