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colour inside

Photovoltaic (PV) modules – Transportation testing – Part 1: Transportation and shipping of module package units

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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PHOTOVOLTAIC (PV) MODULES – TRANSPORTATION TESTING –

Part 1: Transportation and shipping of module package units

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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This commented version (CMV) of the official standard IEC 62759-1:2022 edition 2.0 allows the user to identify the changes made to the previous IEC 62759-1:2015 edition 1.0. Furthermore, comments from IEC TC 82 experts are provided to explain the reasons of the most relevant changes, or to clarify any part of the content.

A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text. Experts' comments are identified by a blue-background number. Mouse over a number to display a pop-up note with the comment.

This publication contains the CMV and the official standard. The full list of comments is available at the end of the CMV.

IEC 62759-1 has been prepared by IEC technical committee 82: Solar photovoltaic energy systems. It is an International Standard.

This second edition cancels and replaces the first edition published in 2015. This edition constitutes a technical revision.

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

a) Cancellation of tests and references to relevant standards for CPV.
b) Deletion of different classes for PV modules.
c) Deletion of requirement for minimum 10 modules per shipping unit.
d) Implementation of stabilization as intermediate measurement.
e) Addition of pass/fail criteria.
f) Change of requirements for retesting.
g) Change of number of cycles in dynamic mechanical load test. See also clause 6.4.2.1.

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

Draft	Report on voting
82/2029/FDIS	82/2052/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

A list of all parts in the IEC 62759 series, published under the general title *Photovoltaic (PV) modules – Transportation testing*, can be found on the IEC website.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

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PHOTOVOLTAIC (PV) MODULES – TRANSPORTATION TESTING –

Part 1: Transportation and shipping of module package units

1 Scope ~~and object~~

Photovoltaic (PV) modules are electrical devices intended for continuous outdoor exposure during their lifetime. Existing type approval standards do not consider mechanical stresses that may occur during transportation to the PV installation destination.

This part of IEC 62759 describes methods for the simulation of transportation of complete package units of modules and combined subsequent environmental impacts~~, it does however not include pass/fail criteria~~. 1

~~This standard is designed so that its test sequence can co-ordinate with those of IEC 61215 or IEC 61646, so that a single set of samples may be used to perform both the transportation simulation and performance evaluation of a photovoltaic module design. This standard applies to flat plate photovoltaic modules, but may also be used as a basis for testing of CPV modules and assemblies.~~ 2

A list of design modifications which require a retest is provided in Annex B.

This document applies to flat plate photovoltaic 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 60068-2-27:2008, *Environmental testing – Part 2-27: Tests – Test Ea and guidance: Shock*

~~IEC 60068-2-64, *Environmental testing – Part 2-64: Tests – Test Fh: Vibration, broadband random and guidance*~~

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

~~IEC 61215:2005, *Crystalline silicon terrestrial photovoltaic (PV) modules – Design qualification and type approval*~~

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

IEC 61215-2:2021, *Terrestrial photovoltaic (PV) modules – Design qualification and type approval – Part 2: Test procedures*

~~IEC 61646:2008, *Thin-film terrestrial photovoltaic (PV) modules – Design qualification and type approval*~~

IEC 61730-2:~~2004~~2022, *Photovoltaic (PV) module safety qualification – Part 2: Requirements for testing*

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

~~IEC 62108:2007, *Concentrator photovoltaic (CPV) modules and assemblies – Design qualification and type approval*~~

IEC TS 62782:2016, ~~*Dynamic mechanical load testing for*~~ *Photovoltaic (PV) modules – Cyclic (dynamic) mechanical load testing* ~~(to be published)~~

~~ISO 13355, *Packaging – Complete, filled transport packages and unit loads – Vertical random vibration test*~~

ASTM D880-92~~:2008~~, *Standard Test Method for Impact Testing for Shipping Containers and Systems*

~~ASTM D4169:2008, *Standard Practice for Performance Testing of Shipping Containers and Systems*~~

ASTM D4169-16, *Standard Practice for Performance Testing of Shipping Containers and Systems*

ASTM D4728:2006, *Standard Test Method for Random Vibration Testing of Shipping Containers*

ASTM D5277-92~~:1992~~, *Test method for performing programmed horizontal impact using an inclined impact tester*

ISTA 3E:~~2009~~2017, *Unitized Loads of Same Product*

~~MIL-STD-810G, *Test Method Standard for Environmental Engineering Considerations and Laboratory Tests*~~

IEC 62759-1

Edition 2.0 2022-07

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Photovoltaic (PV) modules – Transportation testing – Part 1: Transportation and shipping of module package units

Modules photovoltaïques (PV) – Essais de transport – Partie 1: Transport et expédition d'unités d'emballage de modules

IEC 62759-1:2022-07(en-fr)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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Part 1: Transportation and shipping of module package units

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PHOTOVOLTAIC (PV) MODULES – TRANSPORTATION TESTING –

Part 1: Transportation and shipping of module package units

1 Scope

Photovoltaic (PV) modules are electrical devices intended for continuous outdoor exposure during their lifetime. Existing type approval standards do not consider mechanical stresses that may occur during transportation to the PV installation destination.

