

1 Damp-Heat-Test in chamber combined with UV radiation for testing PV modules.

2 Climate chamber for various tests according to IEC 61215.

PV MODULE CERTIFICATION FOR NEW STANDARDS AND NEW TECHNOLOGIES

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Photovoltaics have become an important pillar in the global energy supply. Recently, the application of PV technology has especially gained importance in countries with challenging climates, e.g. in the Middle East and North Africa. Due to the constant cost pressure on PV module production, standardized quality assurance remains crucial to ensure safe and reliable products.

New technologies require an adaptation of standardized testing. In the past few years, the most relevant international standards for PV module safety, design qualification and type approval have been revised to keep pace with the innovative technologies penetrating the market as well as to consider recent findings.

The accredited TestLab PV Modules at Fraunhofer ISE has updated its capabilities to meet the new standards IEC 61215:2016 and IEC 61730:2016.

THE TESTLAB PV MODULES AT FRAUNHOFER ISE

In cooperation with VDE Testing and Certification Institute in Offenbach, Fraunhofer ISE operates the accredited TestLab PV Modules in Freiburg since 2006. High-grade and innovative testing facilities, accredited to ISO/IEC 17025:2005, ensure the most precise testing results. Our in-house partner laboratory CalLab PV Modules is an accredited calibration laboratory which conducts performance measurements at a worldwide leading measurement uncertainty as low as 1.3%. In addition, our customers profit from the scientific environment of Fraunhofer ISE in which both labs are embedded. For many years, our experience in PV module reliability has been contributing to standardization procedures and we have participated in the revision process of the new standards as well.



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New Developments in PV Module Standardization

To give room to a fast developing and innovative market, the standard's structure has been revised. While in the past, there were different standards for two major technologies (IEC 61215:2005 for crystalline silicon and IEC 61646:2008 for thin film PV modules), the new standard is divided into two parts. As illustrated in Fig. 5, one part states the test conditions, while the other part includes general requirements as well as special adaptations of the test conditions for individual technologies. In addition, almost every test procedure has been technically adjusted and new tests have been added.

Exemplarily some highlighted changes are:

- consideration of LID: Independent from the cell technology, every module is tested for its sensitivity to an initial light-induced degradation.
- evaluation of module power with respect to nominal value: The measured power of each test sample must not deviate strongly from the nominal value.
- replacement of NOCT (nominal operating cell temperature): NMOT (nominal operating module temperature) with a respectively changed test procedure is implemented instead.

These changes require modifications in the test equipment and processes as well as in the evaluation of results. TestLab PV Modules at Fraunhofer ISE has completed all necessary adaptations and is now able to test according to IEC 61215:2016 and IEC 61730:2016.

Testing New Technologies

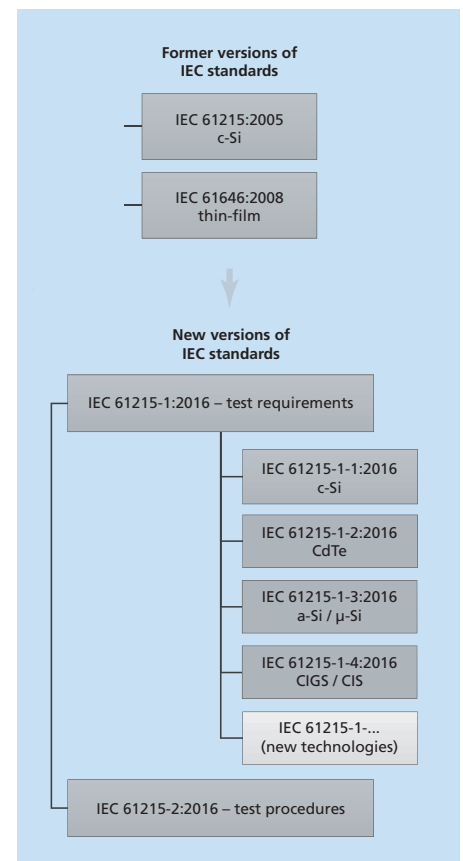
Despite joint efforts of various testing laboratories worldwide, international standards are always one step behind the latest developments in PV module and cell technologies. Thus, test standards for the newest technologies often do not exist.

Through our close cooperation with VDE and our innovative test equipment we offer test solutions for modules of latest technologies or special designs. These include smart modules, AC modules, bifacial PV modules, which use the front and rear side irradiance to generate electricity, as well as PV modules with organic or dye-sensitized solar cells.

TestLab PV Modules supports customers in adapting and developing suitable testing conditions for new technologies in close cooperation with the certification body VDE. Our long-term experience in PV module testing helps us to identify necessary modifications in test conditions that enable certification testing for new technologies. Our expertise enables us to detect possible risks at an early stage. We ensure that with every modification in a test procedure, the original objective of the underlying standard is preserved.

3 UV climate chamber.

4 Test equipment developed for hail test.



5 Former and new versions of PV module standards.