Irish Standard
I.S. EN 62759-1:2015

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

I.S. EN 62759-1:2015

Incorporating amendments/corrigenda/National Annexes issued since publication:

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National Foreword

I.S. EN 62759-1:2015 is the adopted Irish version of the European Document EN 62759-1:2015, Photovoltaic (PV) modules - Transportation testing - Part 1: Transportation and shipping of module package units

This document does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 62759-1

September 2015

ICS 27.160

English Version

Photovoltaic (PV) modules - Transportation testing - Part 1: Transportation and shipping of module package units (IEC 62759-1:2015)

Modules photovoltaïques (PV) - Essais de transport - Partie 1: Transport et expédition d'unités d'emballage de modules (IEC 62759-1:2015)

Transportprüfung von Photovoltaik(PV)-Modulen - Teil 1: Transport und Versand von PV-Modulpaketen (IEC 62759-1:2015)

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Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Ref. No. EN 62759-1:2015 E

European foreword

The text of document 82/962/FDIS, future edition 1 of IEC 62759-1, prepared by IEC/TC 82 "Solar photovoltaic energy systems" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62759-1:2015.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2016-05-01
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2018-07-31

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Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

Publication	Year	Title	EN/HD	Year
IEC 60068-2-27	2008	Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock	EN 60068-2-27	2009
IEC 60068-2-64	-	Environmental testing - Part 2-64: Tests - Test Fh: Vibration, broadband random and guidance	EN 60068-2-64	-
IEC 61215	2005	Crystalline silicon terrestrial photovoltaic (PV) modules - Design qualification and type approval	EN 61215	2005
IEC 61646	2008	Thin-film terrestrial photovoltaic (PV) modules - Design qualification and type approval	EN 61646	2008
IEC 61730-2 (mod)	2004	Photovoltaic (PV) module safety qualification - Part 2: Requirements for testing	EN 61730-2	2007
IEC/TS 61836	-	Solar photovoltaic energy systems - Terms, definitions and symbols	CLC/TS 61836	-
IEC 62108	2007	Concentrator Photovoltaic (CPV) modules and assemblies - Design qualification and type approval	EN 62108	2008
IEC/TS 62782	- [1)]	Dynamic mechanical load testing for photovoltaic (PV) modules	-	-
ISO 13355	-	Packaging - Complete, filled transport packages and unit loads - Vertical random vibration test	EN ISO 13355	-

1) To be published.

EN 62759-1:2015

Publication	Year	Title	EN/HD	Year
ASTM D 880-92	2008	Standard Test Method for Impact Testing for Shipping Containers and Systems	-	-
ASTM D 4169	2008	Standard Practice for Performance Testing of Shipping Containers and Systems	-	-
ASTM D 4728	2006	Standard Test Method for Random Vibration Testing of Shipping Containers	-	-
ASTM D 5277	1992	Standard Test Method for Performing Programmed Horizontal Impacts Using an Inclined Impact Tester	-	-
MIL-STD-810G	-	Test Method Standard: Environmental Engineering Considerations and Laboratory Tests	-	-

IEC 62759-1

Edition 1.0 2015-06

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 62759-1:2015-06(en-fr)

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

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

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CONTENTS

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

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

FDIS	Report on voting
82/962/FDIS	82/982/RVD

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

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

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

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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.

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 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 61215:2005, *Crystalline silicon terrestrial photovoltaic (PV) modules – Design qualification and type approval*

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

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

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

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

IEC 62782, *Dynamic mechanical load testing for photovoltaic (PV) modules* (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 D4728:2006, *Standard Test Method for Random Vibration Testing of Shipping Containers*

ASTM D5277:1992, *Test method for performing programmed horizontal impact using an incline impact tester*

ISTA 3E:2009, *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.

3.1
bandwidth
difference in Hz between the upper and lower limits of a frequency band. 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. It describes the severity or harshness of the testing grade

3.3
root mean square
r.m.s.
square root of the mean square value. In the exclusive case of a sine wave, the r.m.s. value is 0,707 times peak value

3.4
random vibration
oscillation whose instantaneous amplitude is not prescribed for any given instant in time. The instantaneous amplitudes of a random vibration are prescribed by a probability distribution function, the integral of which, over a given amplitude range, will give the probable percentage of time that the amplitude will fall within that range. Random vibration contains no periodic or quasi-periodic components

3.5
packaging
material and technology used to protect goods from transportation stresses and separate individual units from each other

3.6
power spectral density
PSD
expression of random vibration in terms of mean-square acceleration per unit of frequency. The units are g^2/Hz (g^2/cycles/s). Power spectral density is the limit of the mean square