

PHOTOVOLTAIC



A TESTING PROTOCOL BUILT FOR THE PHOTOVOLTAIC INDUSTRY BY THE PHOTOVOLTAIC INDUSTRY

CSA GROUP UTILIZES STAKEHOLDER ENGAGEMENT AND CONSENSUS-BACKED PROCESSES TO ADDRESS EQUIPMENT LONGEVITY IN THE PHOTOVOLTAIC INDUSTRY

National energy strategies are often heavily influenced by three pillars: energy security, environmental priorities, and economic benefits. Renewable energy technologies such as photovoltaics (PV) can address all three. As a result, PV has experienced strong commercial growth in recent years, evolving from a niche market of small-scale applications to a mainstream electricity source.

This growth provides promise for substantial market opportunities, as well as global opportunities, in manufacturing. However, reliability and quality continue to be critical elements for the continued growth of the PV industry, particularly because PV technology is expected to perform in the field for 25-plus years. Recognizing the need for a universally accepted testing protocol, CSA Group[®] harnessed its expertise in standards development and alternative energy sources to create C450-18 - *Photovoltaic (PV) Module Testing Protocol for Quality Assurance Programs* – an important industry guideline that will be published as a bi-national standard in 2018.

Key Challenges Facing the PV Industry

PV modules are expected to perform outside in many different elements – hot, cold, snow, hail, rain, wind, etc. – for 25 years or more without significant performance degradation. In addition, these modules and their

components are manufactured in different countries, by many different companies, with differing levels of quality control. It is for these reasons that reliability and quality are key concerns for all stakeholders in the PV industry, whether it's the financiers investing in these products, the utilities maintaining these modules over their lifetime, or the

manufacturers producing the modules. If this equipment is expected to reliably perform in harsh environments for a quarter of a century, it must be rigorously tested.

However, under most regulatory regimes, PV module manufacturers are only required to conduct safety and qualification testing

according to ANSI/UL 1703 or IEC 61730 and IEC 61215. These standards alone cannot validate product performance in many different types of environments in the field for 25 years or more, so most PV module manufacturers are considering extended reliability testing above and beyond safety and qualification testing. This is completed either internally or externally through third-party labs.

The challenge is that labs are using multiple testing protocols to determine the long-term reliability of these modules because there are no consistent accepted best practices to streamline the process. This results in ambiguity, which can lead to decreased functionality of the PV modules, redundant testing, greater costs for manufacturers, and a lack of consumer confidence.

Stakeholders need a solution that consolidates existing protocols into a publicly available protocol that better serves the marketplace, eliminates redundant testing, and enables data to be easily compared across manufacturers and projects.

A Focused Solution

In response to this challenge, and in collaboration with major stakeholders in the PV sector, CSA Group developed a uniform best practice document that brings current PV testing protocols under one umbrella. Initially, the organization created a committee of stakeholders to develop EXP 450, an express document designed to address the gaps in current industry standards. The document, which is based on industry input, as well as extensive research and discussion over the course of a year, establishes testing requirements based on industry best practices, and provides PV stakeholders with a protocol that allows them to work with

different manufacturers and laboratories across the globe and compare durability testing results.

CSA Group has taken this a step further by working to gain an ANSI/CSA standard for the testing protocol. Known as C450, the bi-national standard is nearly complete. A technical committee comprised of broad representation from the PV value chain, including manufacturers, testing bodies, research firms, and financiers from around the globe, have been developing the standard to ensure it meets the needs of the entire industry. The committee, under the guidance of Mohsen M. Sepehr, CSA Group's Project Manager for Renewables & Energy Storage, has used EXP 450 as a seed document, as well as the most current information available, including works from the National Renewable Energy Laboratory (NREL) and the Photovoltaic Quality Assurance Task Force (PVQAT).

A First-of-its-kind, Comprehensive Protocol

Comprehensiveness is critical when looking at the role best practice protocols play in various global industries, and the PV industry is no exception. C450 reduces ambiguity and brings multiple existing protocols under a first-of-its-kind, comprehensive protocol based on input from actual stakeholders in the PV industry, as well as extensive research. It addresses various accelerated stress tests performed on PV modules, including thermal cycle, damp heat, humidity freeze, UV, static mechanical load and dynamic mechanical load tests.

"There is no standard anywhere in the world for this kind of testing," says Jim Crimmins, General Manager for CFV Solar Test Laboratory, and member of the EXP 450 and



C450 committees. "This is the first standard [of its kind] developed by a standards development organization, with a technical committee, with a transparent process."

Highlights of the C450 standard, include:

- Provides a publically available, consistent and comparative evaluation that can be used by a variety of manufacturers and labs across North America to reduce inconsistencies, reduce waste, and provide an even playing field in the industry;
- Enables the evaluation of comparative reliability among different module manufacturers, designs, and bills of materials;
- Enables the diagnosis of potential problems with new module manufacturing equipment or facilities through comparison with equipment and facilities that are known to be good;
- Provides data for ongoing quality monitoring programs after product validation;
- Designed to be flexible, and can be quickly updated as new test methods are developed and validated; and
- Can be used across multiple PV module technology types.

Testing to Acceptable Parameters

CSA Group is already offering testing programs based on C450 through its state-of-the-art labs in both the U.S. and China. Its testing capabilities are designed to provide full scope testing of PV modules to the latest protocols.

One of these state-of-the-art labs in Albuquerque, New Mexico, CFV Solar Test Laboratory, tests PV equipment. The company, whose customers had been requesting such a protocol, has already had several customers testing to the guidelines since the EXP 450 document was released last year.

"I'd say the response has been overwhelmingly positive," says Mr. Crimmins, who believes that C450 will have a major impact on the PV industry.

"Manufacturers are being required to test to multiple different protocols that are not standards," he explains. "The idea is that C450 will make this kind of testing more transparent, hopefully reduce the cost of it because there won't be as much redundant testing, and there will be more participants who are able to offer this kind of testing, which should help prevent testing delays".

Contact Us

To learn how to get your products verified against C450, contact us today.

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