

Photovoltaic devices - Part 2: Requirements for reference solar cells

Photovoltaic devices -- Part 2: Requirements for
reference solar devices

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN 60904-2:2007 sisaldab Euroopa standardi EN 60904-2:2007 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 13.09.2007 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN 60904-2:2007 consists of the English text of the European standard EN 60904-2:2007.</p> <p>This document is endorsed on 13.09.2007 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
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<p>Käsitlusala:</p> <p>This part of IEC 60904 gives requirements for the classification, selection, packaging, marking, calibration and care of reference solar devices. This standard covers solar reference devices used to determine the electrical performance of solar cells, modules and arrays under natural and simulated sunlight. It does not cover solar reference devices for use under concentrated sunlight.</p>	<p>Scope:</p> <p>This part of IEC 60904 gives requirements for the classification, selection, packaging, marking, calibration and care of reference solar devices. This standard covers solar reference devices used to determine the electrical performance of solar cells, modules and arrays under natural and simulated sunlight. It does not cover solar reference devices for use under concentrated sunlight.</p>
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ICS 27.160

Võtmesõnad: photovoltaic devices, primary cell, reference cell, requirements, secondary cell, solar cells

**Photovoltaic devices -
Part 2: Requirements for reference solar devices
(IEC 60904-2:2007)**

Dispositifs photovoltaïques -
Partie 2: Exigences relatives aux
dispositifs solaires de référence
(CEI 60904-2:2007)

Photovoltaische Einrichtungen -
Teil 2: Anforderungen an
Referenz-Solarelemente
(IEC 60904-2:2007)

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CENELEC

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

The text of document 82/425/CDV, future edition 2 of IEC 60904-2, prepared by IEC TC 82, Solar photovoltaic energy systems, was submitted to the IEC-CENELEC parallel Unique Acceptance Procedure and was approved by CENELEC as EN 60904-2 on 2007-05-01.

EN 60904-2:2007 supersedes EN 60904-2:1993 + A1:1998 and EN 60904-6:1994 + A1:1998.

The main technical changes with regard to EN 60904-2:1993 are as follows:

- added subclause on “Calibration traceability”;
- added subclause on “Construction” to differentiate the various types of reference devices;
- added guidance on use of a built-in shunt resistor;
- increased data sheet requirements. In particular added requirement for either a mismatch correction or an estimate of uncertainty due to the mismatch of the reference device;
- added Clause on “Calibration of working solar reference devices”.

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) | 2008-02-01 |
| – latest date by which the national standards conflicting with the EN have to be withdrawn | (dow) | 2010-05-01 |

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60904-2:2007 was approved by CENELEC as a European Standard without any modification.

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 60891	- ¹⁾	Procedures for temperature and irradiance corrections to measured I-V characteristics of crystalline silicon photovoltaic devices	EN 60891	1994 ²⁾
IEC 60904-1	- ¹⁾	Photovoltaic devices - Part 1: Measurement of photovoltaic current-voltage characteristics	EN 60904-1	2006 ²⁾
IEC 60904-5	- ¹⁾	Photovoltaic devices - Part 5: Determination of the equivalent cell temperature (ECT) of photovoltaic (PV) devices by the open-circuit voltage method	EN 60904-5	1995 ²⁾
IEC 60904-7	- ¹⁾	Photovoltaic devices - Part 7: Computation of spectral mismatch error introduced in the testing of a photovoltaic device	EN 60904-7	1998 ²⁾
IEC 60904-8	- ¹⁾	Photovoltaic devices - Part 8: Measurement of spectral response of a photovoltaic (PV) device	EN 60904-8	1998 ²⁾
IEC 60904-9	- ¹⁾	Photovoltaic devices - Part 9: Solar simulator performance requirements	-	-
IEC 60904-10	- ¹⁾	Photovoltaic devices - Part 10: Methods of linearity measurement	EN 60904-10	1998 ²⁾
IEC 61215	- ¹⁾	Crystalline silicon terrestrial photovoltaic (PV) modules - Design qualification and type approval	EN 61215	2005 ²⁾
IEC 61646	- ¹⁾	Thin-film terrestrial photovoltaic (PV) modules - Design qualification and type approval	EN 61646	1997 ²⁾

¹⁾ Undated reference.

²⁾ Valid edition at date of issue.

INTERNATIONAL STANDARD

IEC
60904-2

Second edition
2007-03

Photovoltaic devices –

Part 2:
Requirements for reference solar devices

*This **English-language** version is derived from the original **bilingual** publication by leaving out all French-language pages. Missing page numbers correspond to the French-language pages.*



Reference number
IEC 60904-2:2007(E)

Publication numbering

As from 1 January 1997 all IEC publications are issued with a designation in the 60000 series. For example, IEC 34-1 is now referred to as IEC 60034-1.

Consolidated editions

The IEC is now publishing consolidated versions of its publications. For example, edition numbers 1.0, 1.1 and 1.2 refer, respectively, to the base publication, the base publication incorporating amendment 1 and the base publication incorporating amendments 1 and 2.

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60904-2

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Commission Electrotechnique Internationale
International Electrotechnical Commission
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PRICE CODE

M

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

PHOTOVOLTAIC DEVICES –

Part 2: Requirements for reference solar devices

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.
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International Standard IEC 60904-2 has been prepared by IEC Technical Committee 82: Solar photovoltaic energy systems.

This second edition cancels and replaces IEC 60904-2 (1989), its Amendment 1 (1998) and IEC 60904-6 (1994) and its Amendment 1 (1998). It constitutes a technical revision.

The main technical changes with regard to the previous edition are as follows:

- Added subclause on "Calibration traceability".
- Added subclause on "Construction" to differentiate the various types of reference devices.
- Added guidance on use of a built-in shunt resistor.

- Increased data sheet requirements. In particular added requirement for either a mismatch correction or an estimate of uncertainty due to the mismatch of the reference device.
- Added Clause on “Calibration of working solar reference devices”.

The text of this standard is based on the following documents:

CDV	Report on voting
82/425/CDV	82/465/RVC

Full information on the voting for the approval of this standard 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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

PHOTOVOLTAIC DEVICES –

Part 2: Requirements for reference solar devices

1 Scope and object

This part of IEC 60904 gives requirements for the classification, selection, packaging, marking, calibration and care of reference solar devices.

This standard covers solar reference devices used to determine the electrical performance of solar cells, modules and arrays under natural and simulated sunlight. It does not cover solar reference devices for use under concentrated sunlight.

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 60891, *Procedures for temperature and irradiance corrections to measured I-V characteristics of crystalline silicon photovoltaic devices*

IEC 60904-1, *Photovoltaic devices – Part 1: Measurements of photovoltaic current-voltage characteristics*

IEC 60904-5, *Photovoltaic devices – Part 5: Determination of the equivalent cell temperature (ECT) of photovoltaic (PV) devices by the open-circuit voltage method*

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

IEC 60904-8, *Photovoltaic devices – Part 8: Measurement of spectral response of a photovoltaic (PV) device*

IEC 60904-9, *Photovoltaic devices – Part 9: Solar simulator performance requirements*

IEC 60904-10, *Photovoltaic devices – Part 10: Methods of linearity measurement*

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

IEC 61646, *Thin-film terrestrial photovoltaic (PV) modules – Design qualification and type approval*