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INTERSOLAR EUROPE 2013
25 pages of product news


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Carsten Binne/Die Illustratoren Corinna Hein GmbH

Photo: SolarWorld

The best solar power system is always the best investment.

A solar power system is much like any other investment: Only those who invest in quality can expect reliable returns.

Dear customers and readers,

Choosing German quality Made by SolarWorld always pays off. You're holding proof of this fact in your hands right now. The PV+Test carried out by TUV Rheinland in cooperation with Solarpraxis establishes which module most reliably delivers the performance required to achieve the calculated return on investment.

Of the 21 modules tested to date, the Sunmodule Plus SW 245 poly from SolarWorld was the only module to obtain a perfect score under the current testing regulations and receive the coveted "excellent" classification. The test evaluates factors such as durability, electrical safety, workmanship, performance, documentation and guarantee.

Our modules also achieved excellent ratings in the categories of thermal cycling test and damp heat test. The examiners were especially impressed with the outstanding workmanship of our solar modules – a decisive factor affecting durability. Their verdict: absolutely flawless.

Achieving first place yet again in an independent performance test confirms the success of our uncompromising approach to quality.

At SolarWorld everything comes from a single source – from the cells to the solar module, the system kits and the battery system. It's one of the secrets behind our integrated quality assurance strategy.

We rely on German quality standards and a coherent quality system: a thorough quality test is conducted after every single manufacturing step and at all levels of production. Before leaving the factory, each and every one of our solar modules is carefully inspected. In other words: At SolarWorld, we always take the decisive step forward.

At the same time, we never lose sight of our most important goal: to guarantee our customers a secure and sustainable investment with excellent products, the highest yields and consistent performance.

Sunny regards,

Frank Henn
Chief Sales Officer

Photos: TÜV Rheinland

The PV+Test 2.0 has been intensified in several areas. In one aspect, the evaluation for the new test procedure was somewhat relaxed in comparison to the first round, i.e. in the case of isolation resistance.

Clear the ring for round two!

PV+Test: Not only in the trade dispute does SolarWorld have to contend with Chinese manufacturers. In the new and more stringent module testing program from TÜV Rheinland and Solarpraxis, PV+Test 2.0, SolarWorld unwittingly entered into a direct quality comparison with a module producer from China – and clearly won.

The first two modules to face the even more stringent test conditions required by the PV+Test make a very good outward impression. Workmanship, soldered connections, string arrangement, edge test, back sheets – all without objection. There were only minimum point deductions for the Chinese module for slightly smeared silicone sealing which nevertheless serves its purpose well. Thus the quality differences cannot be detected with the naked eye. However, they do in fact exist, as the further tests show. Testing was performed on the Sunmodule Plus SW 245 poly from SolarWorld and the module from a Chinese manufacturer who waived publication of their name and the detailed test results. Manufacturers with poor results are allowed to decide on this option.

The Chinese module committed a serious blunder already when it came to the initial test for electrical safety. In two of five test modules the contacts of the male plug connector were able to be contacted with a test finger. "That is an absolute no-go," says Andreas Cox, who is responsible for the qualification of solar modules at TÜV Rheinland and for the PV+Test as well. There is a risk of death if something like that happens with an installer's finger during assembly. Up to 1,000 Volts can be unloaded into the installer's body particularly when several modules are interconnected into a string. In this case the test provides for corresponding point deductions: zero points for the accessibility test and a further five points deducted from the overall result. In contrast, the Sunmodule from SolarWorld performed very well in terms of electrical safety.

Broken promise of performance

Differences were also determined in terms of the modules' performance. Alt-

In two of the five test modules from the Chinese manufacturer who chose to remain unnamed, the contacts of the male plug connector were able to be contacted with a test finger. A no-go!

hough the values measured in the TÜV laboratories exhibited slight downward deviation in the case of both module types when compared with the information provided on the name plate, with the SolarWorld module all of the results were still within the output tolerance indicated. This was not the case with the Chinese module. One module fell 3.6% below the nameplate data and thus did not fulfil the performance promise given by the manufacturer.

The consequence: only three of ten points in the important partial evaluation for deviation from nominal value. On average the SolarWorld module exhibited an efficiency variance of -0.6%, while the Chinese module deviated from the information provided on the name plate by - 2.5%. No initial degradation could be determined for either of the two modules.

The evaluation of low-light performance and output variances in the case of temperature fluctuation is carried out in the extended test routine on the basis of a so-called matrix measurement. Here too the Sunmodule from SolarWorld obtained better results on average. With a partial result (power measurement with 800 W/m² of irradiation and 50°C ambient temperature) the Chinese module exhibited an efficiency reduction of 18.7%, while the SolarWorld module exhibited a performance degradation of just under 11%.

In the case of two partial evaluations of the matrix measurement (with 600 W/m² and 25°C as well as with 200 W/m² and 15 °C) the efficiency of the two module types even slightly improved. Output in these cases increased by a maximum of 0.5 percentage points.

