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Responsible committee: GEL/82 Photovoltaic Energy Systems

Interested committees:

Title: BS EN 61215-1 Amd.1 Ed.2.0 Draft Amendment 1 - Terrestrial photovoltaic (PV) modules - Design qualification and type approval. Part 1: Test requirements.

Please notify admin.start@bsigroup.com if you are aware of any keywords that might assist in clarifying or identifying the standard or of the content of this standard:

- i) has any issues related to 3rd party IPR, patent or copyright
- ii) affects other national standard(s)
- iii) requires additional national guidance or information

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This draft is issued to allow comments from interested parties; all comments will be given consideration prior to publication. No acknowledgement will normally be sent. **See overleaf for information on the submission of comments.**

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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

Submission of Comments

- **Annotated drafts are not acceptable and will be rejected.**
- All comments should be submitted online at <https://standardsdevelopment.bsigroup.com/>. You will need to register in order to comment.

Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



82/2371/CD

COMMITTEE DRAFT (CD)

PROJECT NUMBER:

IEC 61215-1/AMD1 ED2

DATE OF CIRCULATION:

2025-02-28

CLOSING DATE FOR COMMENTS:

2025-04-25

SUPERSEDES DOCUMENTS:

82/2084/RR

IEC TC 82 : SOLAR PHOTOVOLTAIC ENERGY SYSTEMS

SECRETARIAT:

United States of America

SECRETARY:

Mr George Kelly

OF INTEREST TO THE FOLLOWING COMMITTEES:

HORIZONTAL FUNCTION(S):

ASPECTS CONCERNED:

This document is still under study and subject to change. It should not be used for reference purposes.

Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Recipients of this document are invited to submit, with their comments, notification of any local regulations or technical reasons that may exist and should be considered should this proposal proceed, recognizing that failure to address such requirements could result in the need for new or existing "In Some Countries" clauses. (SEE AC/22/2007 OR NEW GUIDANCE DOC).

TITLE:

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

NOTE FROM TC/SC OFFICERS:

This project was discussed and supported by WG2 during their meeting in 2024-10.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**TERRESTRIAL PHOTOVOLTAIC (PV) MODULES –
DESIGN QUALIFICATION AND TYPE APPROVAL –****Part 1: Test requirements****FOREWORD**

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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) Additions of references, definitions and terms used throughout this document.
- b) A revision of normative requirements for the nameplate and documentation.
- c) An additional gate criterion for bifaciality.
- d) Updated requirements that constitute major visual defects.
- e) A revision of the testing tree required for type approval qualification.
- f) The bifacial stress irradiance (BSI), which was used to determine stress conditions for bifacial modules, has been replaced by the applied bifacial stress irradiance (aBSI).

94 g) Addition of weights to junction box during damp heat (MQT 13) testing.

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

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

96
97 Full information on the voting for the approval of this International Standard can be found in the
98 report on voting indicated in the above table.

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

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

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

- 106 • reconfirmed,
- 107 • withdrawn,
- 108 • replaced by a revised edition, or
- 109 • amended.

110 The contents of the corrigendum of May 2021 have been included in this copy.

111

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.

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113

114

INTRODUCTION

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

119

120

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 module 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.

- 167 IEC 60269-6, *Low-voltage fuses – Part 6: Supplementary requirements for fuse-links for the*
168 *protection of solar photovoltaic energy systems*
- 169 IEC 60891, *Photovoltaic devices – Procedures for temperature and irradiance corrections to*
170 *measured I-V characteristics*
- 171 IEC 60904-1, *Photovoltaic devices – Part 1: Measurement of photovoltaic current-voltage*
172 *characteristics*
- 173 IEC TS 60904-1-2:2019, *Photovoltaic devices – Part 1-2: Measurement of current-voltage*
174 *characteristics of bifacial photovoltaic (PV) devices*
- 175 IEC 60904-3, *Photovoltaic devices – Part 3: Measurement principles for terrestrial photovoltaic*
176 *(PV) solar devices with reference spectral irradiance data*
- 177 IEC 60904-10, *Photovoltaic devices – Part 10: Methods of linear dependence and linearity*
178 *measurements*
- 179 IEC TS 60904-13, *Photovoltaic devices – Part 13: Electroluminescence of photovoltaic modules*
- 180 IEC 61140, *Protection against electric shock – Common aspects for installation and equipment*
- 181 IEC 61215-2, *Terrestrial photovoltaic (PV) modules – Design qualification and type approval –*
182 *Part 2: Test procedures*
- 183 IEC 61730-1, *Photovoltaic (PV) module safety qualification – Part 1: Requirements for*
184 *construction*
- 185 IEC 61730-2, *Photovoltaic (PV) module safety qualification – Part 2: Requirements for testing*
- 186 IEC TS 61836, *Solar photovoltaic energy systems – Terms, definitions and symbols*
- 187 IEC 61853-1, *Photovoltaic (PV) module performance testing and energy rating – Part 1:*
188 *Irradiance and temperature performance measurements and power rating*
- 189 IEC TS 62782, *Photovoltaic (PV) modules – Cyclic (dynamic) mechanical load testing*
- 190 IEC 62788-1 (all parts), *Measurement procedures for materials used in photovoltaic modules – Part 1:*
191 *Encapsulants*
- 192 IEC 62790, *Junction boxes for photovoltaic modules – Safety requirements and tests*
- 193 IEC TS 62804-1, *Photovoltaic (PV) modules – Test methods for the detection of potential-*
194 *induced degradation – Part 1: Crystalline silicon*
- 195 IEC 62852, *Connectors for DC-application in photovoltaic systems – Safety requirements and*
196 *tests*
- 197 IEC TS 62915, *Photovoltaic (PV) modules – Type approval, design and safety qualification –*
198 *Retesting*
- 199 IEC 62930, *Electric cables for photovoltaic systems with a voltage rating of 1,5 kV DC*
- 200 IEC 62941, *Terrestrial photovoltaic (PV) modules – Quality system for PV module*
201 *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,
- under conditions of use of the instruments, different from those customarily used, after intervals of time relatively long compared with the duration of a single measurement. [consistent with the International Vocabulary of Metrology (VIM), 3.7]

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