IBC SOLAR

Have sun!

Quality

The IBC SOLAR quality.

The 7-step quality test in SUNLAB test laboratory.

SUNLAB

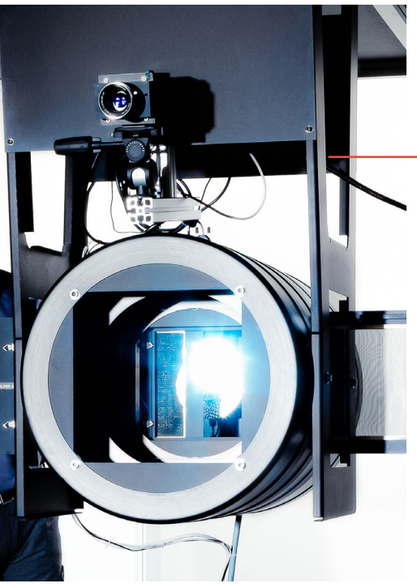
Qualified testing of solar modules.

Photovoltaic modules and components are exposed to a wide range of impacts, whether weather, manufacturing or wear and tear.

In the SUNLAB test laboratory over an area of around 250 sq. m, PV specialists implement seven different test procedures to determine whether the products deliver what they promise. In this way, our customers benefit from maximum security in terms of warranty, guarantee and recourse.

Our quality promise at a glance:

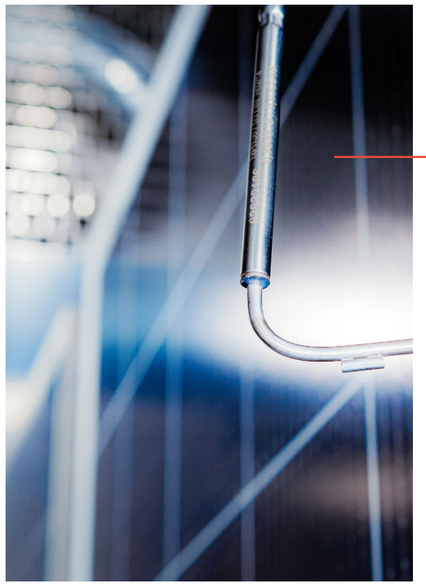
- All components come from reputable and certified manufacturers
- Unique quality assurance measures prevalent throughout the industry
- Comprehensive incoming goods inspections, based on DIN ISO 2859-1



The measure of all things.

Determining the highest performance
DIN EN IEC 61215-2:2022-02 | MQT02

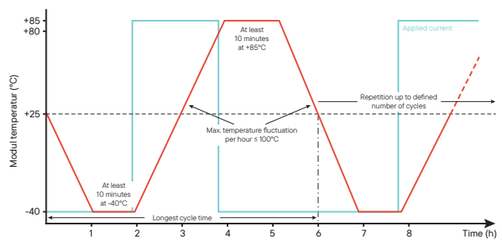
Purpose	Determining the highest output of the PV modules before and after environmental impact tests. The defined value is used as the starting point for the incoming goods inspection and processing complaints.
Test device	BBA sunlight simulator according to the IEC 60904-9 standard B B A Irradiance Homogeneity Spectrum
Process	• Comparison object is a PV reference module according to IEC 60904-2 that is stored in a darkroom with UV-reduced light and at a constant temperature of +25°C (±2), therefore its photovoltaic parameters are stable • The PV reference module and the test module are mounted in a recording device that is vertical to the radiation direction • The voltage curve is measured according to IEC 60904-1
Standard Test parameter	• Radiation strength: 1,000 W/m² • Test temperature: +25°C (±5) • Measurement period: 10 ms • Test period: 2 minutes • Possibility of low-light measurement from 100 W/m² to 1,000 W/m² in increments of 100



South Pole and Sahara.

