

# INTERNATIONAL STANDARD



**Photovoltaic (PV) modules – Transportation testing –  
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

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**PHOTOVOLTAIC (PV) MODULES –  
TRANSPORTATION TESTING –****Part 1: Transportation and shipping of module package units****FOREWORD**

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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](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/standardsdev/publications](http://www.iec.ch/standardsdev/publications).

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under [webstore.iec.ch](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.

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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 GPV 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~~

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC TS 61836:1999 and the following apply.

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

##### **bandwidth**

difference in Hz between the upper and lower limits of a frequency band

*Note 1 to entry:* For the purposes of the described test method, the bandwidth may be considered equivalent to the frequency resolution of a spectrum analysis.

#### 3.2

##### **overall $g_{RMS}$**

square root of the integral of power spectral density over the total frequency range

*Note 1 to entry:* It describes the severity or harshness of the testing grade.