



SLOVENSKI STANDARD
SIST EN 61215:2001

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SIST EN 61215:2005

Prizemni fotonapetostni (PV) moduli s kristalnim silicijem – Ocena zasnove in odobritev tipa

Crystalline silicon terrestrial photovoltaic (PV) modules - Design qualification and type approval

Terrestrische Photovoltaik (PV) Module mit Silizium-Solarzellen - Bauarteignung und Bauartzulassung

Modules photovoltaïques (PV) au silicium cristallin pour application terrestre - Qualification de la conception et homologation

Ta slovenski standard je istoveten z: EN 61215:1995

ICS:

27.160 Solar energy engineering

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EUROPEAN STANDARD
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EUROPÄISCHE NORM

EN 61215

April 1995

ICS 31.260

Descriptors: Photovoltaic (PV) module, crystalline silicon, design, qualification, testing, pass criteria, marking

English version

**Crystalline silicon terrestrial photovoltaic (PV) modules
Design qualification and type approval
(IEC 1215:1993)**

Modules photovoltaïques (PV) au silicium cristallin pour application terrestre
Qualification de la conception et homologation
(CEI 1215:1993)

Terrestrische photovoltaische (PV) Module aus kristallinem Silizium
Konstruktionsqualifikation und Typzulassung
(IEC 1215:1993)

This European Standard was approved by CENELEC on 1995-03-06. 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.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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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 the International Standard IEC 1215:1993, prepared by IEC TC 82, Solar photovoltaic energy systems, was submitted to the formal vote and was approved by CENELEC as EN 61215 on 1995-03-06 without any modification.

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) 1996-03-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1996-03-01

For products which have complied with the relevant national standard before 1996-03-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 2001-03-01.

Annexes designated "normative" are part of the body of the standard.
In this standard, annex ZA is normative.
Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 1215:1993 was approved by CENELEC as a European Standard without any modification.

Editorial corrections:

1 Scope and object

In line three replace "general open-air climates" by "moderate open-air climates"

Figure 1 - Qualification test sequence

Add a link between the test sequence 10.9 and the last horizontal line of Figure 1.

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Annex ZA (normative)

Normative references to international publications
with their corresponding European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

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 68-1	1988	Environmental testing Part 1: General and guidance	EN 60068-1 ¹⁾	1994
IEC 68-2-3	1969	Part 2: Tests - Test Ca: Damp heat, steady state	HD 323.2.3 S2 ²⁾	1987
IEC 68-2-21	1983	Test U: Robustness of terminations and integral mounting devices	HD 323.2.21 S3 ³⁾	1988
IEC 410	1973	Sampling plans and procedures for inspection by attributes	-	-
IEC 721-2-1	1982	Classification of environmental conditions Part 2: Environmental conditions appearing in nature - Temperature and humidity	HD 478.2.1 S1 ⁴⁾	1989
IEC 891	1987	Procedures for temperature and irradiance corrections to measured I-V characteristics of crystalline silicon photovoltaic devices		
+ A1	1992		EN 60891	1994
IEC 904-1	1987	Photovoltaic devices Part 1: Measurement of photovoltaic current-voltage characteristics	EN 60904-1	1993
IEC 904-3	1989	Part 3: Measurement principles for terrestrial photovoltaic (PV) solar devices with reference spectral irradiance data	EN 60904-3	1993
QC 001002	1986	Rules of procedure of the IEC Quality Assessment System for Electronic Components (IECQ)	-	-
A1	1992		-	-

1) EN 60068-1 includes the corrigendum October 1988 and A1:1992 to IEC 68-1

2) HD 323.2.3 S2 includes A1:1984 to IEC 68-2-3

3) HD 323.2.21 S3 includes A1:1985 to IEC 68-2-21

4) HD 478.2.1 S1 includes A1:1987 to IEC 721-2-1:1982

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1215

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**Modules photovoltaïques (PV) au silicium
cristallin pour application terrestre –
Qualification de la conception et homologation**

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

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International Electrotechnical Commission
Международная Электротехническая Комиссия

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international cooperation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. 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. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of the IEC on technical matters, prepared by technical committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.
- 3) They have the form of recommendations for international use published in the form of standards, technical reports or guides and they are accepted by the National Committees in that sense.
- 4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
- 5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.

International Standard IEC 1215 has been prepared by IEC technical committee 82: Solar photovoltaic energy systems.

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

Six Months' Rule	Reports on Voting	DIS	Reports on Voting
82(CO)16	82(CO)28	82(CO)31	82(CO)50
82(CO)23	82(CO)40	82(CO)32	82(CO)51
82(CO)24	82(CO)41	82(CO)35	82(CO)60
82(CO)26	82(CO)43	82(CO)36	82(CO)61
82(CO)27	82(CO)44	82(CO)37	82(CO)62
		82(CO)45	82(CO)63
		82(CO)46	82(CO)64
		82(CO)47	82(CO)65
		82(CO)48	82(CO)66
		82(CO)53	82(CO)69
		82(CO)56	82(CO)71

Full information on the voting for the approval of this standard can be found in the reports on voting indicated in the above table.

