SLOVENSKI STANDARD
SIST EN IEC 61215-1:2021

01-junij-2021

Nadomešča:
SIST EN 61215-1:2017

Prizemni fotonapetostni (PV) moduli - Ocena zasnove in odobritev tipa - 1. del: Zahteve za preskušanje

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

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

Ta slovenski standard je istoveten z: **EN IEC 61215-1:2021**

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EUROPEAN STANDARD

NORME EUROPÉENNE

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EN IEC 61215-1

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Supersedes EN 61215-1:2016 and all of its amendments and corrigenda (if any)

English Version

Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1: Test requirements (IEC 61215-1:2021)

Modules photovoltaïques (PV) pour applications terrestres - Qualification de la conception et homologation - Partie 1: Exigences d'essai (IEC 61215-1:2021)

Terrestrische Photovoltaik(PV)-Module - Bauarteignung und Bauartzulassung - Teil 1: Prüfanforderungen (IEC 61215-1:2021)

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

European foreword

The text of document 82/1828A/FDIS, future edition 2 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 IEC 61215-1:2021.

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) 2021-12-30
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2024-03-30

This document supersedes EN 61215-1:2016 and all of its amendments and corrigenda (if any).

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

Endorsement notice

The text of the International Standard IEC 61215-1:2021 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 60904-7	NOTE	Harmonized as EN IEC 60904-7
IEC 60904-9	NOTE	Harmonized as EN IEC 60904-9
IEC 61215-1-1:2021	NOTE	Harmonized as EN IEC 61215-1-1:2021 (not modified)
IEC 61215-1-2:2021	NOTE	Harmonized as EN IEC 61215-1-2:2021 (not modified)
IEC 61215-1-3:2021	NOTE	Harmonized as EN IEC 61215-1-3:2021 (not modified)
IEC 61215-1-4:2021	NOTE	Harmonized as EN IEC 61215-1-4:2021 (not modified)
IEC 61853-2:2016	NOTE	Harmonized as EN 61853-2:2016 (not modified)
IEC 62108:2016	NOTE	Harmonized as EN 62108:2016 (not modified)
IEC 62506	NOTE	Harmonized as EN 62506
IEC 60904-9:2007	NOTE	Harmonized as EN 60904-9:2007 (not modified)

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 1 Where 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.

Publication	Year	Title	EN/HD	Year
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 IEC 60904-1	-
IEC/TS 60904-1-2	2019	Photovoltaic devices - Part 1-2: Measurement of current-voltage characteristics of bifacial photovoltaic (PV) devices	-	-
IEC 60904-3	-	Photovoltaic devices - Part 3: Measurement principles for terrestrial photovoltaic (PV) solar devices with reference spectral irradiance data	EN IEC 60904-3	-
IEC 60904-10	-	Photovoltaic devices - Part 10: Methods of linear dependence and linearity measurements	EN IEC 60904-10	-
IEC/TS 60904-13	-	Photovoltaic devices - Part 13: Electroluminescence of photovoltaic modules	-	-
IEC 61140	-	Protection against electric shock - Common aspects for installation and equipment	EN 61140	-
IEC 61215-2	-	Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 2: Test procedures	EN IEC 61215-2	-

Publication	Year	Title	EN/HD	Year
IEC 61730-1	-	Photovoltaic (PV) module safety qualification - Part 1: Requirements for construction	EN IEC 61730-1	-
IEC 61730-2	-	Photovoltaic (PV) module safety qualification - Part 2: Requirements for testing	EN IEC 61730-2	-
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	EN 61853-1	-
IEC/TS 62782	-	Photovoltaic (PV) modules - Cyclic (dynamic) mechanical load testing	-	-
IEC 62790	-	Junction boxes for photovoltaic modules - Safety requirements and tests	EN IEC 62790	-
IEC/TS 62804-1	-	Photovoltaic (PV) modules - Test methods for the detection of potential-induced degradation - Part 1: Crystalline silicon	-	-
IEC 62852	-	Connectors for DC-application in photovoltaic systems - Safety requirements and tests	EN 62852	-
IEC/TS 62915	-	Photovoltaic (PV) modules - Type approval, design and safety qualification - Retesting	-	-
IEC 62941	-	Terrestrial photovoltaic (PV) modules - Quality system for PV module manufacturing	EN IEC 62941	-
IEC/TS 63163	—[1]	Terrestrial photovoltaic (PV) modules for consumer products - Design qualification and type approval	-	-
ISO/IEC Guide 98-3	-	Uncertainty of measurement - Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)	-	-

[1] Under preparation. Stage at the time of publication: ADTS.

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Edition 2.0 2021-02

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

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

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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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 second edition of IEC 61215-1 cancels and replaces the first edition of IEC 61215-1, published in 2016; it constitutes a technical revision.