This part of IEC 62759 describes methods for the simulation of transportation of complete package units of modules and combined subsequent environmental impacts.

A list of design modifications which require a retest is provided in Annex B.

This document applies to flat plate photovoltaic modules.

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IEC 60068-2-27:2008, *Environmental testing – Part 2-27: Tests – Test Ea and guidance: Shock*

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

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

IEC 61215-2:2021, *Terrestrial photovoltaic (PV) modules – Design qualification and type approval – Part 2: Test procedures*

IEC 61730-2:2022*, Photovoltaic (PV) module safety qualification – Part 2: Requirements for testing*

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

IEC TS 62782:2016, *Photovoltaic (PV) modules – Cyclic (dynamic) mechanical load testing*

ASTM D880-92, *Standard Test Method for Impact Testing for Shipping Containers and Systems*

ASTM D4169-16, *Standard Practice for Performance Testing of Shipping Containers and Systems*

ASTM D4728:2006, *Standard Test Method for Random Vibration Testing of Shipping Containers*

ASTM D5277-92, *Test method for performing programmed horizontal impact using an inclined impact tester*

ISTA 3E:2017, *Unitized Loads of Same Product*

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MODULES PHOTOVOLTAÏQUES (PV) – ESSAIS DE TRANSPORT –

Partie 1: Transport et expédition d'unités d'emballage de modules

AVANT-PROPOS

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L'IEC 62759-1 a été établie par le comité d'études 82 de l'IEC: Systèmes de conversion photovoltaïque de l'énergie solaire. Il s'agit d'une Norme internationale.

Cette deuxième édition annule et remplace la première édition parue en 2015. Elle constitue une révision technique.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

a) annulation des essais et des références relatifs aux normes applicables aux modules photovoltaïques à concentration (CPV);
b) suppression des différentes classes de modules PV;
c) suppression du minimum exigé de 10 modules par colis d'expédition;
d) mise en place de la stabilisation comme mesurage intermédiaire;

e) ajout des critères d'acceptation/de rejet;

f) modification des exigences pour les contre-essais;

g) modification du nombre de cycles dans l'essai de charge mécanique dynamique. Voir aussi l'article 6.4.2.1.

Le texte de cette Norme internationale est issu des documents suivants:

Projet	Rapport de vote
82/2029/FDIS	82/2052/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à son approbation.

La langue employée pour l'élaboration de cette Norme internationale est l'anglais.

Une liste de toutes les parties de la série IEC 62759, publiées sous le titre général *Modules photovoltaïques (PV) – Essais de transport*, peut être consultée sur le site web de l'IEC.

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2, il a été développé selon les Directives ISO/IEC, Partie 1 et les Directives ISO/IEC, Supplément IEC, disponibles sous www.iec.ch/members_experts/refdocs. Les principaux types de documents développés par l'IEC sont décrits plus en détail sous www.iec.ch/standardsdev/publications.

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MODULES PHOTOVOLTAÏQUES (PV) – ESSAIS DE TRANSPORT –

Partie 1: Transport et expédition d'unités d'emballage de modules

1 Domaine d’application

Les modules photovoltaïques (PV - photovoltaic) sont des dispositifs électriques destinés à une exposition extérieure continue pendant leur durée de vie. Les normes d’homologation existantes ne prennent pas en considération les contraintes mécaniques pouvant survenir au cours du transport vers la destination d’installation du PV.

La présente partie de l'IEC 62759 décrit les méthodes de simulation de transport de l’ensemble des unités d’emballage des modules et des impacts environnementaux résultants combinés.

L’Annexe B fournit une liste des modifications de la conception qui exige un contre-essai.

Le présent document s’applique aux modules photovoltaïques à plaque plane.

2 Références normatives

Les documents suivants sont cités dans le texte de sorte qu’ils constituent, pour tout ou partie de leur contenu, des exigences du présent document. Pour les références datées, seule l’édition citée s’applique. Pour les références non datées, la dernière édition du document de référence s'applique (y compris les éventuels amendements).

IEC 60068-2-27:2008, *Essais d'environnement – Partie 2-27: Essais – Essai Ea et guide: Chocs*

IEC TS 60904-13, *Photovoltaic devices – Part 13: Electroluminescence of photovoltaic modules* (disponible en anglais seulement)

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

IEC 61215-2:2021, *Modules photovoltaïques (PV) pour applications terrestres – Qualification de la conception et homologation – Partie 2: Procédures d'essai*

IEC 61730-2*, Qualification pour la sûreté de fonctionnement des modules photovoltaïques (PV) – Partie 2: Exigences pour les essais*

IEC TS 61836, *Solar photovoltaic (PV) energy systems – Terms, definitions and symbols* (disponible en anglais seulement)

IEC TS 62782:2016, *Photovoltaic (PV) modules – Cyclic (dynamic) mechanical load testing* (disponible en anglais seulement)

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