

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE



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

**Modules photovoltaïques (PV) pour applications terrestres – Qualification de la  
conception et homologation –  
Partie 2: Procédures d'essai**

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Partie 2: Procédures d'essai**

INTERNATIONAL  
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COMMISSION

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## CONTENTS

FOREWORD .....	6
INTRODUCTION .....	8
1 Scope .....	9
2 Normative references .....	9
3 Terms and definitions .....	11
4 Test procedures .....	12
4.1 Visual inspection (MQT 01) .....	12
4.1.1 Purpose .....	12
4.1.2 Procedure .....	12
4.1.3 Requirements .....	12
4.2 Maximum power determination (MQT 02) .....	12
4.2.1 Purpose .....	12
4.2.2 Apparatus .....	12
4.2.3 Procedure .....	13
4.3 Insulation test (MQT 03) .....	13
4.3.1 Purpose .....	13
4.3.2 Apparatus .....	14
4.3.3 Test conditions .....	14
4.3.4 Procedure .....	14
4.3.5 Test requirements .....	15
4.4 Measurement of temperature coefficients (MQT 04) .....	15
4.5 Placeholder section, formerly NMOT .....	15
4.6 Performance at STC (MQT 06.1) .....	15
4.6.1 Purpose .....	15
4.6.2 Apparatus .....	15
4.6.3 Procedure for measuring at STC (MQT 06.1) .....	16
4.7 Performance at low irradiance (MQT 07) .....	16
4.7.1 Purpose .....	16
4.7.2 Apparatus .....	16
4.7.3 Procedure .....	17
4.8 Outdoor exposure test (MQT 08) .....	17
4.8.1 Purpose .....	17
4.8.2 Apparatus .....	17
4.8.3 Procedure .....	17
4.8.4 Final measurements .....	18
4.8.5 Requirements .....	18
4.9 Hot-spot endurance test (MQT 09) .....	18
4.9.1 Purpose .....	18
4.9.2 Hot-spot effect .....	18
4.9.3 Classification of cell interconnection .....	19
4.9.4 Apparatus .....	20
4.9.5 Procedure .....	21
4.9.6 Final measurements .....	28
4.9.7 Requirements .....	28
4.10 UV preconditioning test (MQT 10) .....	28
4.10.1 Purpose .....	28

4.10.2	Apparatus .....	28
4.10.3	Procedure .....	29
4.10.4	Final measurements .....	29
4.10.5	Requirements .....	29
4.11	Thermal cycling test (MQT 11) .....	29
4.11.1	Purpose .....	29
4.11.2	Apparatus .....	29
4.11.3	Procedure .....	30
4.11.4	Final measurements .....	31
4.11.5	Requirements .....	31
4.12	Humidity-freeze test (MQT 12) .....	32
4.12.1	Purpose .....	32
4.12.2	Apparatus .....	32
4.12.3	Procedure .....	32
4.12.4	Final measurements .....	32
4.12.5	Requirements .....	32
4.13	Damp heat test (MQT 13) .....	33
4.13.1	Purpose .....	33
4.13.2	Apparatus .....	33
4.13.3	Procedure .....	33
4.13.4	Final measurements .....	34
4.13.5	Requirements .....	34
4.14	Robustness of terminations (MQT 14) .....	34
4.14.1	Purpose .....	34
4.14.2	Retention of junction box on mounting surface (MQT 14.1) .....	34
4.14.3	Test of cord anchorage (MQT 14.2) .....	34
4.15	Wet leakage current test (MQT 15) .....	35
4.15.1	Purpose .....	35
4.15.2	Apparatus .....	35
4.15.3	Procedure .....	35
4.15.4	Requirements .....	35
4.16	Static mechanical load test (MQT 16) .....	36
4.16.1	Purpose .....	36
4.16.2	Apparatus .....	36
4.16.3	Procedure .....	37
4.16.4	Final measurements .....	37
4.16.5	Requirements .....	37
4.17	Hail test (MQT 17) .....	37
4.17.1	Purpose .....	37
4.17.2	Apparatus .....	37
4.17.3	Procedure .....	38
4.17.4	Final measurements .....	39
4.17.5	Requirements .....	39
4.18	Bypass diode testing (MQT 18) .....	40
4.18.1	Bypass diode thermal test (MQT 18.1) .....	40
4.18.2	Bypass diode functionality test (MQT 18.2) .....	43
4.19	Stabilization (MQT 19) .....	44
4.19.1	General .....	44
4.19.2	Criterion definition for stabilization .....	44

