



the standard in safety

Solar ABCs Product Safety Panel

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Underwriters Laboratories Inc. (UL)

- An independent, not-for-profit product safety organization testing and certifying products
- Writing and publishing Standards for Safety
- Accredited by OSHA as a Nationally Recognized Test Laboratory (NRTL) and the Standards Council of Canada
- The only IECCE North American National Certification Body (NCB) for photovoltaic (PV) product certification
- North American market leader in certification



Standards

- Standards are requirements or recommendations based on best practices
- Created by bringing together the experience and expertise of interested parties
- Generally, the UL standard revision and development process is limited to Standards Technical Panel (STP) members
 - UL 1703 - PV panels, modules and module accessories
 - UL 1741 - Distributed power systems equipment and accessories, inverters, charge controllers, PV combiner boxes and utility interconnection systems equipment.



Solar ABCs and UL Standards

- Provides an open forum to industry and other interested parties
 - Comment on work being done
 - Suggest areas to Solar ABCs to be addressed
 - Could then be presented to UL STPs
 - Make inquiries and ask questions about existing standards and requirements
- Identify and address gaps in standards requirements
- Provide additional opportunities to collaborate with research studies on related projects



Product Safety Panel - General

- The majority of activities and deliverables of the *Product Safety Panel* center on planning, coordination, and outreach tasks related to UL standards, particularly UL 1703 (modules) and UL1741 (inverters).
- Update – UL participated in the TC 82 WG6 meeting regarding the revisions to the IEC 62109 inverter standard.



Panel Working Process

- Individual panel members will work on assigned activities, collaborating where necessary on joint projects
- Use of website to post research and gather input and opinion from stakeholders
- Quarterly meetings (either teleconference or in-person) to discuss and determine panel direction and actions
- Minutes and annual reports will need to be reviewed by the panel for submittal to the PA



Stakeholders and Collaboration

- Stakeholders
 - Use web-based list serve to provide input to work underway and to ask questions
- Collaboration with PV/CSP Product Study Panel
- Collaboration with other Coordination and Implementation Panels
- Collaborations with other SAI partners



Product Safety Panel – PV AFCI

- In response to recent increases in PV module field failures due to over temperature and arcing within high voltage PV systems, the *Product Safety Panel* has identified development of an arc fault circuit interrupter as technology research area that may lead to improved safety and reliability as well as overall reduced costs of PV systems.
- The *Product Safety Panel* will conduct a literature search of national and international PV documents to characterize issues related to PV AFCI needs.
- The panel will develop a proposed PV system AFCI design to the SOLAR ABCS for consideration.



Product Safety Panel – PV AFCI

- Attended IEC workshop on PV arcing issues and potential protection means.
- Tim Zgonena made a presentation on UL experience and information gathered to date on the topic.
- Presented conclusion that a PV AFCI product would mitigate many of the potential PV fire hazards that this industry is starting to encounter.



Product Safety Panel – PV AFCI

- All attendees agreed that PV arc faults were a significant problem that need to be addressed. A portion of the attendees and presenters were supporting a means to minimize the arc fault hazard by increasing the quality and reliability of the existing PV systems components.
- Unfortunately, while this method will reduce the number of issues it does not develop a means to mitigate the hazard when it does occur.
- A Swiss professor had a functional prototype PV AFCI and demonstrated it for the group, but this design is patented and limited details were available on how it functions.
- While this is promising, the industry is not likely to support a single solution that is not commercially available and not likely to be made commercially.
- It was discussed that the PV arc does not provide a unique or easily identifiable signature.



Product Safety Panel – Polymeric Materials

- The *Product Safety Panel* will conduct an industry survey to identify the causes and severity of PV module failures resulting from polymer property failure issues to examine if current testing procedures adequately exercise materials under test for the conditions seen in the field. The panel will develop test methods to address these failure modes.
- Update – Based upon industry information, UL plastic materials experts developed a test program to evaluate the long-term temperature rating of multi material laminated PV module backsheet materials being used today.



Additional Deliverables

- UL 1703 and IEC 61730
 - Identify and discuss differences between US and international standards
 - Future adoption and integration with national differences
- UL 1741 and IEC 62109
 - Identification of UL 1741 and IEC 62109 new or revised requirements for ungrounded PV arrays and non-isolated inverters, other additional equipment
 - Identify national requirements and differences between US and international standards (Y2)



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