



**NSAI**  
Standards

Standard Recommendation  
S.R. CLC/TS 61836:2009

# Solar photovoltaic energy systems - Terms, definitions and symbols (IEC/TS 61836:2007 (EQV))

## S.R. CLC/TS 61836:2009

*Incorporating amendments/corrigenda issued since publication:*

<i>This document replaces:</i>	<i>This document is based on:</i> CLC/TS 61836:2009	<i>Published:</i> 7 May, 2009	
This document was published under the authority of the NSAI and comes into effect on: 12 August, 2009		ICS number: 27.160	
<b>NSAI</b> 1 Swift Square, Northwood, Santry Dublin 9	T +353 1 807 3800 F +353 1 807 3838 E standards@nsai.ie W <b>NSAI.ie</b>	<b>Sales:</b> T +353 1 857 6730 F +353 1 857 6729 W standards.ie	<b>Price Code:</b> W
Údarás um Chaighdeáin Náisiúnta na hÉireann			

TECHNICAL SPECIFICATION  
SPÉCIFICATION TECHNIQUE  
TECHNISCHE SPEZIFIKATION

**CLC/TS 61836**

May 2009

---

ICS 27.160

English version

**Solar photovoltaic energy systems -  
Terms, definitions and symbols  
(IEC/TS 61836:2007)**

Systèmes de conversion photovoltaïque  
de l'énergie solaire -  
Termes, définitions et symboles  
(CEI/TS 61836:2007)

Photovoltaische Solarenergiesysteme -  
Begriffe, Definitionen und Symbole  
(IEC/TS 61836:2007)

This Technical Specification was approved by CENELEC on 2009-01-23.

CENELEC members are required to announce the existence of this TS in the same way as for an EN and to make the TS available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

**CENELEC**

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

**Central Secretariat: avenue Marnix 17, B - 1000 Brussels**

---

## Foreword

The text of the Technical Specification IEC/TS 61836:2007, prepared by IEC TC 82, Solar photovoltaic energy systems was submitted to the vote in accordance with the Internal Regulations, Part 2, Subclause 11.3.3.3 and was approved by CENELEC as CLC/TS 61836 on 2009-01-23.

The following date was fixed:

- latest date by which the existence of the CLC/TS  
has to be announced at national level (doa) 2009-07-23

Annex ZA has been added by CENELEC.

---

### Endorsement notice

The text of the Technical Specification IEC/TS 61836:2007 was approved by CENELEC as a Technical Specification without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60891 + A1	NOTE	Harmonized as EN 60891:1994 (not modified).
IEC 60904-1	NOTE	Harmonized as EN 60904-1:2006 (not modified).
IEC 60904-2	NOTE	Harmonized as EN 60904-2:2007 (not modified).
IEC 60904-5	NOTE	Harmonized as EN 60904-5:1995 (not modified).
IEC 60904-7	NOTE	Harmonized as EN 60904-7:1998, which is superseded by EN 60904-7:2009 based on IEC 60904-7:2008 (not modified).
IEC 60904-8	NOTE	Harmonized as EN 60904-8:1998 (not modified).
IEC 60904-9	NOTE	IEC 60904-9:1995 is superseded by IEC 60904-9:2007, which is harmonized as EN 60904-9:2007 (not modified).
IEC 60904-10	NOTE	Harmonized as EN 60904-10:1998 (not modified).
IEC 61215	NOTE	Harmonized as EN 61215:2005 (not modified).
IEC 61646	NOTE	Harmonized as EN 61646:1997, which is superseded by EN 61646:2008 based on IEC 61646:2008 (not modified).
IEC 61730-1	NOTE	Harmonized as EN 61730-1:2007 (modified).
IEC 61730-2	NOTE	Harmonized as EN 61730-2:2007 (modified).
IEC 61683	NOTE	Harmonized as EN 61683:2000 (not modified).
IEC 61702	NOTE	Harmonized as EN 61702:1999 (not modified).
IEC 61725	NOTE	Harmonized as EN 61725:1997 (not modified).
IEC 62093	NOTE	Harmonized as EN 62093:2005 (not modified).
IEC 61173	NOTE	Harmonized as EN 61173:1994 (not modified).
IEC 61194	NOTE	Harmonized as EN 61194:1995 (modified).
IEC 61277	NOTE	Harmonized as EN 61277:1998 (not modified).
IEC 61724	NOTE	Harmonized as EN 61724:1998 (not modified).
IEC 62124	NOTE	Harmonized as EN 62124:2005 (not modified).
IEC 61345	NOTE	Harmonized as EN 61345:1998 (not modified).
IEC 61701	NOTE	Harmonized as EN 61701:1999 (not modified).
IEC 61721	NOTE	Harmonized as EN 61721:1999 (not modified).
IEC 62108	NOTE	Harmonized as EN 62108:2008 (not modified).