4.19.3	Light induced stabilization procedures .....	45
4.19.4	Other stabilization procedures .....	46
4.19.5	Initial stabilization (MQT 19.1) .....	46
4.19.6	Final stabilization (MQT 19.2) .....	46
4.19.7	Stress-specific stabilization – BO LID (MQT 19.3) .....	47
4.20	Cyclic (dynamic) mechanical load test (MQT 20) .....	47
4.20.1	Purpose .....	47
4.20.2	Procedure .....	47
4.20.3	Final measurements .....	47
4.20.4	Requirements .....	48
4.21	Potential induced degradation test (MQT 21) .....	48
4.21.1	Purpose .....	48
4.21.2	Samples .....	48
4.21.3	Apparatus .....	48
4.21.4	Procedure .....	48
4.21.5	Final measurements .....	48
4.21.6	Requirements .....	49
4.22	Bending test (MQT 22) .....	49
4.22.1	Purpose .....	49
4.22.2	Apparatus .....	49
4.22.3	Procedure .....	49
4.22.4	Final measurements .....	49
4.22.5	Requirements .....	49
Annex A (informative) Recommended setup for managing weights during mechanical loading (MQT 16) .....		50
Bibliography .....		54
Figure 1 – Case S, series connection with optional bypass diode .....		19
Figure 2 – Case PS, parallel-series connection with optional bypass diode .....		19
Figure 3 – Case SP, series-parallel connection with optional bypass diode .....		20
Figure 4 – Module $I$ - $V$ characteristics with different cells totally shadowed .....		21
Figure 5 – Module $I$ - $V$ characteristics with the test cell shadowed at different levels .....		23
Figure 6 – Hot-spot effect in a MLI thin-film module with serially connected cells .....		24
Figure 7 – Thermal cycling test – Temperature and applied current profile .....		30
Figure 8 – Proper attachment of 5 N weight to junction box for module utilizing a) electrical termination leads, b) or wire for attachment, and c) only one junction box .....		31
Figure 9 – Humidity-freeze cycle – Temperature and humidity profile .....		33
Figure 10 – Hail-test equipment .....		38
Figure 11 – Hail test impact locations: top for wafer/cell based technologies, bottom for monolithic processed thin film technologies .....		40
Figure 12 – Bypass diode thermal test .....		42
Figure A.1 – 3D view (at left of figure), end view (at top right), and side view (at bottom right) of gantry crane over mounting jig and loading jig .....		50
Figure A.2 – 3D close up views of mounting jig (right) and loading jig (left) .....		51
Figure A.3 – 2D view of mounting jig and loading jig .....		52
Figure A.4 – 3D view of loading jig .....		52
Figure A.5 – Close-up view of loading jig .....		53

Table 1 – Voltage stress levels .....	14
Table 2 – Ice-ball masses and test velocities .....	38
Table 3 – Impact locations .....	39

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DESIGN QUALIFICATION AND TYPE APPROVAL –****Part 2: Test procedures****FOREWORD**

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International Standard IEC 61215-2 has been prepared by IEC technical committee 82: Solar photovoltaic energy systems.

This second edition of IEC 61215-2 cancels and replaces the first edition of IEC 61215-2 issued in 2016; it constitutes a technical revision.

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

- a) Addition of cyclic (dynamic) mechanical load testing (MQT 20).
- b) Addition of a test for detection of potential-induced degradation (MQT 21).
- c) Addition of test methods required for bifacial PV modules.
- d) Addition of test methods required for flexible modules. This includes the addition of the bending test (MQT 22).
- e) Revision of simulator requirements to ensure uncertainty is both well-defined and minimized.

- f) Correction to the hot spot endurance test, where the procedure for monolithically integrated (MLI) thin film technologies (MQT 09.2) previously included two sections describing a procedure only appropriate for silicon modules.
- g) Selection of three diodes, rather than all, for testing in the bypass diode thermal test (MQT 18).
- h) Removal of the nominal module operating test (NMOT), and associated test of performance at NMOT, from the IEC 61215 series.

Informative Annex A of IEC 61215-1:2021 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 standard is based on the following documents:

FDIS	Report on voting
82/1829/FDIS	82/1853/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.

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## 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 2: Test procedures

### 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 98<sup>th</sup> percentile operating temperatures exceed 70 °C, users are recommended to consider testing to higher temperature test conditions as described in IEC TS 63126<sup>1</sup>. 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.

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.

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 IEC 61215-1:2021. 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.

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<sup>1</sup> Information on 98<sup>th</sup> percentile operating temperature as a function of system location and mounting configuration is included in IEC TS 63126.