Temperature cycling test
DIN EN IEC 61215-2:2022-02 | MQT11

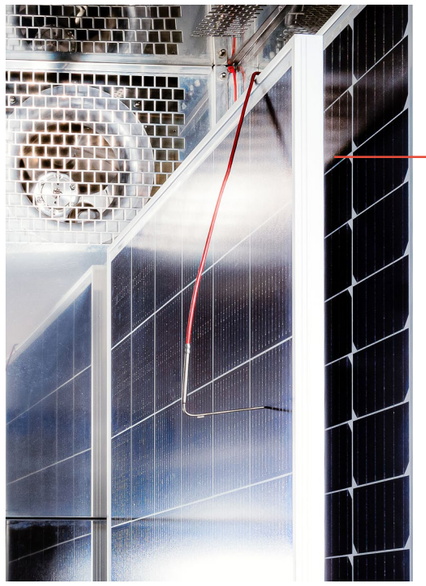
Purpose	Determining the suitability of PV modules. Thermal mismatches or material fatigue, for example, can be prevented in advance as a result of simulated temperature fluctuations.
Test device	Climate chamber with: • Automatic temperature control and air circulation • Function for preventing condensation on the PV module • Integrated module fastening rails for improved air circulation • Temperature gauge • Continuous electricity supply
Process	• Attachment and inclusion of PV modules at room temperature • Temperature influence of -40°C to +80°C with power supply to the PV modules • Total cycle duration: 6 hours • Number of cycles: 200 • At least 1 hour recovery time at room temperature
Tests before and after the inspection	• Visual inspection (DIN EN 61215/10.1) • Measurement to determine the maximum output with electroluminescence imaging (DIN EN 61215/10.2) • Testing the insulation resistance subject to water submergence (DIN EN 61215/10.15)



For bending and breaking.

Static mechanical load testing
DIN EN IEC 61215-2:2022-02 | MQT16

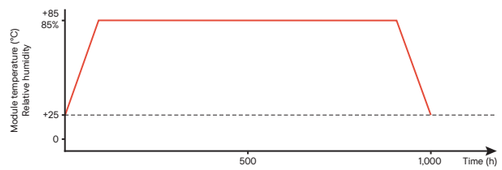
Purpose	Determining the suitability of the PV module to withstand a static minimum load.
Test device	Loading table • Test rig with a frame made from extruded aluminium profiles for absorbing the mechanical test loads • 15 pneumatically-controlled test cylinders • Vacuum cups at the ends of the cylinders enable pressure and suction loads • Force measurement frame with 4 force sensors to calculate the force exerted on the module/the holder • Control software to calculate the total force based on signals from the 4 force sensors
Process	• Assembling the PV module with the holder stipulated by the manufacturer. If there are numerous attachment variants, all of these variants will be tested • The design load stipulated by the manufacturer will be applied - Positive design load → Download pressure - Negative design load → Upward tension • The same procedure is also applied to the reverse side
Standard Test parameter	• Minimum test force: 2,400 Pa (≙244.73 kg/m²) • Test temperature: +25°C (±5) • Load duration: 1 hour • Repetition: 3 cycles • Load evenness: ±5%
Tests before and after the inspection	• Visual inspection (DIN EN IEC 61215/10.1) • Measurement to determine the maximum output with electroluminescence imaging (DIN EN IEC 61215/10.2) • Testing the insulation resistance subject to water submergence (DIN EN IEC 61215/10.15)



Perfect climate for hard facts.

Heat test with humidity
DIN EN IEC 61215-2:2022-02 | MQT13

Purpose	Determining the suitability of PV modules to withstand the long-term penetration of moisture.
Test device	Climate chamber with: • Automatic temperature control and air circulation • Function for preventing condensation on the PV module • Integrated module fastening rails for improved air circulation • Temperature gauge
Process	• Attachment and inclusion of PV modules at room temperature • Conducting the test according to IEC 60068-2-78 at +85°C and a relative humidity of 85% • Total cycle duration: 1,000 hours • At least 2 to 4 hours recovery time at room temperature and a relative humidity below 75%
Tests before and after the inspection	• Visual inspection (DIN EN 61215/10.1) • Measurement to determine the maximum output with electroluminescence imaging (DIN EN 61215/10.2) • Testing the insulation resistance subject to water submergence (DIN EN 61215/10.15)



In light of the truth.

Electroluminescence measuring for PV modules
IEC 82/1062/CD:2016

Explanation

When applying an electrical voltage to the PV module, light will be emitted by the materials (EL for short) that is captured by an electroluminescent camera.

Purpose

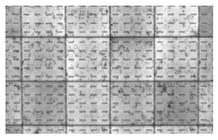
Electroluminescence images of PV modules reliably indicate possible material defects, such as hair-line cracks.

