

Testing and certification services for solar products

Solar and Renewable Energy sector

Kiwa Italia



**Trust
Quality
Progress**

Solar PV Testing and Certification

Kiwa operates as an internationally recognized Notified Body for Solar PV modules (Crystalline and Thin Film), such as NCB and CBTL, according to the IECCE scheme.

We use our accredited laboratories to test PV modules according to IEC 61730 for safety requirements and IEC 61215 for performance requirements on crystalline silicon terrestrial photovoltaic (PV) modules and Thin Film terrestrial photovoltaic (PV) modules.

- **IEC 61215:** This International Standard lays down IEC requirements for the design qualification and type approval of crystalline silicon terrestrial photovoltaic modules suitable for long term operation in general open-air climates. It applies to both crystalline silicon and Thin Film modules types.

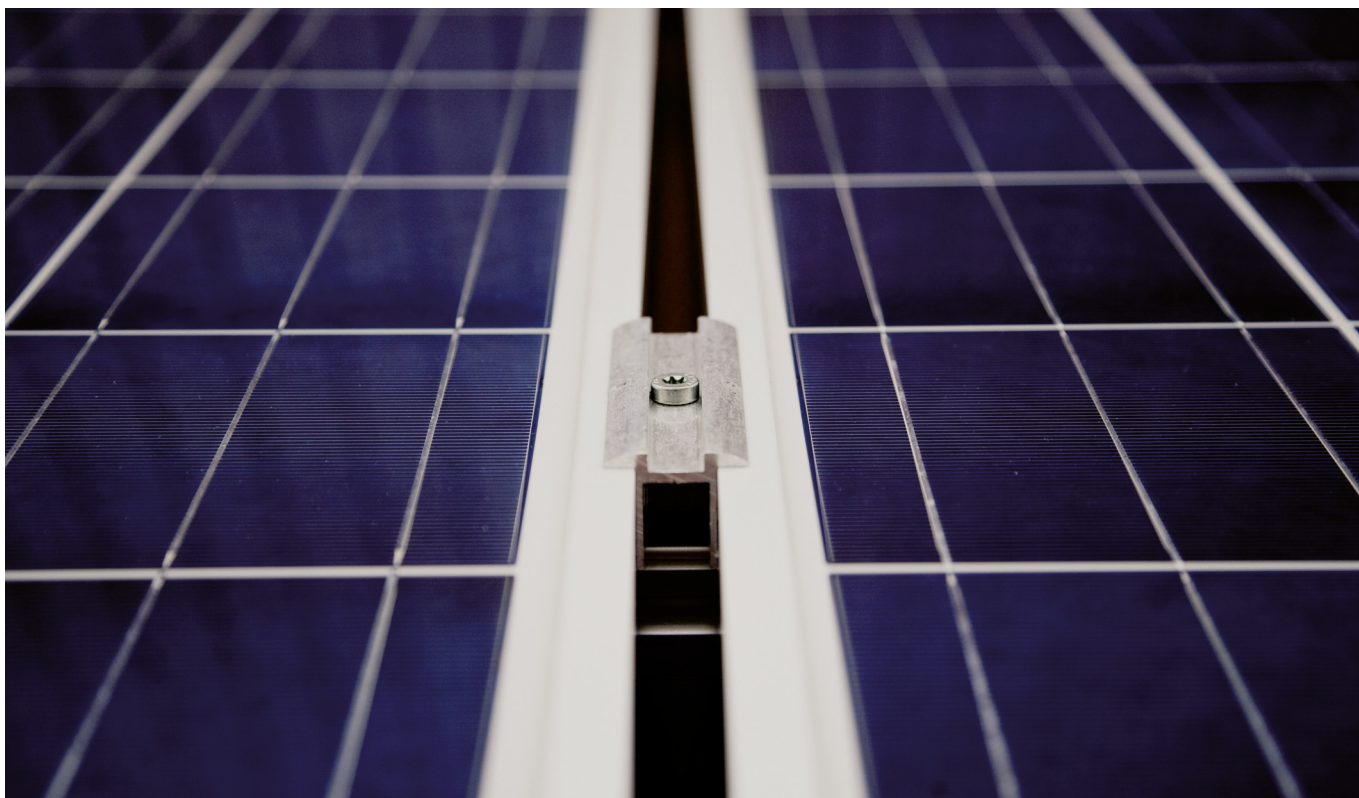
The new structure is the following:

