

Photovoltaic devices -- Part 9: Solar simulator performance requirements

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EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN 60904-9:2007 sisaldab Euroopa standardi EN 60904-9:2007 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 17.12.2007 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN 60904-9:2007 consists of the English text of the European standard EN 60904-9:2007.</p> <p>This document is endorsed on 17.12.2007 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>IEC standards for photovoltaic devices require the use of specific classes of solar simulators deemed appropriate for specific tests. Solar simulators can be either used for performance measurements of PV devices or endurance irradiation tests. This part of IEC 60904 provides the definitions of and means for determining simulator classifications. In the case of PV performance measurements, using a solar simulator of high class does not eliminate the need to quantify the influence of the simulator on the measurement by making spectral mismatch corrections and analyzing the influences of uniformity of irradiance of the test plane and temporal stability on that measurement. Test reports for devices tested with the simulator shall list the class of simulator used for the measurement and the method used to quantify the simulator's effect on the results. The purpose of this standard is to define classifications of solar simulators for use in indoor measurements of terrestrial photovoltaic devices, solar simulators are classified as A, B or C for each of the three categories based on criteria of spectral distribution match, irradiance non-uniformity on the test plane and temporal instability. This standard provides the required methodologies for determining the rating achieved by a solar simulator in each of the categories.</p>	<p>Scope:</p> <p>IEC standards for photovoltaic devices require the use of specific classes of solar simulators deemed appropriate for specific tests. Solar simulators can be either used for performance measurements of PV devices or endurance irradiation tests. This part of IEC 60904 provides the definitions of and means for determining simulator classifications. In the case of PV performance measurements, using a solar simulator of high class does not eliminate the need to quantify the influence of the simulator on the measurement by making spectral mismatch corrections and analyzing the influences of uniformity of irradiance of the test plane and temporal stability on that measurement. Test reports for devices tested with the simulator shall list the class of simulator used for the measurement and the method used to quantify the simulator's effect on the results. The purpose of this standard is to define classifications of solar simulators for use in indoor measurements of terrestrial photovoltaic devices, solar simulators are classified as A, B or C for each of the three categories based on criteria of spectral distribution match, irradiance non-uniformity on the test plane and temporal instability. This standard provides the required methodologies for determining the rating achieved by a solar simulator in each of the categories.</p>
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**Photovoltaic devices -
Part 9: Solar simulator performance requirements
(IEC 60904-9:2007)**

Dispositifs photovoltaïques -
Partie 9: Exigences pour le
fonctionnement des simulateurs solaires
(CEI 60904-9:2007)

Photovoltaische Einrichtungen -
Teil 9: Leistungsanforderungen
an Sonnensimulatoren
(IEC 60904-9:2007)

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Foreword

The text of document 82/488/FDIS, future edition 2 of IEC 60904-9, prepared by IEC TC 82, Solar photovoltaic energy systems, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60904-9 on 2007-11-01.

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) 2008-08-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2010-11-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60904-9:2007 was approved by CENELEC as a European Standard without any modification.

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

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 60904-7	NOTE Harmonized as EN 60904-7:1998 (not modified).
IEC 60904-8	NOTE Harmonized as EN 60904-8:1998 (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 (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	- ¹⁾	Photovoltaic devices - Part 3: Measurement principles for terrestrial photovoltaic (PV) solar devices with reference spectral irradiance data	EN 60904-3	1993 ²⁾

¹⁾ Undated reference.

²⁾ Valid edition at date of issue.

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Photovoltaic devices –
Part 9: Solar simulator performance requirements**

**Dispositifs photovoltaïques –
Partie 9: Exigences pour le fonctionnement des simulateurs solaires**



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

PHOTOVOLTAIC DEVICES –

Part 9: Solar simulator performance requirements

FOREWORD

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International Standard IEC 60904-9 has been prepared by IEC technical committee 82: Solar photovoltaic energy systems.

This second edition cancels and replaces the first edition issued in 1995. It constitutes a technical revision.

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

- Added "Terms and definitions" clause
- Redefinition of solar simulator classification
- Added procedures for the measurement of classification parameters: Spectral match, temporal instability, non-uniformity of irradiance
- Provided details and guidance to address technology specific measurement effects

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

FDIS	Report on voting
82/488/FDIS	82/498/RVD

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.

A list of all parts of the IEC 60904 series, under the general title *Photovoltaic devices*, can be found on the IEC web site.

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

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PHOTOVOLTAIC DEVICES –

Part 9: Solar simulator performance requirements

1 Scope and object

IEC standards for photovoltaic devices require the use of specific classes of solar simulators deemed appropriate for specific tests. Solar simulators can be either used for performance measurements of PV devices or endurance irradiation tests. This part of IEC 60904 provides the definitions of and means for determining simulator classifications. In the case of PV performance measurements, using a solar simulator of high class does not eliminate the need to quantify the influence of the simulator on the measurement by making spectral mismatch corrections and analyzing the influences of uniformity of irradiance of the test plane and temporal stability on that measurement. Test reports for devices tested with the simulator shall list the class of simulator used for the measurement and the method used to quantify the simulator's effect on the results.

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This standard is referred to by other IEC standards in which class requirements are laid down for the use of solar simulators. Solar simulators for irradiance exposure should at least fulfil class CCC requirements where the third letter is related to long term instability. In the case of use for PV performance measurements, classification CBA is demanded where the third letter is related to the short term instability.

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

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1 solar simulator

A solar simulator can be used for two different applications:

- a) I-V measurement.
- b) Irradiance exposure.

The equipment is used to simulate the solar irradiance and spectrum. Simulators usually consist of three main components: (1) light source(s) and associated power supply; (2) any optics and filters required to modify the output beam to meet the classification requirements;