



Source: Phoenix Solar

## Sun simulation and UV irradiation

equipment for testing according to  
IEC 61215 & IEC 61646

### System-Features

- modular design
- electronic power supplies
- operation via touch screen
- sun simulator class CCA  
up to BBA available

### Advantages

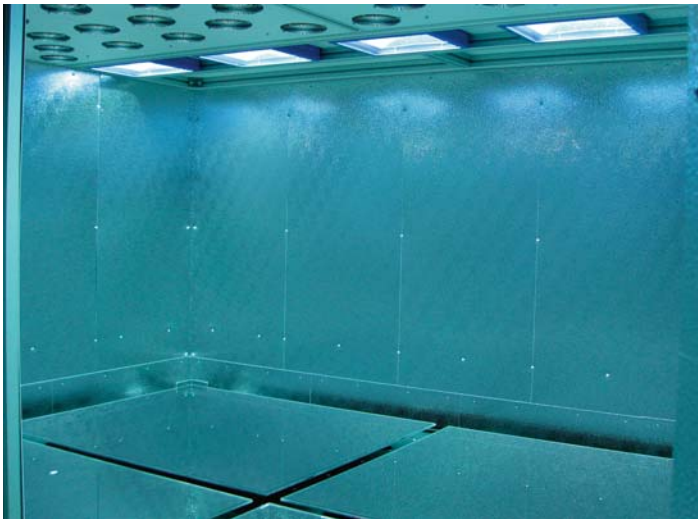
- long lamp service life
- easy to integrate
- only small amount of  
maintainance
- flexible irradiation  
chambers

## Sun Simulation and UV irradiation – Test Systems for Photovoltaic Modules

Nowadays photovoltaics (PV) plays an integral part in the development of renewable energy sources.

The PV research mainly focuses on the advancement of this promising technology and the improvement of its efficiency. The key elements of this technology are the PV-modules. They have to comply with very high requirements: PV-modules are expected to work perfectly for more than 20 years, at environment conditions that are permanently changing and often quite adverse. Therefore the PV-modules have to be tested under extreme conditions in order to ensure that they have the required quality.

The testing procedure also includes various qualification tests regarding the artificial load of the materials used for PV-modules. These tests are defined in the standards **IEC 61215** and **IEC 61646**. In the past few years a qualification certificate corresponding to these IEC-standards has become widely accepted and is now even a requirement for national and international funding programs.



Light soaking chamber

In response to these requirements the Dr. Höhle AG has developed irradiation systems based on **IEC 61215 / IEC 61646**, which can primarily be used for tests like light soaking, hotspot or UV-preconditioning.

### Höhle Sun Simulation Systems

Höhle sun simulation systems are manufactured tailor-made according to the customer's specifications. Höhle offers a great variety of systems in this sector, ranging from small laboratory test stands to large irradiation chambers. The sun simulation systems are all based on the well-established SOL units from Höhle.



SOL-Unit

The light spectrum of the SOL units is produced by gas discharge lamps containing metal halides. These radiation sources emit an almost continuous spectrum, which is close to that of natural sunlight. It is possible to use either a conventional choke ballast or the electronic power supply (EPS) produced by Höhle as power supply for the lamps. The EPS from Höhle offers several advantages, as for example its output power, which remains very stable even in case of supply voltage fluctuations. In addition, using the EPS allows precise intensity control and also increases the lamp life.

In combination with the electronic power supply all Höhle sun simulation systems meet the requirements of classification CCA up to BBA, if desired, as specified in **IEC 60904-9**. Sun simulation systems of Class CCC are of course also available on request.

The Höhle sun simulation systems are ideally suitable for **light soaking- and hotspot-tests**.

### Höhle UV irradiation Systems

The gas discharge lamps serve also as radiation sources for the Höhle UV irradiation systems. They are optimized to a high band of radiation of UVA and UVB. Through special filter systems the ratio between UVA and UVB can be varied in order to meet the different requirements for crystalline PV-modules and thin-film modules.

Höhle UV irradiation systems (UVASPOT units) are ideal for **UV preconditioning tests**.