- **IEC 61215-1:** Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1: Test requirements
- **IEC 61215-2:** Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 2: Test procedures
- **IEC 61215-1-1:** Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1-1: Special requirements for testing of crystalline silicon photovoltaic (PV) modules
- **IEC 61215-1-2:** Terrestrial photovoltaic (PV) modules - Design qualification and Type approval - Part 1-2: Special requirements for testing of thin-film Cadmium Telluride (CdTe) based photovoltaic (PV) modules
- **IEC 61215-1-3:** Terrestrial photovoltaic (PV) modules - Design qualification and Type approval - Part 1-3: Special requirements for testing of thin-film amorphous silicon based photovoltaic (PV) modules
- **IEC 61215-1-4:** Terrestrial photovoltaic (PV) modules - Design qualification and Type approval - Part 1-4: Special requirements for testing of crystalline silicon photovoltaic (PV) modules.

- **IEC 61730:** This standard describes the fundamental construction requirements for photovoltaic modules in order to provide safe electrical and mechanical operation during their expected lifetime. Specific topics are provided to assess the prevention of electrical shock, fire hazards, and personal injury due to mechanical and environmental stresses.

The new structure is the following:

- **IEC 61730-1:** Photovoltaic (PV) module safety qualification - Part 1: Requirements for construction.
 - **IEC 61730-2:** Photovoltaic (PV) module safety qualification - Part 2: Requirements for testing.
- **UL 1703:** TA Standard for Safety Flat - Plate Photovoltaic Modules and Panels. These requirements cover flat-plate photovoltaic modules and panels intended for installation on or integration into buildings, or to be freestanding (that is, not attached to buildings), in accordance with the National Electrical Code, NFPA 70, and Model Building Codes, as well as modules and panels intended for use in systems with a maximum system voltage of 1000 V or less and components intended to provide electrical connection to and mounting for facilities for flat-plate photovoltaic modules and panels.
 - **IEC 61701:** The Salt Mist Corrosion Test has been issued for testing salt mist corrosion with sodium chloride moisture. The salt spray test is a standardized test method used to check corrosion resistance of coated samples. Salt spray test is an accelerated corrosion test that produces a corrosive attack to the coated samples in order to predict its suitability in use as a protective finish. IEC 61701 for photovoltaic modules specify the duration and ambient temperature of the test with a module of specific inclination. Acceptance criteria are the same as those of IEC 61215 and no corrosion of modules parts that may influence module safety and functionality. Normally the time required for the test depends on the level of severity. Severities are 1 (marine environments) and 2-3-4-5-6 (environment with changes between salt and dry atmosphere).
 - **IEC 62716:** The ammonia corrosion test has been developed for modules that are installed on livestock farms and greenhouses are subjected to particular environmental conditions that may be very harsh: in particular fertilizing, ammonia and dust particles can develop. The concentration of ammonia, which is a harmful substance released into the air in large amounts on farms, may be very high and these emissions can additionally increase aging (degradation) of the photovoltaic modules. Degradation leads to a lower energy yield and therefore a lower return rate for the operator of a photovoltaic system.
 - **IEC 62804:** PID-Potential Induced Degradation is a negative effect observed more and more frequently in the last ten years due to an increase in maximum system voltage of array installations. This effect caused by high-voltage biasing can lead to power output degradation due to cell polarization. The standard has been developed with the aim to evaluate this effect in a systematic and reproducible way.



- **IEC 60904-11:** LID - Light Induced Degradation (LID) conducted with sunlight (real or simulated). Silicon PV modules have a natural degradation due to the physical reactions (electron flow) through the p-n fittings of a PV module. Nevertheless, a concept of (initial) "Power Stabilization" should be used more widely, recognized and taken into account.
- **IEC 60068-2-68:** The Sand Abrasion test. The considerable increase of installations in desert areas makes it essential to assess the resistance of modules to sand and weather conditions in various areas of the world (especially in the MENA Region). The scope of the tests is to examine the performance of the modules in environments such as deserts, where sand storms and a shortage of rain may cause undesired inefficiency of the plant.
- **IEC 62790:** This International Standard describes safety requirements, constructional requirements and tests for junction boxes up to 1500V dc for use on photovoltaic modules. This standard also applies to enclosures mounted on PV-modules containing electronic circuits for converting, controlling, monitoring or similar operations.