---

**Annex ZA**  
(normative)**Normative references to international publications  
with their corresponding European publications**

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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60904-3	1989	Photovoltaic devices - Part 3: Measurement principles for terrestrial photovoltaic (PV) solar devices with reference spectral irradiance data	EN 60904-3 <sup>1)</sup>	1993

---

<sup>1)</sup> EN 60904-3 is superseded by EN 60904-3:2008, which is based on IEC 60904-3:2008.



# TECHNICAL SPECIFICATION

---

## Solar photovoltaic energy systems – Terms, definitions and symbols





## **THIS PUBLICATION IS COPYRIGHT PROTECTED**

**Copyright © 2007 IEC, Geneva, Switzerland**

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester.

If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Central Office  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland  
Email: [inmail@iec.ch](mailto:inmail@iec.ch)  
Web: [www.iec.ch](http://www.iec.ch)

### **About the IEC**

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

### **About IEC publications**

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

- Catalogue of IEC publications: [www.iec.ch/searchpub](http://www.iec.ch/searchpub)

The IEC on-line Catalogue enables you to search by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, withdrawn and replaced publications.

- IEC Just Published: [www.iec.ch/online\\_news/justpub](http://www.iec.ch/online_news/justpub)

Stay up to date on all new IEC publications. Just Published details twice a month all new publications released. Available on-line and also by email.

- Electropedia: [www.electropedia.org](http://www.electropedia.org)

The world's leading online dictionary of electronic and electrical terms containing more than 20 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary online.

- Customer Service Centre: [www.iec.ch/webstore/custserv](http://www.iec.ch/webstore/custserv)

If you wish to give us your feedback on this publication or need further assistance, please visit the Customer Service Centre FAQ or contact us:

Email: [csc@iec.ch](mailto:csc@iec.ch)  
Tel.: +41 22 919 02 11  
Fax: +41 22 919 03 00





# TECHNICAL SPECIFICATION

---

## Solar photovoltaic energy systems – Terms, definitions and symbols

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

PRICE CODE **XC**

## CONTENTS

FOREWORD.....	3
INTRODUCTION.....	5
1 Scope and object.....	6
2 Normative references .....	6
3 Glossary of terms and symbols for solar photovoltaic energy systems .....	6
3.1 Solar photovoltaic cells and modules.....	6
3.2 Solar photovoltaic systems components .....	16
3.3 Solar photovoltaic systems .....	21
3.4 Solar photovoltaic system and component performance parameters .....	32
3.5 Measurement devices.....	50
3.6 Environmental parameters.....	51
3.7 Quality and testing .....	59
3.8 Concentrator photovoltaics .....	64
3.9 Project management .....	66
3.10 Miscellaneous .....	67
4 Acronyms and abbreviations.....	67
Bibliography.....	70
Index of terms and symbols .....	72

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

---

### **SOLAR PHOTOVOLTAIC ENERGY SYSTEMS – TERMS, DEFINITIONS AND SYMBOLS**

#### FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

The main task of IEC technical committees is to prepare International Standards. In exceptional circumstances, a technical committee may propose the publication of a technical specification when

- the required support cannot be obtained for the publication of an International Standard, despite repeated efforts, or
- The subject is still under technical development or where, for any other reason, there is the future but no immediate possibility of an agreement on an International Standard.

Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC 61836, which is a technical specification, has been prepared IEC technical committee 82: Solar photovoltaic energy systems.

This second edition cancels and replaces the first edition published in 1997. This edition constitutes a technical revision.

This edition included the following significant technical changes with respect to the previous edition:

- 1) The number of terms has increased. Abbreviations have been included.
- 2) The terms in Edition 2 are organised into categories and families. Terms contained in families are cross referenced with an alphabetical listing. A bibliography and an index were added. The purpose of aggregating terms into families is to allow readers to easily see the relationships between terms that speak of similar quantities and subjects but that have slight variations.

The text of this technical specification is based on the following documents:

Enquiry draft	Report on voting
82/442/DTS	82/487/RVC

Full information on the voting for the approval of this technical specification can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- transformed into an International standard,
- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual edition of this document may be issued at a later date.