## Technical data

Useable irradiation areas:

- Can be adapted to customer specifications
- Standard sizes: 1,1 m x 1,3 m – 2,2 m x 2,6 m
- Already realized sizes: 0,3 m x 0,3 m – 6,0 m x 4,0 m

Typical lamp service life:

- More than 2000 operating hours

Hönle sun simulation systems can meet the following standard:

- CCC to BBA (IEC 60904-9)

Intensities:

- Solar simulator: 700 – 1100 W/m<sup>2</sup>, if required also 200 W/m<sup>2</sup>
- UV-preconditioning equipment: up to 250 W/m<sup>2</sup> UVA + UVB (very short test cycles: after 2,5 days 15 kWh/m<sup>2</sup> are already reached, UV-Test IEC61215, IEC61646)



Irradiation chamber 2,2 m x 2,6 m

Adjustable PV module temperature during the irradiation:

- 40°C – 70 °C

**Hönle sun simulation systems can be easily modified to a UV Preconditioning systems.**

## Safety at work

- Hönle irradiation systems are light-proof constructions
- Irradiation chambers are available with shutter mechanism: During the PV modul change it's not necessary to switch of the lamps to protect the worker from the irradiation
- Irradiation chambers without shutter systems can only be opened when the lamps are switched off and in the open status it's not possible to switch on the lamps
- Integrated emergency stop, over heating protection



Irradiation chamber 1,1 m x 1,3 m

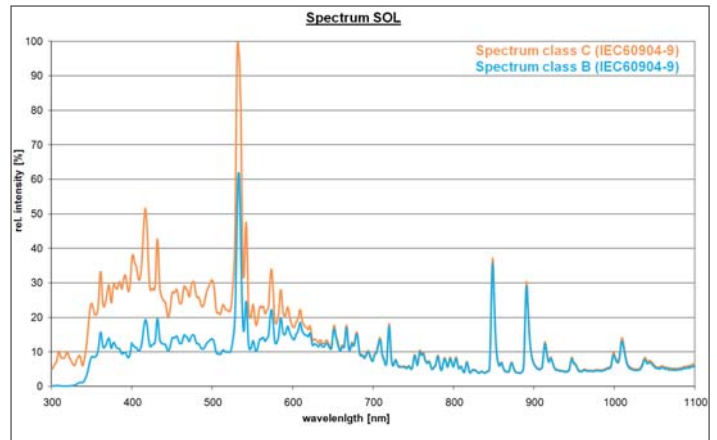
## Hönle and Photovoltaics – a Success Story

Hönle is a worldwide leading supplier for industrial UV-technology and has been very successful in the fields of sun simulation and UV-irradiation for many years now. Together with our customers we are continuously advancing our systems, in order to meet their requirements and to permanently improve our products.

Hönle is a reliable partner for the photovoltaics sector. And our know-how grows with its success. We are really looking forward to the future.



Sun simulation switch cabinet & touch screen operating panel



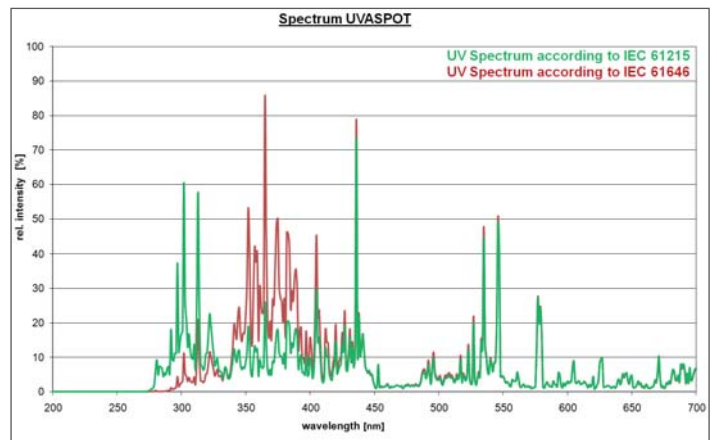
The irradiation of the SOL units generates a class C spectrum according to IEC60904-9. Class B can be achieved by using of appropriate filters.



### UVACUBE400

The UVACUBE 400 is an economical irradiation chamber for laboratory use (Irradiation area max. 400 x 300 mm) for sun simulation and UV irradiation tests for solar cells and small PV-modules.

The UVACUBE 400 has a manually operated shutter and meets the highest demands in operational safety and ease of handling.



For UV preconditioning tests the spectrum of our UVASPOT units can be adopted to the relevant requirements of IEC61215 and IEC61646 by the usage of different filters.

UVACUBE 400

<b>hönle group</b>		Curing	Drying	Bonding	Potting	Measuring



Dr. Höhle AG UV Technology, Lochhamer Schlag 1, 82166 Gräfelfing/München, Germany  
 Phone: +49 89 85608-0, Fax: +49 89 85608-148. [www.hoenle.de](http://www.hoenle.de)

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