

## **UL Standards Update: Corrosion Testing for PV Applications**

Colleen O'Brien  
UL, LLC

### **Abstract:**

PV mounting systems perform structural and electrical functions that are critical to the safety and performance of PV systems. Mounting systems must securely support modules, wiring, and electrical enclosures to withstand wind, snow, seismic and gravitational loads. Additionally, mounting systems constructed of conductive material are often relied upon to provide a low impedance path to ground in the event of an electrical fault. Corrosion of metal used in mounting systems can compromise these structural and electrical functions, leading to shock, fire, and injury hazards. UL 2703 is the safety standard for Mounting Systems, Mounting Devices, Clamping/Retention Devices, and Ground Lugs for Use with Flat-Plate Photovoltaic Modules and Panels, and has specific requirements to address corrosion resistance. Research and testing conducted by members of a UL 2703 corrosion task group has resulted in proposals to update the corrosion requirements in UL 2703. An analysis of corrosion related failures of fasteners used in UL 2703 compliant PV systems was conducted, which led to a hypothesis that the two atmospheric corrosion tests in UL 2703 could be improved. The UL 2703 salt spray test currently requires continuous exposure to a salt spray with no drying cycles. Side by side testing of fastener samples exposed to the continuous salt spray test were compared to samples exposed to a cyclic salt spray test that included periods of drying in between exposure to salt spray. Results showed that the corrosion products formed in the cyclic salt spray test more closely to the corrosion products formed in the field, and the task group has proposed adoption of a cyclic salt spray test. Additionally, it was determined that the UL 2703 moist sulphur dioxide/carbon dioxide test may lead to the selection of protective coatings that are not optimized for performance in typical atmospheric conditions. The moist sulphur dioxide/carbon dioxide test was originally adopted to address corrosive atmospheres caused by pollution and acid rain that are not applicable to most locations in the U.S. today, and the task group has proposed that this test be made optional. The task group's ongoing work includes finalizing the proposal to the UL 2703 Standards Technical Panel (STP) to replace the static salt spray test with the cyclic salt spray test. Additionally, exceptions to existing UL 2703 corrosion protection requirements are being considered for weathering (uncoated) steel for certain utility scale PV components, such as steel pile foundations that are sufficiently protected from direct energization from fault current.

### **Bio:**

Colleen O'Brien is UL's technical lead for photovoltaic modules and mounting systems, and has over two decades of PV industry experience spanning cell fabrication, module manufacturing, component reliability and certifications, and PV system design and risk assessments.

Colleen is a voting member in numerous UL Standards Technical Panels and the IEC Working Group 2, and is also active in IEC Working Groups 3, 6 and 7.