

ELECTRICAL & ELECTRONICS  
PHOTOVOLTAICS SERVICES



# PHOTOVOLTAICS ANALYSIS, TESTING, CERTIFICATION

**GAIN ACCESS** TO GLOBAL PHOTOVOLTAIC MARKETS

**SGS**

# LOCALLY AVAILABLE WORLDWIDE

Electrical and electronic product manufacturers and retailers are under increasing pressure from clued in consumers who know about sustainability, energy efficiency and green issues. Partner with SGS to deliver well designed, desirable goods that are trusted for real life whilst ensuring quality, safety and sustainability for retailers and consumers.

## WHO IS SGS?

SGS is the world's leading inspection, verification, testing and certification company. SGS is recognised as the global benchmark for quality and integrity. With **85,000 employees**, SGS operates a network of over **1,800 offices** and laboratories around the world. As a result, our expertise provides a single consolidated source to reduce your risk, improve efficiency and quality, and ensure compliance.

## SOLUTIONS

- Hazardous substances
- Product safety
- EMC (Electromagnetic Compatibility)
- Audit & certification
- Performance & reliability
- Product inspection
- Analytical services
- Sustainability (ErP - Energy related Products, Ecodesign, Energy Efficiency, PEP - Product Environmental Profile, etc.)

## NEW MARKETS AND PRODUCTS

- Electro medical devices
- Wireless devices & applications
- Photovoltaic modules

## COVERING ALL CONSUMER ELECTRONICS

- Household appliances
- Luminaries
- Batteries
- Power supplies
- Information Technology (IT)
- Audio/Video equipment
- Power tools
- Automotive parts

## THINKING SUSTAINABLY

Across our global network of sustainability experts we can support your company in its strategy by offering a range of services covering the environmental, safety and social aspects of sustainability:

- Restricted substances management
- Social responsibility solutions
- Ecodesign services



# PHOTOVOLTAIC CERTIFICATION

## ONE SIGN TO ACCESS GLOBAL MARKETS

Photovoltaics is a world-wide, dynamic and innovative market. The leading industry suppliers and the regions with a high concentration of importers, retailers and power plant companies are setting the market trends.

The SGS solar test facilities are located at the center of such markets, to keep up with solar trends and development, and to offer its knowledge to the global market leaders. In addition to testing modules, SGS Solar experts have also built a Solar Certification Programme and a Solar Performance Scheme.

## SGS SOLAR PERFORMANCE

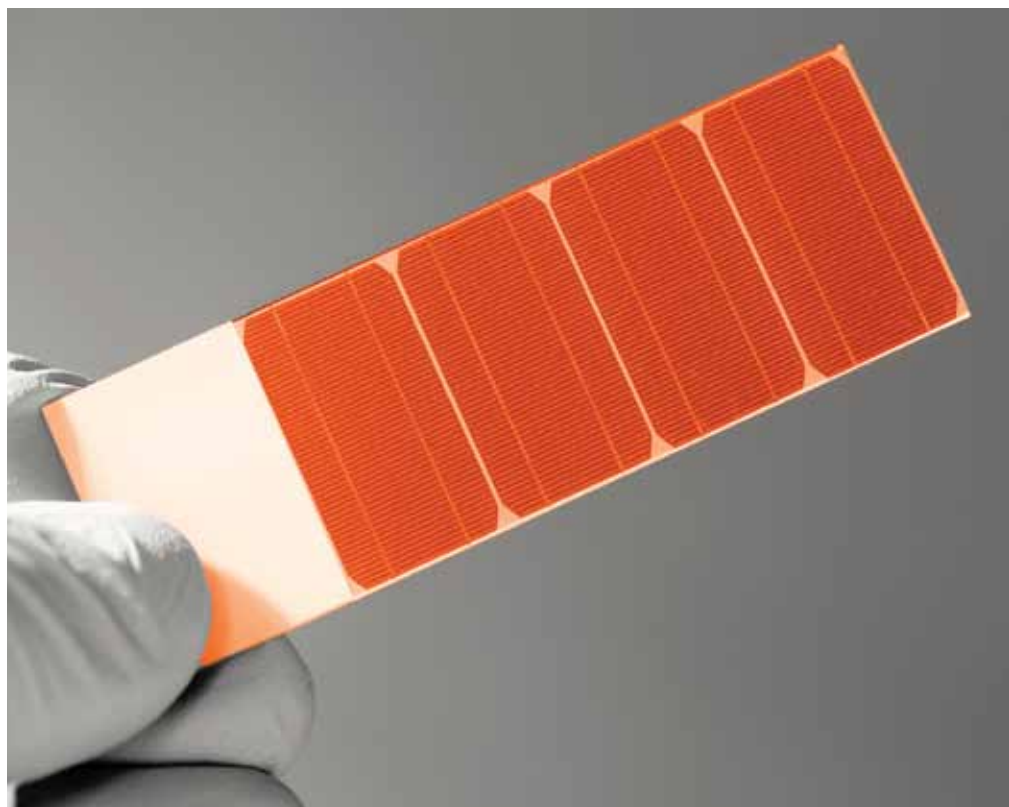
SGS is constantly developing test methods and collaborates on research and development projects to support increase the use of solar-power based technologies.