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

1 Scope and object

This International Standard lays down IEC requirements for the design qualification and type approval of terrestrial photovoltaic modules suitable for long-term operation in general open-air climates, as defined in IEC 721-2-1. It applies only to crystalline silicon types. Standards for thin-film modules and other environments, such as marine or equator conditions, are under consideration.

This standard does not apply to modules used with concentrators.

The object of this test sequence is to determine the electrical and thermal characteristics of the module and to show, as far as is 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 normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 68-1: 1988, *Environmental testing – Part 1: General and guidance*

IEC 68-2-3: 1969, *Environmental testing – Part 2: Tests – Test Ca: Damp heat, steady state*

IEC 68-2-21: 1983, *Environmental testing – Part 2: Tests – Test U: Robustness of terminations and integral mounting devices*

IEC 410: 1973, *Sampling plans and procedures for inspection by attributes*

IEC 721-2-1: 1982, *Classification of environmental conditions – Part 2: Environmental conditions appearing in nature – Temperature and humidity*

IEC 891: 1987, *Procedures for temperature and irradiance corrections to measured I-V characteristics of crystalline silicon photovoltaic (PV) devices*

Amendment No. 1 (1992)

IEC 904-1: 1987, *Photovoltaic devices – Part 1: Measurements of photovoltaic current-voltage characteristics*

IEC 904-3: 1989, *Photovoltaic devices – Part 3: Measurement principles for terrestrial photovoltaic (PV) solar devices with reference spectral irradiance data*

QC 001002: 1986, *Rules of Procedure of the IEC Quality Assessment System for Electronic Components (IECQ)*
Amendment No. 1 (1992)

3 Sampling

Eight modules for qualification testing (plus spares as desired) shall be taken at random from a production batch or batches, in accordance with the procedure given in IEC 410. The modules shall have been manufactured from specified materials and components in accordance with the relevant drawings and process sheets and have been subjected to the manufacturer's normal inspection, quality control and production acceptance procedures. The modules shall be complete in every detail and shall be accompanied by the manufacturer's handling, mounting and connection instructions, including the maximum permissible system voltage.

When the modules to be tested are prototypes of a new design and not from production, this fact shall be noted in the test report (see clause 8).

4 Marking

Each module shall carry the following clear and indelible markings:

- name, monogram or symbol of manufacturer;
- type or model number;
- serial number;
- polarity of terminals or leads (colour coding is permissible);
- maximum system voltage for which the module is suitable.

The date and place of manufacture shall be marked on the module or be traceable from the serial number.

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5 Testing

The modules shall be divided into groups and subjected to the qualification test sequences in figure 1, carried out in the order laid down. Each box refers to the corresponding subclause in this standard. Test procedures and severities, including initial and final measurements where necessary, are detailed in clause 10.

NOTE – Where the final measurements for one test serve as the initial measurements for the next test in the sequence, they need not be repeated. In these cases, the initial measurements are omitted from the test.

In carrying out the tests, the tester shall strictly observe the manufacturer's handling, mounting and connection instructions. Test given in 10.4 may be omitted if the temperature coefficients α and β are already known.

Test conditions are summarized in table 1.

6 Pass criteria

A module design shall be judged to have passed the qualification tests, and therefore to be IEC type approved, if each test sample meets all the following criteria:

- a) the degradation of maximum output power at standard test conditions (STC) does not exceed the prescribed limit after each test nor 8 % after each test sequence;
- b) no sample has exhibited any open-circuit or ground fault during the tests;
- c) there is no visual evidence of a major defect, as defined in clause 7;
- d) the insulation test requirements are met after the tests.

If two or more modules do not meet these test criteria, the design shall be deemed not to have met the qualification requirements. Should one module fail any test, another two modules meeting the requirements of clause 3 shall be subjected to the whole of the relevant test sequence from the beginning. If one or both of these modules also fail, the design shall be deemed not to have met the qualification requirements. If, however, both modules pass the test sequence, the design shall be judged to have met the qualification requirements.

7 Major visual defects

For the purposes of design qualification and type approval, the following are considered to be major visual defects:

- a) broken, cracked, bent, misaligned or torn external surfaces;
- b) a crack in a cell whose propagation could remove more than 10 % of that cell's area from the electrical circuit of the module;
- c) bubbles or delamination forming a continuous path between any part of the electrical circuit and the edge of the module;
- d) loss of mechanical integrity, to the extent that the installation and/or operation of the module would be impaired.

8 Report

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Following type approval, a certified report of the qualification tests, with measured performance characteristics and details of any failures and re-tests, shall be prepared by the test agency in accordance with IECQ procedure QC 001002. A copy of this report shall be kept by the manufacturer for reference purposes.

9 Modifications

Any change in the design, materials, components or processing of the module may require a repetition of some or all of the qualification tests to maintain type approval.