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

a) Addition of a test taken from IEC TS 62782.
b) Addition of a test taken from IEC TS 62804-1.
c) Addition of test methods required for flexible modules. This includes the addition of the bending test (MQT 22).
d) Addition of definitions, references and instructions on how to perform the IEC 61215 design qualification and type approval on bifacial PV modules.

e) Clarification of the requirements related to power output measurements.

f) Addition of weights to junction box during 200 thermal cycles.

g) Requirement that retesting be performed according to IEC TS 62915.

h) Removal of the nominal module operating test (NMOT), and associated test of performance at NMOT, from the IEC 61215 series.

Informative Annex A explains the background and reasoning behind some of the more substantial changes that were made in the IEC 61215 series in progressing from edition 1 to edition 2.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
82/1828A/FDIS	82/1848/RVD

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

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

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.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

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

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

Whereas Part 1 of this standards 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

This document lays down requirements for the design qualification of terrestrial photovoltaic modules suitable for long-term operation in open-air climates. The useful service life of modules so qualified will depend on their design, their environment and the conditions under which they are operated. Test results are not construed as a quantitative prediction of module lifetime.

In climates where 98th percentile operating temperatures exceed 70 °C, users are recommended to consider testing to higher temperature test conditions as described in IEC TS 63126. Users desiring qualification of PV products with lesser lifetime expectations are recommended to consider testing designed for PV in consumer electronics, as described in IEC TS 63163 (under development). Users wishing to gain confidence that the characteristics tested in IEC 61215 appear consistently in a manufactured product may wish to utilize IEC 62941 regarding quality systems in PV manufacturing.

This document is intended to apply to all terrestrial flat plate module materials such as crystalline silicon module types as well as thin-film modules. It does not apply to systems that are not long-term applications, such as flexible modules installed in awnings or tenting.

This document 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 irradiance, current, voltage and power levels expected at the design concentration.

This document 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 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 outdoors. Accelerated test conditions are empirically based on those necessary to reproduce selected observed field failures and are applied equally across module types. Acceleration factors may vary with product design, and thus not all degradation mechanisms may manifest. Further general information on accelerated test methods including definitions of terms may be found in IEC 62506.

Some long-term degradation mechanisms can only reasonably be detected via component testing, due to long times required to produce the failure and necessity of stress conditions that are expensive to produce over large areas. Component tests that have reached a sufficient level of maturity to set pass/fail criteria with high confidence are incorporated into the IEC 61215 series via addition to Table 1. In contrast, the tests procedures described in this series, in IEC 61215-2, are performed on modules.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 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 TS 60904-1-2:2019, *Photovoltaic devices – Part 1-2: Measurement of current-voltage characteristics of bifacial photovoltaic (PV) devices*

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 linear dependence and linearity measurements*

IEC TS 60904-13, *Photovoltaic devices – Part 13: Electroluminescence of photovoltaic modules*

IEC 61140, *Protection against electric shock – Common aspects for installation and equipment*

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

IEC 61730-1, *Photovoltaic (PV) module safety qualification – Part 1: Requirements for construction*

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 TS 62782, *Photovoltaic (PV) modules – Cyclic (dynamic) mechanical load testing*

IEC 62790, *Junction boxes for photovoltaic modules – Safety requirements and tests*

IEC TS 62804-1, *Photovoltaic (PV) modules – Test methods for the detection of potential-induced degradation – Part 1: Crystalline silicon*

IEC 62852, *Connectors for DC-application in photovoltaic systems – Safety requirements and tests*

IEC TS 62915, *Photovoltaic (PV) modules – Type approval, design and safety qualification – Retesting*

IEC 62941, *Terrestrial photovoltaic (PV) modules – Quality system for PV module manufacturing*

IEC TS 63163: –[1]*Terrestrial photovoltaic (PV) modules for consumer products – Design qualification and type approval*

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

3 Terms, definitions and abbreviated terms

For the purposes of this document, the terms and definitions in IEC TS 61836 apply, as well as the following.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1
bins of power classes
power (typically maximum power) sorting criteria from the PV module manufacturer

3.2
tolerances <on label>
value range of electrical parameters on the label of the PV module as given by the manufacturer

3.3
MQT
Module Quality Test

3.4
type approval
conformity test made on one or more items representative of the production

[SOURCE: IEC 60050-581:2008, 581-21-08 – Type test]

3.5
reproducibility <of measurements>
closeness of agreement between the results of measurements of the same value of a quantity, when the individual measurements are made under different conditions of measurement:

– principle of measurement,
– method of measurement,
– observer,
– measuring instruments,
– reference standards,
– laboratory,

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