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Solcellsanläggningar – Konstruktions- och typgodkännande av solcellsmoduler – Del 1: Proving

*Terrestrial photovoltaic (PV) modules –
Design qualification and type approval –
Part 1: Test requirements*

Som svensk standard gäller europastandarden EN 61215-1:2016. Den svenska standarden innehåller den officiella engelska språkversionen av EN 61215-1:2016.

Nationellt förord

Europastandarden EN 61215-1:2016

består av:

- **europastandardens ikraftsättningsdokument**, utarbetat inom CENELEC
- **IEC 61215-1, First edition, 2016 - Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1: Test requirements**

utarbetad inom International Electrotechnical Commission, IEC.

Tidigare fastställd svensk standard SS-EN 61215, utgåva 2, 2005, gäller ej fr o m 2019-12-09.

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English Version

**Terrestrial photovoltaic (PV) modules - Design qualification and
type approval - Part 1: Test requirements
(IEC 61215-1:2016)**

Modules photovoltaïques (PV) pour applications terrestres -
Qualification de la conception et homologation - Partie 1:
Exigences d'essai
(IEC 61215-1:2016)

Terrestrische Photovoltaik-(PV-)Module - Bauarteignung
und Bauartzulassung - Part 1: Prüfanforderungen
(IEC 61215-1:2016)

This European Standard was approved by CENELEC on 2016-04-13. 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 CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre has the same status as the official versions.

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



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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

European foreword

The text of document 82/1046/FDIS, future edition 1 of IEC 61215-1, prepared by IEC/TC 82 "Solar photovoltaic energy systems" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61215-1:2016.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2017-06-09
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2019-12-09

This document supersedes partially EN 61215:2005.

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

Endorsement notice

The text of the International Standard IEC 61215-1:2016 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 documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

<u>Publication</u>	<u>Year series</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year series</u>
IEC 60050		International Electrotechnical Vocabulary	-	
IEC 60269-6	-	Low-voltage fuses -- Part 6: Supplementary requirements for fuse-links for the protection of solar photovoltaic energy systems	EN 60269-6	-
IEC 60891	-	Photovoltaic devices - Procedures for temperature and irradiance corrections to measured I-V characteristics	EN 60891	-
IEC 60904-1	-	Photovoltaic devices -- Part 1: Measurement of photovoltaic current-voltage characteristics	EN 60904-1	-
IEC 60904-3	-	Photovoltaic devices - Part 3: Measurement principles for terrestrial photovoltaic (PV) solar devices with reference spectral irradiance data	EN 60904-3	-
IEC 60904-10	-	Photovoltaic devices -- Part 10: Methods of linearity measurement	EN 60904-10	-
IEC 61215-2	-	Terrestrial photovoltaic (PV) modules - Design qualification and type approval -- Part 2: Test procedures	EN 61215-2	-
IEC 61730-2	-	Photovoltaic (PV) module safety qualification -- Part 2: Requirements for testing	EN 61730-2	-
IEC 61853-1	-	Photovoltaic (PV) module performance testing and energy rating -- Part 1: Irradiance and temperature performance measurements and power rating	EN 61853-1	-
IEC 61853-2	-	Photovoltaic (PV) module performance testing and energy rating -- Part 2: Spectral response, incidence angle and module operating temperature measurements	-	-
IEC/TS 61836	-	Solar photovoltaic energy systems - Terms, definitions and symbols	CLC/TS 61836	-
IEC/TS 62915	-	Photovoltaic (PV) Modules - Retesting for type approval, design and safety qualification	-	-
ISO/IEC 17025	-	General requirements for the competence of testing and calibration laboratories	EN ISO/IEC 17025	-
ISO/IEC Guide 98-3	-	Uncertainty of measurement -- Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)	-	-

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**TERRESTRIAL PHOTOVOLTAIC (PV) MODULES –
DESIGN QUALIFICATION AND TYPE APPROVAL –****Part 1: Test requirements****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 61215-1 has been prepared by IEC technical committee 82: Solar photovoltaic energy systems.

This first edition of IEC 61215-1 cancels and replaces the second edition of IEC 61215, published in 2005; it constitutes a technical revision.