Test device

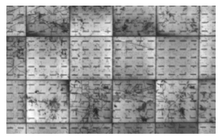
- Camera: Great Eyes GE 2048 2048 FI model
- CCD sensor specification: 2048 x 2048 pixel format
- Camera specifications: Hermetically sealed vacuum head
- Software: Integrated and can be controlled with a PC
  Freely-selectable current and voltage values

Process

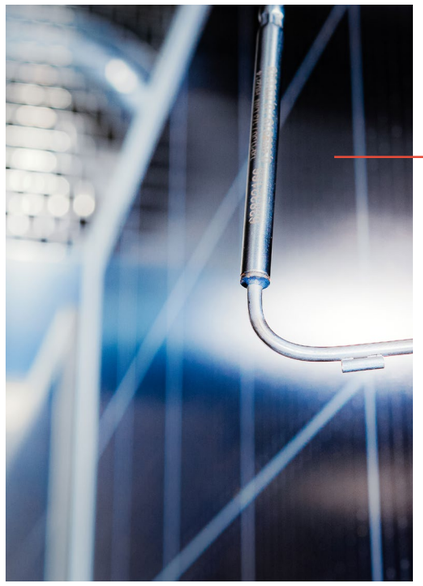
- The PV module is brought into a darkroom to ensure high-quality images
- The image angle to the surface must be observed
- The connecting cables (+) (-) are connected correctly to the test object
- A foreign light source must not be used
- The electrical DC power supply is fed in with a voltage that Isc must reach. In order to ensure identical image quality, the DC power supply that is applied is not changed for the same module types
- Test temperature: +20°C to +25°C
- A temperature fluctuation of 1°C must not be exceeded during the measurement



Electroluminescence image of an intact PV module



Electroluminescence image of a faulty PV module



Still watertight?

Measuring the insulation resistance under wet conditions
DIN EN IEC 61215-2:2022-02 | MQT15

Purpose

Evaluating the insulation of the PV module when exposed to moisture. Rain, dew or melted snow must not enter active parts of the PV module in order to prevent corrosion, earth faults and safety hazards.

Test device

Water tank for PV modules with:

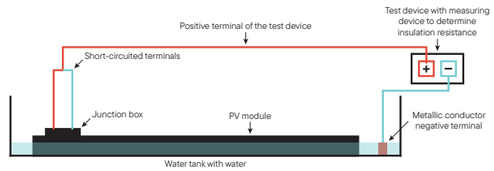
- A DC voltage source that can generate a 1,500 V system voltage and is equipped with a current limiter
- Measuring device to determine the insulation resistance

Process

- Prepare water so that the temperature is at +25°C (±2)
- Insert the PV module into the water basin until it is covered
- Do not immerse the junction boxes too. They will be covered with water
- The short-circuited output terminals of the PV module will be connected to the positive terminal of the test device
- The water must be connected to the negative terminal of the test device with a suitable metallic conductor
- Test period: 3,5 minutes
- If modules have an area of greater than 0.1 m², the measured insulation resistance multiplied by the module area must not be less than 40 MΩ x m²

Example

Measured insulation resistance for module area exceeding 0.1 m²
IBC SOLAR standard size = 1.722 mm x 1.134 mm = 1,92 m²
40 MΩ x 1,92 m² = 78,08 MΩ



Just don´t let up!

Detection of voltage-induced degradation
DIN IEC/TS 62804-1:2017-05

Purpose	System load of PV modules in an environment with humid heat. Qualification requirement of PV modules for the charge produced by the system voltage during operations. Early detection of degradation to prevent output losses and losses of earnings at an early stage.
Test device	Climate chamber
Process	• Using a high DC voltage source with current limiter • Attaching and introducing the PV modules into the climate chambers with temperature and moisture control
Standard Test parameter	• Air temperature: +60°C (±2) IBC SOLAR conducts tests in a stringent process at +85°C (±2) • Relative humidity: 85% (±5) • Test period: 96 hours • Voltage: 1,000V – 1,500V
Tests before and after the inspection	• Determining the maximum output according to DIN EN 612162:2017-08 (MQT02) • Electroluminescence test according to IEC 82/1062/CD:2016

Repeatedly tested longer lasting.

Quality is our top priority – both for our own brand and for external brands in our portfolio.

That's why you receive photovoltaic components developed in-house under the IBC SOLAR brand, into which we have poured years of experience and expertise. In addition to the quality tests in the SUNLAB, IBC SOLAR modules undergo long-term tests under real environmental conditions on a 3,000 square metre test facility.

We source third-party products from reputable manufacturers. We subject the products to extensive incoming goods inspections and also test them at our own test facility.

This is how we guarantee that our systems always meet the highest standards. They are certified according to current standards and evaluated by globally recognised independent institutes (TÜV, VDE and Fraunhofer ISE).

We are convinced by the quality of our products. That's why we give exceptionally long product guarantees.

SUN LAB

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