

# Solar cells — Datasheet information and product data for crystalline silicon solar cells

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ICS 27.160

## National foreword

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**Solar cells -  
Datasheet information and product data  
for crystalline silicon solar cells**

Cellules solaires -  
Spécifications particulières et données  
de produit pour les cellules solaires en  
silicium cristallin

Solarzellen -  
Datenblattangaben und Angaben zum  
Produkt für kristalline Silizium-Solarzellen

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European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

**Central Secretariat: rue de Stassart 35, B - 1050 Brussels**

## Foreword

This European Standard was prepared by the Technical Committee CENELEC TC 82, Solar photovoltaic energy systems. The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 50461 on 2006-02-01.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2007-03-01
  - latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2009-02-01
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## **1 Scope**

This European Standard describes data sheet and product data information for crystalline silicon solar cells.

The intent of this standard is to provide minimum information required to configure safe and optimal photovoltaic modules.

In this context, data sheet information is a technical description separate from the photovoltaic module.

Product data information concerns the packaging, marking, storage and containing a commitment to inform about major changes on product and on process. These data are needed for further processing of solar cells to photovoltaic modules.

## **2 Normative references**

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 60068-2-44, Environmental testing - Part 2: Tests - Guidance on test T: Soldering (IEC 60068-2-44)

EN 60904-1, Photovoltaic devices - Part 1: Measurement of photovoltaic current-voltage characteristics (IEC 60904-1)

EN 60904-3, Photovoltaic devices - Part 3: Measurement principles for terrestrial photovoltaic (PV) solar devices with reference spectral irradiance data (IEC 60904-3)

EN 61189 series, Test methods for electrical materials, printed boards and other interconnection structures and assemblies (IEC 61189 series)

EN 61215, Crystalline silicon terrestrial photovoltaic (PV) modules - Design qualification and type approval (IEC 61215)

IEC 60326-2, Printed boards - Part 2: Test methods

DIN 6174, Colorimetric Evaluation of Colour Differences of Surface Colours According to the CIELAB Formula

## **3 Data sheet information**

### **3.1 Certificates**

All relevant certificates must be considered in the datasheet (i.e. certified material test report, certificate of conformance, certified electrical measuring record, certificate to quality management, etc.).

### 3.2 Applicable materials and their condition

Quotation of the materials which are used in crystalline solar cells:

- wafer specification (standard in work);
- colour (indication of number of colour according to DIN 6174 or a similar specimen);
- indication of basic material of the surface: antireflective coating, metallization (front- and backside).

Adhesive strength examination of all surfaces with the tape test according to IEC 60326-2, test 13a, (for example tape 3M 810) which is specified as follows: removable tape with adhesion force of 2 N/cm to 4 N/cm. Afterwards optical test with human eye. No debonding layer on solar cell identifiable.

### 3.3 Process characteristic

#### 3.3.1 Solder connection

Inspection of solderability according to EN 60068-2-44.

Adhesive strength of solder connection according to EN 61189-2 Test 2M05. As an alternative to the test equipment described in the standard another suitable construction may be used.

Minimum peel strength 1 N per mm solder tab width.

Soldering conditions: The manufacturer should give details to suitable solder conditions (solder, temperature, solder time, etc.).

#### 3.3.2 Breaking strength (in work)

### 3.4 Size

Size: the dimensions are nominal values with measuring tolerances in mm.

Surface: declaration in mm<sup>2</sup>.

Thickness: the dimensions are nominal values with measuring tolerances in μm.

Busbar-width: the dimensions are nominal values with measuring tolerances in mm. Front- and backside.

NOTE All measurements at 25 °C ± 2 °C.

A complete dimensioned technical drawing with all measuring tolerances shall be added.

### 3.5 Electrical characteristics

Values shall be specified for following parameters: 1 000 W/m<sup>2</sup>, 800 W/m<sup>2</sup> and 200 W/m<sup>2</sup> (25 ± 2) °C, AM 1.5 in accordance with EN 60904-3:

- Fill factor quantities in % with measuring tolerances in %
- $V_{OC}$  quantities in V with measuring tolerances in %
- $I_{SC}$  quantities in A with measuring tolerances in %
- $V_{MPP}$  quantities in V with measuring tolerances in %
- $I_{MPP}$  quantities in A with measuring tolerances in %
- Power at  $V_{MPP}$  quantities in W with measuring tolerances in %
- Efficiency at MPP quantities in % with measuring tolerances in %

NOTE All measurements according to EN 60904-1.

All solar cells shall be measured at STC and sorted corresponding to the classification in power classes or current rates.

### **3.6 Thermal characteristics**

The temperature coefficient of short circuit current ( $\alpha$ ) in [mA/K], the temperature coefficient of open circuit voltage ( $\beta$ ) in [mV/K], and the temperature coefficient of  $P_{\max}$  ( $\delta$ ) in [W/K], shall be given.

NOTE All measurements according to EN 61215. Relative temperature coefficients expressed as percentages can be determined by dividing the calculated  $\alpha$ ,  $\beta$ , and  $\delta$  by the values of current, voltage and peak power at a selected temperature.

## **4 Packaging, marking and storage**

### **4.1 Packaging**

- Packing unit
- Kind of packaging

### **4.2 Marking**

The smallest package unit should be accompanied by the following information:

- type designation;
- lot numbering;
- quantity.

### **4.3 Storage**

- Data to stack ability
- Ambient conditions
- Maximal storage time

## **5 Major changes of product and of processes**

Commitment to inform about changes as defined in EN 61215.

## **Bibliography**

EN 50380:2003, Datasheet and nameplate information for photovoltaic modules

EN 60891:1994, Procedures for temperature and irradiance corrections to measured I-V characteristics of crystalline silicon photovoltaic devices (IEC 60891:1987 + A1:1992)

EN 60904-2:1993 + A1:1998, Photovoltaic devices – Part 2: Requirements for reference solar cells (IEC 60904-2:1989 + A1:1998)

EN 60904-6:1994 + A1:1998, Photovoltaic devices – Part 6: Requirements for reference solar modules (IEC 60904-6:1994 + A1:1998)

EN 60904-7:1998, Photovoltaic devices – Part 7: Computation of spectral mismatch error introduced in the testing of a photovoltaic device (IEC 60904-7:1998)

EN 60904-8:1998; Photovoltaic devices – Part 8: Measurement of spectral response of a photovoltaic (PV) device (IEC 60904-8:1998)

IEC 60904-9:1995, Photovoltaic Devices — Part 9: Solar simulator performance requirements

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