## INTRODUCTION

Following the development of solar photovoltaic (PV) technology, specific Standards have been prepared by IEC Technical Committee 82 since 1987. The terms and symbols used in the PV industry necessitate a systematisation in order to have a consolidated glossary for experts' common understanding.

This Glossary lists the terms and symbols that the PV industry commonly uses. It is a living document that will change as new terms and symbols are added. These have been harmonized with IEC 60050 and other IEC documents as far as possible. All definitions not included in this Technical Specification may be found elsewhere in other IEC documents.

NOTE 1 The terms "PV", "photovoltaic" and "solar photovoltaic" can be read and used interchangeably and without the need for stating each term to show that each are applicable and commonly used by the solar photovoltaic industry.

NOTE 2 All terms beginning with "solar photovoltaic" and "PV" are listed under their respective "photovoltaic" names.

NOTE 3 The terms are listed alphabetically in ten categories. Under these categories, some of the terms have been grouped into families of related meaning in order for the reader to readily see the differences between the terms.

NOTE 4 This Glossary lists the precise usage of terms. Cross-references are provided to efficiently point the reader to the location of definitions. For example, a "solar photovoltaic array" may also be referred to as "photovoltaic array" or "array" when the reference to it is particularly clear. The definition for this term, for example, occurs under the family heading of "photovoltaic" in the "Solar photovoltaic systems" section.

NOTE 5 The colloquial use of "solar" as the sole adjective of a noun is discouraged. For example, though "solar array" may be commonly used in non-technical conversations, the precise terms are "solar photovoltaic array", "photovoltaic array", and "array".

NOTE 6 Unless specifically noted otherwise, the terms "device", "cell", "module", "array", "sub-array", "field", "component", "system", and "product" refer to items incorporating a photovoltaic device. As a result, each of these terms can be understood to read as "PV device", "PV cell", "PV module", *etc.*, without having to re-state the term "PV" each time, though now and then it is useful to re-state "PV".

NOTE 7 The numeric quantities described by many of the terms can be expressed over any convenient unit of time that the user may wish, such as day, month or year.

NOTE 8 " $W_p$ " is not a recommended unit for rated power. For example for a 50 W module, the correct terminology is "the rated power is 50 W", and not "the power is 50  $W_p$ ".

NOTE 9 The documents from which these terms originated are shown in square brackets [ ]. Some adaptations may have occurred.

NOTE 10 This Glossary document recognises the related IEC co-ordinating Technical Committees:

1	Terminology	77	Electromagnetic compatibility
21	Secondary cells and batteries	82	Solar photovoltaic energy systems
22	Power electronic systems and equipment	88	Wind turbines
47	Semiconductor devices	105	Fuel cell technologies
64	Electrical installations and protection against electric shock	106	Methods for the assessment of electric, magnetic and electromagnetic fields associated with human exposure

## **SOLAR PHOTOVOLTAIC ENERGY SYSTEMS – TERMS, DEFINITIONS AND SYMBOLS**

### **1 Scope and object**

This Technical Specification deals with the terms and symbols from national and international solar photovoltaic standards and relevant documents used within the field of solar photovoltaic (PV) energy systems. It includes the terms and symbols compiled from the published IEC technical committee 82 standards, previously published as technical report IEC 61836:1997.

The focus of this Technical Specification is "what do the words mean" and not "under what conditions do the terms apply".

### **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.

IEC 60904-3:1989, *Photovoltaic devices – Part 3: Measurement principles for terrestrial photovoltaic (PV) solar devices with reference spectral irradiance data*

### **3 Glossary of terms, definitions and symbols for solar photovoltaic energy systems**

#### **3.1 Solar photovoltaic cells and modules**

This subclause addresses vocabulary pertaining to photovoltaic materials, photovoltaic cells and photovoltaic modules. Other photovoltaic components are described in subclause 3.2. Photovoltaic systems are described in subclause 3.3.

##### **3.1.1 amorphous photovoltaic material**

solid-state material in a semi-stable condition with no long-range order in the structural arrangement of the atoms

##### **3.1.2 amorphous silicon**

see "silicon/amorphous", 3.1.58a).

##### **3.1.3 anti-reflective coating**

layer formed on the surface of a PV cell to reduce reflective loss

##### **3.1.4 back surface field effect**

see "effect/back surface field effect", 3.1.25a)

##### **3.1.5 band gap energy**

(Unit: eV)

This is a free preview. Purchase the entire publication at the link below:

[Product Page](#)

- 
- [Looking for additional Standards? Visit Intertek Inform Infostore](#)
  - [Learn about LexConnect, All Jurisdictions, Standards referenced in Australian legislation](#)
-