Calibration

- IEC 60904-9: Solar simulator performance requirements according to defined classifications of solar simulators for use in indoor measurements of terrestrial photovoltaic devices; solar simulators are classified as A, B or C for each of the three categories based on the criteria of spectral distribution match, non-uniform irradiance on the test plane and temporal instability. These provide the required methodologies for determining the rating achieved by a solar simulator in each of the categories.
- ISO 9847: Calibration of field pyranometers by comparison to a reference pyranometer. Specifies two preferred methods: the outdoor calibration (with the pyranometer in a horizontal position, in a tilted position, or at normal incidence) and the indoor calibration (using an integrating sphere with shaded or unshaded lamp or at normal incidence). Applicable to most types of field pyranometers regardless of the type of radiation receptor employed.

Plant inspections

The actual inspection/assessment will consist of following items:

- ✓ Comparison of detailed design with as-built situation and verification of the as-built result of the total plant
- ✓ Visual inspection of the PV generator, dc- and ac- cabling, inverters and grid connection (including parts and components)
- ✓ Sample measurements of PV generator and strings
- ✓ Photograph documentation of possible deviations from plan
- ✓ Assessment report per plant.

Inline Inspection

Quality audits are performed to verify conformance to standards set by Solarif and Kiwa through review of objective evidence. A system of quality audits may verify the effectiveness of a quality management system and ensure (through inline inspection) that the right material is used for the end product.

With quality audits the number of problems is reduced to a minimum and is eliminated from the production process. With an increase in the number of the inline audits, the chance of potential problems is minimized.

We will check:

- ✓ Raw materials and movement of materials from stock
- ✓ Operational excellence of plant personnel
- ✓ Witness testing on site
- ✓ Review of the quality system
- ✓ Check that product requirements are met.

Pre-shipment inspection

We will check:

- ✓ Raw materials and movement of materials from stock
- ✓ Packaging
- ✓ Witness testing on site
- ✓ Check that product requirements are met.

With this check our clients are sure that the products produced and shipped are in line with the requirements set by the clients themselves. It can also provide useful information (combined with after-shipment controls) about the loss in power because of transport.

Testing and certification of solar thermal collectors and solar boilers

Kiwa is a testing and certification body for solar thermal collectors (ISO 9806), systems (EN 12976) and Custom built systems (EN 12977). We are able to certify your products according to:

- The Solar Keymark Scheme is the European quality mark for solar boilers and collectors.
- ISO 9806: This standard details the general requirements for durability, reliability and safety testing and the thermal performance characterization of solar collectors.
- EN 12976: This standard details the general requirements for durability, reliability and safety testing and the thermal performance characterization of solar domestic hot water systems.
- EN 12977: This standard details the general requirements for durability, reliability and safety testing and the thermal performance characterization of custom built systems
- PVT (Hybrid) modules - Kiwa offers testing & certification for PVT (PV and Thermal) modules according to the Solar Keymark Scheme.

Testing and certification of inverters and grid connections

Kiwa is also a Notified Body on all relevant directives that apply to inverters - electromagnetic compatibility directive (EMC-D), low voltage directive (LVD) and grid connection - our test facilities and expertise are available to you.

Some of the standards we offer you are:

- EN 62109
- OVE/ONORM E 8001-4-712
- DIN VDE 0126-1-1 + C10/1
- ABNT 16179
- ABNT 16150
- ABNT 62116
- DIN VDE 0126-1-1
- EN 61000 series
- UL 1741
- G83
- VFR 2013
- VFR 2014
- VDE AR-N-4105
- BDEW
- CEI 0-21 (with integrated interface protection)
- CEI 0-21 (without integrated interface protection)
- CEI 0-16, G83/2, EN 50438 (2)

Testing and certification of mounting structures

Kiwa is a testing lab for the following tests on mounting structures: Water tightness test, wind load resistance test, external fire exposure test. BDA (Building Design Advisor) Solar Energy Systems is the department of the Kiwa Group that focuses on architectural aspects of solar power systems that are installed on roofs and facades.

Solar energy systems may consist of solar heat systems (solar boilers) and solar power systems (PV) or a combination of these.

Since the early 1990s, BDA has been active in the field of integrating solar energy systems in roofs and facades. Both for new development projects and for existing buildings, there is a clear trend toward solar energy systems.