This edition of IEC 61215-1 includes the following significant technical changes with respect to the second edition of IEC 61215:2005 and the second edition of IEC 61646:2008:

- a) New standard series structure consistent with other IEC standards: Part 1 lists general requirements, Part 1-x specifics for each PV technology and Part 2 defines testing. All tests defined in Part 2 are MQTs (module quality tests).
- b) Sampling procedure rewritten (Clause 4).
- c) Marking requirements better defined for name plate and general documentation.

- d) Pass/fail criteria have been divided into two “gates”. Gate No. 1 verifies the initial maximum power at STC with respect to name plate rating and Gate No. 2 defines the power loss during accelerated aging testing.
- e) Revised hot-spot endurance test (MQT 09).
- f) Update of the other tests to be consistent with changes in IEC 61646.
- g) Removal of the method for measuring temperature coefficients and reference to IEC 60891.
- h) Definition of NMOT as the nominal module operating temperature measured with the module under maximum power conditions.
- i) Rewriting of the standard using NMOT instead of NOCT and reference to future IEC 61853-2 for the test procedure.
- j) Rewriting of the robustness of termination test (MQT 14) to include evaluation of both cables and junction boxes.
- k) Stabilization of PV modules implemented. This replaces either light soaking procedure from IEC 61646 or preconditioning from IEC 61215.

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

FDIS	Report on voting
82/1046/FDIS	82/1074/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.

A list of all parts in the IEC 61215 series, published under the general title *Terrestrial photovoltaic (PV) modules – Design qualification and type approval*, can be found on the IEC website.

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 stability 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.

INTRODUCTION

Whereas Part 1 of this standard series describes requirements (both in general and specific with respect to device technology), the sub-parts of Part 1 define technology variations and Part 2 defines a set of test procedures necessary for design qualification and type approval. The test procedures described in Part 2 are valid for all device technologies.

TERRESTRIAL PHOTOVOLTAIC (PV) MODULES – DESIGN QUALIFICATION AND TYPE APPROVAL –

Part 1: Test requirements

1 Scope and object

This part of IEC 61215 lays down IEC requirements for the design qualification and type approval of terrestrial photovoltaic (PV) modules suitable for long-term operation in general open-air climates, as defined in IEC 60721-2-1. This standard is intended to apply to all terrestrial flat plate module materials such as crystalline silicon module types as well as thin-film modules.

This standard does not apply to modules used with concentrated sunlight although it may be utilized for low concentrator modules (1 to 3 suns). For low concentration modules, all tests are performed using the current, voltage and power levels expected at the design concentration.

This standard does not address the particularities of PV modules with integrated electronics, it may however be used as a basis for testing such PV modules.

The objective of this test sequence is to determine the electrical and thermal characteristics of the module and to show, as far as possible within reasonable constraints of cost and time, that the module is capable of withstanding prolonged exposure in climates described in the scope. The actual lifetime expectancy of modules so qualified will depend on their design, their environment and the conditions under which they are operated.

2 Normative references

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

IEC 60050 (all parts), *International Electrotechnical Vocabulary* (available at <http://www.electropedia.org>)

IEC 60269-6, *Low-voltage fuses – Part 6: Supplementary requirements for fuse-links for the protection of solar photovoltaic energy systems*

IEC 60891, *Photovoltaic devices – Procedures for temperature and irradiance corrections to measured I-V characteristics*

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

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

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

IEC 61215-2, *Terrestrial photovoltaic (PV) modules – Design qualification and type approval – Part 2: Test procedures*

IEC 61730-2, *Photovoltaic (PV) module safety qualification – Part 2: Requirements for testing*

IEC TS 61836, *Solar photovoltaic energy systems – Terms, definitions and symbols*

IEC 61853-1, *Photovoltaic (PV) module performance testing and energy rating – Part 1: Irradiance and temperature performance measurements and power rating*

IEC 61853-2, *Photovoltaic (PV) module performance testing and energy rating – Part 2: Spectral response, incidence angle, and module operating temperature measurements¹*

IEC TS 62915, *Photovoltaic (PV) modules – Retesting for type approval, design and safety qualification¹*

ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*

ISO/IEC Guide 98-3, *Uncertainty of measurement – Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)*

¹ To be published.