Solar America Board for Codes and Standards – 2013 Progress Update

Larry Sherwood, Solar ABCs Project Administrator

Fire Classification Rating Testing of Standoff-mounted Photovoltaic Modules and Systems

(Publication due in Summer 2013)

Can the presence of a rooftop PV system contribute to the intensity or spread of a structural fire? This is the reason for the fire classification rating of PV modules and systems and was the subject of a series of laboratory tests that will be reported in this report. These tests were designed specifically to evaluate how PV and roof material interact as a system during exposure to fire and burning material.

From a safety perspective, the goal is that the installation of a standoff-mounted PV system does not degrade the fire class rating of the roof assembly. Tests conducted at the UL Fire Test Laboratory show that the fire class rating of the PV module (performed to UL 1703) is not a predictor of the whether or not the fire class rating of the PV module and roof assembly as a system is changed from the fire classification rating of the roof assembly. Thus the stakeholders and investigation team decided to pursue the development of a new fire classification test for the PV module and roof assembly as a system. UL conducted many additional tests to develop and validate this new fire classification rating test.

The proposed new fire classification test procedure is a significant change from the current PV module fire classification test procedure. In the new procedure, the module is tested mounted over representative roof covering systems and the performance of the entire system is the basis for the fire classification rating of the PV module with mounting system. In this way, the new PV fire classification test is a measure of impact of the photovoltaic installation on the fire classification rating of the roof covering system and provides a more logical rating than the old PV rating test. This new test procedure is current ly in the review and approval process with the UL 1703 Standard Technical Panel.

A Literature Review and Analysis on Accelerated Lifetime Testing of Photovoltaic Modules

(Mani) GovindaSamy TamizhMani, Joseph Kuitche, Arizona State University
(Publication due Spring 2013)

One of the major technical barriers for photovoltaic (PV) diffusion and to access project financing is the technology risk: concern that a technology will underperform (durability issue) or become obsolete prematurely (reliability issue). The purpose of accelerated testing (AT) is to assess the reliability and durability of products by inducing failures and degradation in a short period of time using accelerated test conditions much more severe than the actual field operating conditions while replicating the actual field failure mechanisms. This report provides a background literature review and analysis on the field failures, degradation and the available accelerated testing methodologies. Based on this review report and the other published literature, the research teams may develop accelerated testing protocols which could potentially be converted into an accelerated comparative testing and/or lifetime testing protocol/standard by one or more standards developing organizations or international/national industry organizations. In order to generate this report, a large number of published papers related to PV module reliability and durability were collected and systematically analyzed.

Additional Reports due by Summer 2013

- Examination of Ground-Fault Blind Spot with Recommendations for Mitigation
- PV Blind Spot Electrical Simulations
- Maintenance and Inspection Guidebook
- Validation of IEC 61853, Part 2
- Validating PV Module Durability Tests
- PV Generation: Temporary Overvoltage Impact and Recommendations
- PV Module Grounding: Addendum Report on Corrosion Testing

Photovoltaic Module Grounding: Issues and Recommendations

Greg Ball, BEW Engineering
Timothy Zgonena, Christopher Flueckiger, Underwriters Laboratories Inc.

This report provides the PV industry with practical guidelines and procedures for module grounding in the overall context of system grounding.

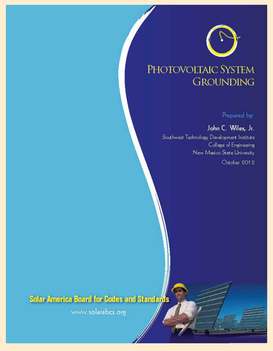
General recommendations for ensuring proper grounds based on field experience and feedback received throughout the course of this study:

•Follow through with proposed changes to the existing standards to improve the method and quality of ground connections.
•Elicit additional industry feedback from the accelerated aging test study to determine if and how these or similar tests might be incorporated into standard testing.
•Be aware of and make use of the new and expanded set of channels for listing module grounding equipment.
•Be aware of the principles of module frame grounding, the type of faults that may occur, and the implications for safety and ground system design.

- Follow the specific design and installation recommendations enumerated in this report, such as using proper materials and components, following manufacturer instructions, using torque wrenches to ensure proper tightening of connections, and avoiding connections of dissimilar metals that lead to corrosion, among many others.

Photovoltaic System Grounding

John C. Wiles, Jr., Southwest Technology Development Institute, New Mexico State University



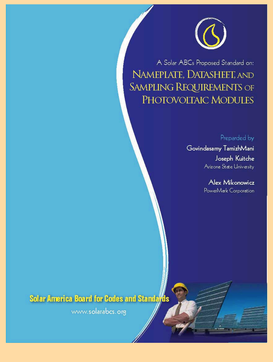
This report provides the PV industry with practical guidelines and procedures to ensure reliable PV system grounding as well as the ongoing safety of these systems.

The report explains what grounding is and defines different types of grounding. It also describes existing *National Electrical Code® (NEC®)* grounding requirements in some detail, explains the basics of grounding PV equipment and systems, and notes the U.S. organizations responsible for developing and publishing grounding and safety standards.

In addition, the report discusses grounding requirements for equipment such as microinverters and AC PV modules, and clarifies the differences between PV system and conventional electrical power systems (utility, generator, or battery sourced) grounding requirements. Finally, it includes an explanation of utility and *NEC* grounding requirements.

A Proposed Standard for: Nameplate, Datasheet, and Sampling Requirements of Photovoltaic Modules

Govindasamy TamizhMani, Joseph Kuitche, Arizona State University
Alex Mikonowicz, PowerMark Corporation



Solar ABCs recommends that the following requirements be included in required standards for PV modules:

•After accounting for the light induced degradation, the measured average power shall be equal to or higher than the nominal nameplate power rating at STC and no individual module power shall be more than 3% below nominal.
•At least one module closest to the nominal rated power shall be measured at the other four rating conditions given in IEC 61853-1 standard (NOCT, LIC, HTC, and LTC).
•Nameplates and datasheets shall contain at least the minimum information specified in the Solar ABCs standard.
•The number of samples used to calculate the measured average power shall be determined using the method identified in the Solar ABCs standard.

Selected Reports - All Reports Available from www.SolarABCs.org

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