From its inception in 2009, the SGS Solar Performance Scheme has been supporting manufacturers determine the behaviour of their solar products under comprehensive environmental conditions and operation modes.

SGS Solar Performance Scheme includes options for corrosive gases (e.g. NH<sub>3</sub>, H<sub>2</sub>S or 4C noxious gas), salt mist, fire, long term durability and potential induced degradation (PID) resistance, among others.

These types of testing results are proven to have significant financial implications, affecting investment decisions and providing answers to the issues of eligibility and bankability of a Photovoltaics system.

## SGS SOLAR CERTIFICATION



# SGS SOLAR TEST FACILITIES



SGS solar testing facilities serve the entire value chain of the photovoltaic industry.

Our modular lab configurations support our goal of delivering turnaround times of less than four months.

## **A FULLY INTEGRATED SOLUTION**

As global market leader, SGS tests photovoltaic modules for performance, durability, safety and compliance with legal regulations in our tailor-made PV test laboratories.






While the most test houses just offer services for photovoltaic modules and systems, SGS is able to serve the entire value chain of the photovoltaic industry.

## **PHOTOVOLTAIC MODULE TEST SEGMENTS**

- Optical investigations
- Mechanical stress tests (wind, snow)
- Climate simulation (heat, humidity, frost)
- Salt mist
- Fire behaviour
- Corrosive gas testing
- Hail impact, transport impact
- Electrical safety (isolation, overload)
- Electrical properties (sun simulation, light soaking, UV)
- Weathering





SI-FEEDSTOCK	WAFER	SOLAR CELL	MODULE	SYSTEM
				
<b>Raw materials</b>	<b>Substrata</b>	<b>Aspects of the cell</b>	<b>Assembly of the module</b>	<b>System set-up</b>

- Impurities elemental analysis (N,C,O, metals)
- Dopants (B and P)
- Contaminations, resistivity, carrier lifetime
- World wide pre-shipment inspection
- Particle sizes

- Failure analysis (XRD, XPS, FTIR)
- Doping errors (SIMS)
- Bulk concentration and defects (O,C,N)
- Metal survey (GDMS)
- p/n junction depth cross section
- Profilometry, texturation, thickness, anti reflective coatings (SEM)
- Physical & chemical characterization of (multi-) layer thin films (CIGS, CdTe, a-Si,  $\mu$ -Si)
- Mechanical tests

- Characterization
- Spectral response
- Carrier lifetime
- I-V curves
- Electro- luminescence (micro cracks)
- Solder, stringer, surface control

- Accredited lab test of PV modules
- Product development (R&D)
- Certification
- Retests
- Pre-qualifications
- Failure & damage clarification
- Performance testing
- Bankability services

- PV testing (PV modules, controllers, inverters, batteries)
- Technical due diligence
- Project certification
- PV installation spot check
- PV visual inspection (array orientation, installation work, controller settings),
- PV field measurement (energy balance, power curve, temperatures, fault finding)
- Training and examination

# PHOTOVOLTAIC SYSTEM-SERVICES

## SGS SOLAR SYSTEM TESTING

The SGS Solar testing team is in constant coordination with all internal business segments within SGS. Acting as an interdisciplinary team, SGS can offer enhanced solar energy services.

We test your PV systems and components (PV modules, controllers, inverters, batteries) for efficiency and durability. Furthermore, we are well known for our spot check of installations and/or field measurements.

## TECHNICAL DUE DILIGENCE

The more emphasis on the economic profitability of the PV system, the more important it becomes that all details have been considered thoroughly during the planning stage, and that the components have proper quality, and that there will be careful follow-up on the operation.

The target group includes investors, business developers, insurance companies, consultants, banks, architects, owners of PV systems and authorities. SGS offers expertise within PV systems at a very high professional level.

Our Technical Due Diligence tests consist of an evaluation of new or existing off grid/on grid connected photovoltaic power plants containing:

- Design Basis – Review of Design Basis Documentation
- Evaluation of Performance and Physical Condition
- Site Inspection

The Technical Due Diligence will be concluded with a Technical Summary Report made by the independent assessor.



# CONNECT WITH **SGS**

We identify the applicable regulations and standards for your specific product and your target markets. SGS supports you reduce risk, improve efficiency and ensure compliance to contractual or regulatory requirements in all your manufacturing, sourcing, distribution and retailing operations.

## STAY UP TO DATE

As you consider your company's compliance challenges, let SGS support you to make the best decisions for your business.

To keep abreast of the developments reshaping your industry sector, subscribe to our free publications at: [www.sgs.com/subscribe](http://www.sgs.com/subscribe).



## CONTACT US

For further information, please contact your local SGS representative or email the global team at

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INSPECTION, VERIFICATION, TESTING  
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WHEN YOU NEED TO BE SURE

