Key Steps to Rapid Global PV Module Certification

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Introduction

The photovoltaic industry has grown rapidly in recent years, and new technologies are regularly coming to market. As the industry has expanded, so have the aspirations of module manufacturers, with many looking to sell their products in multiple countries and regions around the world. But modules must be certified before they can access markets, and the rising number of PV products combined with a limited number of accredited testing labs has led to longer certification times. These delays can often lead to cost overruns, loss of market share, reduced profitability and lowered brand ranking.

The good news is that module manufacturers can significantly reduce the risk of certification delays by making smart choices early in the design of their products. By selecting a testing lab such as Intertek that is accredited to certify modules in North America, Europe and the major Asian markets, a manufacturer can gain access to more than 40 countries after completing just one set of tests. Using one lab can cut certification time down to as little as one-third what it would be when using multiple labs in different countries. This time savings is accomplished by designing a test plan that takes advantage of the overlap between the different crediting standards – meaning fewer tests need to be done. Time can also be saved by conducting a design review before the formal certification testing begins, by taking advantage of some of the testing already done at a manufacturer's own lab, and by limiting the amount of retesting needed for modified components.

This white paper explains in simple and clear language the steps a manufacturer should take for rapid global PV module certification.

#1: Start Early

Begin certifying a new PV module before its design is complete. This ultimately will speed up the time to market. Manufactures that wait too long to begin module certification risk delays and might have to rework some components after they thought their designs were done.

Manufacturers should identify their potential geographic target markets as soon as possible. Different countries around the world and regions or states within those countries, such as the U.S., have their own requirements. Generally speaking, however, manufacturers will want their modules to satisfy two major routes – ANSI/UL for the U.S.

and Canada and CB Scheme for the EU, parts of Asia (including China and India), and other countries that participate in the program. As will be discussed later, knowing early in the module design process which standards must be met will save time during the certification.

#2: Only Use Certified Components

A new module will have to be certified before it can access any markets. But it's important to remember that each component that goes into the finished module – from wiring to adhesives – must comply with certain standards. These standards can be different in North America, the EU, and Asia, so manufacturers should make sure the components they select meet the requirements of their target markets. While in some cases it is relatively easy to test an unapproved component for its intended application or use, such as with encapsulants and backsheets, using materials with the correct certifications is always an easier route.

In most cases, components will have had to be tested and certified to prove they meet the relevant standards. Most component manufacturers have their products certified, but some don't. Intertek has found that one of the most frequent causes of module non-compliance is the use of components that aren't properly certified. Labs such as Intertek that perform design reviews (see step #4) help manufacturers ensure that they only select components and materials that are certified and rated properly for their application in the PV module.

Some module components that require certification:

- PV connectors
- PV junction box
- Leads
- PV polymeric materials such as substrates, encapsulants, adhesives and sealants

#3: Select the Right Lab

Manufacturers often mistakenly believe they have to send their modules to separate labs for certification in each of the geographic markets they intend to do business. In fact, some labs are accredited to certify modules under both of the major routes (ANSI/UL and CB Scheme). The accrediting body for ANSI/UL is OSHA and the accrediting body for CB Scheme is the IECEE. Labs with both accreditations can take advantage of overlap between

the two sets of requirements (see step #5) and significantly reduce the time needed to achieve certification.

It's important that the selected lab has expertise in PV technology. The current certification requirements are generic and written for existing PV technology, but many manufacturers are looking to certify modules with innovative technology that's unlike any products previously on the market. That means new module technology might not fit neatly into the requirements of the current standards. A lab with PV expertise is better equipped to develop the right test plan and apply generic requirements to the new technology.

#4: Do a Design Review

Engage a lab for a design review. During this review, the lab should work with the manufacturer to ensure it is selecting materials and electrical components that are certified in the right geographic markets. The lab should check that the manufacturer is using components with the necessary rating, providing proper spacing between electrical equipment, selecting compatible materials, choosing framing with proper grounding, and developing satisfactory installation instructions. By working with a lab in a design review, problems are identified early and the eventual certification testing can move more quickly.

#5 Develop a Smart Test Plan

A smart test plan will increase the likelihood of a quick and successful certification. A lab that is accredited to certify modules under the two major routes (ANSI/UL and CB Scheme) can develop a smart test plan that ultimately saves time and money. The test sequences for safety and performance in the two major routes have some overlap, so a lab with both accreditations can conduct the certifications concurrently. Where there is overlap, the lab will pick the more stringent requirement and, with one test, satisfy both.

#6 Take Advantage of the Manufacturer's Own Lab

Most major labs allow for what is called a "data acceptance program." Under such a program, some testing done at a manufacturer's internal lab can be used toward certification. All manufacturers should explore this possibility because it speeds up certification.

In today's PV industry, many manufacturers are designing new modules with innovative technology. The manufacturer's in-house staff will have more intimate knowledge of this technology than outside labs. A manufacturer can take advantage of its internal expertise by doing some of its own testing and by developing justifications for why some testing for its technology should be done differently than conventional methods. By joining and taking advantage of these data acceptance programs these modified test plans could be used to do the testing and the data could be used for certification. At Intertek, we refer to it as the "Satellite Program".

#7 Retest only what is Necessary

There is consistent technological advancement in PV technology. As part of this advancement, manufacturers often modify the module design and certain components. As discussed in step #2, module components must meet certain requirements in order for a module to be certified. But if a component, such as a junction box or backsheet, is modified, module certification is invalidated, and it must be retested.

The IECEE, the accrediting body for the CB Scheme, has published retesting guidelines that Intertek and other labs have adopted and in certain cases modified to accommodate certain standards In some cases, the retesting guidelines require modified modules to be completely recertified, but in other instances only limited tests need to be redone . Manufacturers should be aware of the retest guidelines for any components they modify and retest as little as necessary to save time and money.

Relevant ANSI/UL Standards (U.S. only, but Canada typically has similar requirements)

- UL 1703: Standard for flat-plate PV modules and panels
- UL 790: Standard for standard test methods for fire test of roof coverage
- AC 365: Standard for building-integrated PV modules (BIPV)

Individual U.S. State Requirements

- California: California Energy Commission (CEC)
- Florida: Florida State Energy Center (FSEC) and county specific building requirements
- Others forthcoming

Relevant CB Scheme Standards (Europe, parts of Asia and other countries)

- IEC 61730: Standard for PV module safety
  - Part 1: requirements for construction
  - Part 2: requirements for testing
- IEC 61215: Standard for crystalline silicon terrestrial PV modules
- IEC 61646: Standard for thin-film terrestrial PV modules
- IEC 60904-X: Standard for PV devices (measurement procedures and requirements)

Conclusion

The PV industry has been growing fast in recent years, and module manufacturers are constantly making advances in the technology. In order to access markets with their new products, manufacturers must have their products certified. This process can take months and lead to delays, but manufacturers that take certain steps can significantly increase the speed with which they certify their modules. Those steps include starting early, using only certified components and selecting the right lab. Manufacturers also will reduce the likelihood of delays in certification if they do a design review, develop a smart test plan, take advantage of their own lab and retest only what is necessary. Taken together, these steps can lead to a rapid global PV module certification.

About Intertek

Intertek is the leading provider of quality and safety solutions serving a wide range of industries around the world. From auditing and inspection, to testing, quality assurance and certification, Intertek people are dedicated to adding value to customers' products and processes, supporting their success in the global marketplace. Intertek has the expertise, resources and global reach to support its customers through its network of more than 1,000 laboratories and offices and over 24,000 people in 110 countries around the world. For more information, visit www.intertek.com.