Slower aging rate

In the tests for resistance to aging the Chinese module was able to recover some lost ground. This was also because the SolarWorld module obtained worse results in the first temperature fluctuation test and in the mechanical load test with 5,400 pascals. After the first 200 cycles with temperature fluctuations of between -40 and +85°C, the Sunmodule Plus SW poly exhibited reduced contact of the cell junctions in the electroluminescence test. And with approximately 3.7%, the relative output degradation was also higher than in the case of the Chinese module, which degraded by only 0.9% in this test.

According to the mechanical load test with 5,400 pascals, the production degradation of the SolarWorld module was also greater. In this case it lost about 2.6% in performance, while the Chinese module was only about 0.75% weaker in the same test. "The frame of the Chinese module is somewhat more rigid than that of the Sunmodule from SolarWorld," explains Cox. "That certainly could have provided for a positive effect in this test."

However, SolarWorld was better in the damp heat test and the test for PID. After 2,000 hours at 85°C and 85% relative humidity the power degradation for the Sunmodule amounted to a maximum of 0.58%, while this figure was as much as 2.8% for the module from China. The PID test let the Solarworld model degrade up to 1.6%, while the Chinese module in contrast degraded by up to 3.8%.

Overall result is decisive

Altogether the module of the Chinese manufacturer obtained the grade "satisfactory" with 77.5 points. However, this does not indicate that a poor module is involved. If two of the modules had not exhibited electrical safety defects on the plug connectors and if all modules had remained within the given specifications, then the module could still have been given the grade "good." However, it is clear that a potentially lethal error, such as the unsatisfactory design of two plug connectors, must be evaluated accordingly.

The Sunmodule Plus SW 245 poly from SolarWorld achieved a total of 92.3 points and thus a clear score of "very good." And therefore it also takes first place compared with the other 20 modules that have been evaluated thus far in the first PV+Test round. Up to now only one module obtained a better evaluation with 94.3 points; namely, Solon Blue 230/07-235W from the Berlin manufacturer Solon.

Whether or not Solarworld can win the price fight in the contest with the Chinese module manufacturers will be decided, among other things, by the further course of the antidumping dispute. However, as far as quality is concerned, with the Sunmodule Plus SW poly the Bonn photovoltaics manufacturer stands out compared with all of the Chinese modules evaluated in the PV+Test thus far. In the end it could be worth investing a few more dollars. ◆

Mirco Sieg

	SolarWorld Sunmodule+ SW 245
General information	
Period tested	Apr 13
Evaluation criteria from	2013
Made in	Germany
Size (millimeters)	1675 x 1001 x 31
Weight (kg)	21.2
Cell type	polycrystalline
Module type	Glass/EVA/Cell/EVA/Foil
Performance parameters	
Specific power	245 watts
Output tolerance (negative, positive, in %)	- Nameplate: '+/- 3%' - Data sheet: '-0 Wp - +5Wp' (+/- 2% measuring tolerance)
Deviation of measured performance from specified performance	0.6%
Initial degradation by preconditioning	-0.05%
Measured performance within the given performance tolerance	yes
Efficiency under STC (1000 watts of solar radiation per m², 25°C measured)	14.53%
Efficiency reduction at low light levels (200 watts of solar radiation per m²)	-3.2%
Temperature coefficient	-0.427%
Efficiency reduction at 50°C (tempreature coefficient measured)	-10.68%
Fill factor	75.70%
Evaluation of performance variance	++
Evaluation of temperature coefficient	++
Evaluation of temperature & lowlight behavior	++
Evaluation performance parameter (20%)	**++**
Aging behavior	
Thermal cycling test, 200 cycles (power degradation in %)	-3.65%
Thermal cycling test, 400 cycles (additional power degradation in %)	0.03%
Derating after PID Test	-1.60%
Damp heat test, 1000h (Power degradation in %)	-1%
Damp heat test, 2000h (additional power degradation in %)	-0.85%
Mechanical tension and compression test, 2400 pascals (power degradation in %)	-0.14%
Mechanical tension and compression test, 5400 pascals (power degradation in %)	-2.63%
Evaluation thermal cycling test	+++
Evaluation PID Test	++
Evaluation damp heat test, 1000h	+++
Evaluation damp heat test, 2000h	+++
Evaluation mechanical tension and compression test (2400 pascals)	+++
Evaluation Mechanical tension and compression test, very high load (5400 pascals)	+
Irregularities (since April 2013 with EL evaluation)	partial unbonding/contact reduction of cell connectors with thermal test/micro cracks after mechanical load tests
Evaluation aging behavior (30%)	**++**
Documentation	
IEC 61215/IEC 61730/CE-label	(+/+/+)
Irregularities	There is no warning for the possibility of higher electrical values than on the nameplate
Evaluation documentation (10%)	**+++**
Electrical safety	
Results meet requirements of safety standard IEC 61730	yes
Irregularities	0
Evaluation electrical safety (20%)	**+++**
Workmanship	
Sharp corners (tested according to UL)	no
Visible irregularities	none
Evaluation workmanship (15%)	**+++**
Warranty and ease of installation	
Product warranty	10 years
Performance guarantee 90%/80%	25 years, first year 97.5%, then linear -0.7%/year
Special guarantee conditions	
Comments	Relatively heavy module
Evaluation warranty and ease of installation (5%)	**+++**
Overall evaluation	
Results within the requirements of IEC 61215 und IEC 61730	yes
Overall comments	Conflicting information on performance tolerance. Thus the performance is independently controlled (TÜV Rheinland power controlled).
Overall evaluation (Maximum 100 points)	92.294
SCORE	**very good**

