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Standards

Irish Standard
I.S. EN 60891:2010

Photovoltaic devices - Procedures for temperature and irradiance corrections to measured I-V characteristics (IEC 60891:2009 (EQV))

I.S. EN 60891:2010

Incorporating amendments/corrigenda issued since publication:

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English version

**Photovoltaic devices -
Procedures for temperature and irradiance corrections
to measured I-V characteristics
(IEC 60891:2009)**

Dispositifs photovoltaïques -
Procédures pour les corrections
en fonction de la température
et de l'éclairement à appliquer
aux caractéristiques I-V mesurées
(CEI 60891:2009)

Verfahren zur Umrechnung
von gemessenen Strom-Spannungs-
Kennlinien von photovoltaischen
Bauelementen auf andere Temperaturen
und Bestrahlungsstärken
(IEC 60891:2009)

This European Standard was approved by CENELEC on 2010-03-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

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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 document 82/581/FDIS, future edition 2 of IEC 60891, prepared by IEC TC 82, Solar photovoltaic energy systems, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60891 on 2010-03-01.

This European Standard supersedes EN 60891:1994.

The main technical changes with regard to the EN 60891:1994 are as follows:

- extends existing translation procedure to irradiance change during I-V measurement;
- adds 2 new translation procedures;
- revises procedure for determination of temperature coefficients to include PV modules;
- defines new procedure for determination of internal series resistance;
- defines new procedure for determination of curve correction factor.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN and CENELEC shall not be held responsible for identifying any or all such patent rights.

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) 2010-12-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2013-03-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60891:2009 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

IEC 60904-5 NOTE Harmonized as EN 60904-5.

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 60904-1 | - | Photovoltaic devices - Part 1: Measurement of photovoltaic current-voltage characteristics | EN 60904-1 | - |
| IEC 60904-2 | - | Photovoltaic devices - Part 2: Requirements for reference solar devices | EN 60904-2 | - |
| IEC 60904-7 | - | Photovoltaic devices - Part 7: Computation of the spectral mismatch correction for measurements of photovoltaic devices | EN 60904-7 | - |
| IEC 60904-9 | - | Photovoltaic devices - Part 9: Solar simulator performance requirements | EN 60904-9 | - |
| IEC 60904-10 | - | Photovoltaic devices - Part 10: Methods of linearity measurement | EN 60904-10 | - |

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

PHOTOVOLTAIC DEVICES – PROCEDURES FOR TEMPERATURE AND IRRADIANCE CORRECTIONS TO MEASURED I-V CHARACTERISTICS

FOREWORD

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International Standard IEC 60891 has been prepared by IEC technical committee 82: Solar photovoltaic energy systems.

This second edition cancels and replaces the first edition issued in 1987 and its Amendment 1 (1992) and constitutes a technical revision.

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

- extends edition 1 translation procedure to irradiance change during I-V measurement;
- adds 2 new translation procedures;
- revises procedure for determination of temperature coefficients to include PV modules;
- defines new procedure for determination of internal series resistance;
- defines new procedure for determination of curve correction factor.

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

| | |
|-------------|------------------|
| FDIS | Report on voting |
| 82/581/FDIS | 82/588/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.

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 – PROCEDURES FOR TEMPERATURE AND IRRADIANCE CORRECTIONS TO MEASURED I-V CHARACTERISTICS

1 Scope

This standard defines procedures to be followed for temperature and irradiance corrections to the measured I-V (current-voltage) characteristics of photovoltaic devices. It also defines the procedures used to determine factors relevant for these corrections. Requirements for I-V measurement of photovoltaic devices are laid down in IEC 60904-1.

NOTE 1 The photovoltaic devices include a single solar cell with or without a protective cover, a sub-assembly of solar cells, or a module. A different set of relevant parameters for I-V correction applies for each type of device. Although the determination of temperature coefficients for a module (or sub-assembly of cells) may be calculated from single cell measurements, it should be noted that the internal series resistance and curve correction factor should be separately measured for a module or subassembly of cells.

NOTE 2 The term “test specimen” is used to denote any of these devices.

NOTE 3 Care should be taken regarding the use of I-V correction parameters. The parameters are valid for the PV device for which they have been measured. Variations may occur within a production lot or the type class.

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

IEC 60904-2, *Photovoltaic devices – Part 2: Requirements for reference solar devices*

IEC 60904-7, *Photovoltaic devices – Part 7: Computation of the spectral mismatch correction for measurements of photovoltaic devices*

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

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

3 Correction procedures

3.1 General

Three procedures for correcting measured current-voltage characteristics to other conditions of temperature and irradiance (such as STC) can be applied. The first is identical to the procedure given in Edition 1 of this standard, but the equation has been rewritten for easier understanding. The second procedure is an alternative algebraic correction method which yields better results for large irradiance corrections (>20 %). Both procedures require that correction parameters of the PV device are known. If not known they need to be determined prior to performing the correction. The third procedure is an interpolation method which does not require correction parameters as input: It can be applied when a minimum of three current-voltage curves have been measured for the test device. These three current-voltage curves span the temperature and irradiance range for which the correction method is applicable.

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