Solar energy systems are also used as building products that, for example, can fully perform the function of a waterproof layer.

BDA participates actively in several national and European standardization committees to regulate the architectural integration in roofs and facades and to promote the use of solar energy systems. Key assessment criteria are the wind load/wind resistance and water-tightness of the solar energy system.

NEN 7250 has been published for the assessment of solar energy systems on roofs and facades. For flat roofs, pitched roofs and facades, the assessments or necessary tests can be performed by the BDA Group. This often requires calculations relating to the wind load at project level.

BDA's involvement on the national and European standardization committees allows BDA to provide recommendations on project level, based on background knowledge of these standards, but also for system development.

Kiwa Solar Solutions

Kiwa offers a client-focused service, delivering testing and certification solutions of photovoltaic and solar thermal technology, when you need it and at competitive prices. We appreciate that the demands of the European and Asian markets for manufacturers and suppliers are rigorous and competitive.

Kiwa offers you a suite of services designed to meet the needs of your business in this area:

- Solar PV and CPV testing and certification
- Specialized on testing BIPV modules
- Testing and Certification of Solar thermal systems and collectors according to the Solar Keymark rules
- Testing and certification of inverters and grid connections
- Testing of Mounting Structures
- Quality Control of solar PV plants and installations
- U.K. PV certification according to the MCS scheme rules
- Testing and certification for North America (UL1703)
- Pre and Post shipment inspections
- Due diligence
- In-line Inspections
- Instrumentation for quality control at the production stage
- PV monitoring system calibration directly on field
- Testing and certification of PV components (J-boxes, Cables, Connectors, Backsheets)
- PV Custom Tests: (Ammonia Corrosion, Salt Mist, Sand Storm, PID, LID, PAN Files)

Kiwa certification assists customers internationally as a European certification body with internationally recognized certification services of systems, products, processes and people.

We also perform third-party inspections and investigations as independent experts.

You can select from a wide-ranging package of products and services at our company as the answer to all your quality issues.

Kiwa will also assist in obtaining certificates from peer certification companies whenever necessary in assisting with your market entry.

Experience

Kiwa has more than 75 years' experience in the field of testing and certification of energy-related products and systems. Our experienced team of experts offers the latest knowledge of the product and the standards and a broad range of supporting technical and quality services.

Standardization

Kiwa actively participates in standardization activities and committees. This "state-of-the-art" perspective informs all our services and the advice we give our clients.

World-wide acceptance

Kiwa reports and certificates are well respected by authorities, manufacturers and by the testing and compliance industry globally.

International service

With our facilities located in different parts of the world, we can assist and support you with an integrated service in the areas where your production, suppliers and/or clients are active.



Focus

with our offices across Europe and Asia we offer a truly integrated service - communicating with you and supporting you where you need us.



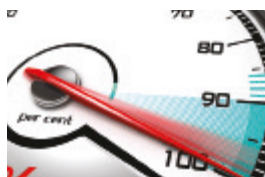
Speed

we can take your products immediately for testing - ensuring your product enters the market as quickly as possible.



Cost

we keep our costs as competitive as possible and seek to add value wherever possible.



Efficient

committed to rapid delivery, accelerated testing programs are available for some products.



Flexibility

we deliver services tailored to your requirements. Authorities, banks and investors will require evidence of compliance and quality of products. It is important to have your solar PV modules and solar thermal collectors tested and certified by an internationally recognized and accredited Testing and Certification Body.





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Trust Quality Progress

Kiwa is a globally active quality assurance firm that assists organizations across a broad range of market sectors with comprehensive certification procedures.

As your partner for progress, Kiwa will help you to continuously improve your processes, products, employees and organizations.

Our activities in the fields of inspection, research, consultancy and training will support you in this goal. With more than 4000 professionals in over 50 countries, we have the expertise and experience needed to be your partner, helping you to reach your full potential.

Kiwa provides independent expert services for quality certification around the world. We create trust by enhancing the continuous improvement of products, processes, systems and people. We do so by helping companies to satisfy their certification, inspection and testing requirements, and by offering services in such areas as training, data services, research and technological know-how. Kiwa has offices in 30 countries on all continents and is active in over 50 countries worldwide. Our services extend to virtually all sectors and market segments.

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