Scoring system

Tested modules:	very good:	very good (-)	good (+)	good	good (-)	satisfactory (+)	satisfactory	sufficient	unsatisfactory
21	2	3	6	5	1	0	3	1	0

The overall evaluation is based on numerous measurements by TÜV Rheinland – the German safety standards authority – that is not all included in the table. Each measurement is evaluated with a score between zero and ten and is weighted differently in the overall result. Test procedure and weighting were decided by the industry advisory committee. More information is available at: www.pv-magazine.com

WHAT IS NEW IN PV+TEST 2.0

After two years of practical experience with the PV+Test testing program TÜV Rheinland and Solarpraxis have decided to intensify the test in several areas. On the one hand, this will help subject the numerous PV modules available on the market to even greater scrutiny, and make it easier to differentiate the modules from one another on the other hand.

What is new, for example, is testing and evaluation of the initial degradation of the modules, also referred to as light-induced degradation (LID). This effect has been known about for a long time in the case of thin film modules, but it can also occur with crystalline modules. The manufacturers of crystalline modules do not always take this LID effect into consideration when it comes to performance specifications on the nameplate. Thus if a manufacturer fails to consider initial degradation when it comes to power sorting, then this would result in point deductions for PV+Test 2.0 evaluations in the future.

The climatic chamber tests also contain more stringent test conditions. For example, an extended thermal cycling test in which the modules have to twice survive 200 cycles between -40 and +85°C. In the likewise extended damp heat test the modules now have to twice survive 1,000 hours at 85°C and 85% relative humidity.

Initially with the old test the electroluminescence (EL) tests were performed only at entry and after the thermal cycling test. This testing method is now used for damage detection after all load tests and is incorporated into the undervaluation. In particular the change in the EL image is evaluated here against the initial entry image. A new test for potential-induced degradation, PID for short, with plus and/or minus 1,000 volts is also new to the portfolio of aging tests.

Several changes have also been carried out with regard to the tests on temperature fluctuation and low-light performance. In the first round of testing the temperature coefficient and low-light performance were for the most part still considered separately from each other. In the new PV+Test 2.0 both values are evaluated in a so-called matrix measurement, which follows the IEC standard 61853 Part 1 and provides for a much more differentiated view of the performance of the module at fluctuating temperatures and light conditions, thus allowing conclusions with regard to the energy yield. Evaluation of the results is carried out with weighting coordinated with Central European climate conditions.

In one aspect the evaluation for the new test procedure was somewhat relaxed in comparison to the first round, i.e. in the case of isolation resistance. Although the tests are still performed both after delivery and after the aging tests, their weighting in the overall evaluation is now, however, less significant in the case of PV+Test 2.0.

ACTUAL TESTS AND CONTACT

The complete summary table with all of the test results and explanations can be found here

www.pv-magazine.com/pv-test

and on the PV+Test homepage:

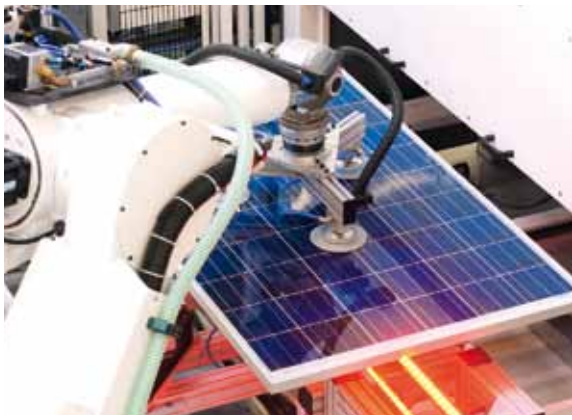
www.pvtest.de/index_en.html

Contact for manufacturers:
Michaela Fischbach: michaela.fischbach@solarpraxis.de
Andreas Cox: cox@de.tuv.com

With the new PV+Test 2.0, the climatic chamber tests encompass more stringent test conditions.







Quality is measurable: We constantly test the quality of our products.
Various independent test facilities regularly award us top marks.

Made in Germany – We produce our quality products in Germany and the United States, both centres of excellence for solar technology

TUV "Power controlled" – Regular tests by TUV Rheinland guarantee that our solar modules maintain the rated outputs.

PV+Test – The outstanding workmanship and the temperature and low-light performance of our Sunmodule Plus SW 245 poly were rated as "excellent" by PV+Test.

GREEN BRAND – SolarWorld AG was the first company in the solar industry to be awarded the 'GREEN BRAND' seal of approval. The certificate is only awarded to brands which have been proven to practise environmental sustainability.

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