

<b>STN</b>	<b>Terestriálne fotovoltaické (PV) moduly. Posúdenie návrhu a typové schválenie. Časť 1-1: Osobitné požiadavky na skúšanie fotovoltaických (PV) modulov z kryštalického kremíka.</b>	<b>STN EN 61215-1-1</b>  36 4630
------------	--	--

Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1-1: Special requirements for testing of crystalline silicon photovoltaic (PV) Modules

Táto norma obsahuje anglickú verziu európskej normy.  
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 12/16

Obsahuje: EN 61215-1-1:2016, IEC 61215-1-1:2016

**124032**

---

Úrad pre normalizáciu, metrológiu a skúšobníctvo SR, 2017  
Podľa zákona č. 264/1999 Z. z. v znení neskorších predpisov sa môžu slovenské technické normy rozmnožovať a rozširovať iba so súhlasom Úradu pre normalizáciu, metrológiu a skúšobníctvo SR.

English Version

Terrestrial photovoltaic (PV) modules - Design qualification and  
type approval - Part 1-1: Special requirements for testing of  
crystalline silicon photovoltaic (PV) Modules  
(IEC 61215-1-1:2016)

Modules photovoltaïques (PV) pour applications terrestres -  
Qualification de la conception et homologation -  
Partie 1-1: Exigences particulières d'essai des modules  
photovoltaïques (PV) au silicium cristallin  
(IEC 61215-1-1:2016)

Terrestrische Photovoltaik-(PV-)Module - Bauarteignung  
und Bauartzulassung -  
Part 1-1: Besondere Anforderungen für das Prüfen von  
kristallinen Silizium-Photovoltaik-(PV) Modulen  
(IEC 61215-1-1:2016)

This European Standard was approved by CENELEC on 2016-04-13. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.



European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

**EN 61215-1-1:2016****European foreword**

The text of document 82/1047/FDIS, future edition 1 of IEC 61215-1-1, prepared by IEC/TC 82 "Solar photovoltaic energy systems" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61215-1-1:2016.

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) 2017-01-13
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2019-04-13

This document supersedes EN 61215:2005 (partially).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

**Endorsement notice**

The text of the International Standard IEC 61215-1-1:2016 was approved by CENELEC as a European Standard without any modification.

**Annex ZA**  
(normative)

**Normative references to international publications  
with their corresponding European publications**

**Annexes ZA of EN 61215-1:2016 and of EN 61215-2:2016 applies.**



# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

**Terrestrial photovoltaic (PV) modules – Design qualification and type approval –  
Part 1-1: Special requirements for testing of crystalline silicon photovoltaic (PV)  
modules**

**Modules photovoltaïques (PV) pour applications terrestres – Qualification de la  
conception et homologation –  
Partie 1-1: Exigences particulières d'essai des modules photovoltaïques (PV) au  
silicium cristallin**





**THIS PUBLICATION IS COPYRIGHT PROTECTED**  
**Copyright © 2016 IEC, Geneva, Switzerland**

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Central Office  
 3, rue de Varembe  
 CH-1211 Geneva 20  
 Switzerland

Tel.: +41 22 919 02 11  
 Fax: +41 22 919 03 00  
[info@iec.ch](mailto:info@iec.ch)  
[www.iec.ch](http://www.iec.ch)

#### About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

#### About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

#### IEC Catalogue - [webstore.iec.ch/catalogue](http://webstore.iec.ch/catalogue)

The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

#### IEC publications search - [www.iec.ch/searchpub](http://www.iec.ch/searchpub)

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, replaced and withdrawn publications.

#### IEC Just Published - [webstore.iec.ch/justpublished](http://webstore.iec.ch/justpublished)

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and also once a month by email.

#### Electropedia - [www.electropedia.org](http://www.electropedia.org)

The world's leading online dictionary of electronic and electrical terms containing 20 000 terms and definitions in English and French, with equivalent terms in 15 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

#### IEC Glossary - [std.iec.ch/glossary](http://std.iec.ch/glossary)

65 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

#### IEC Customer Service Centre - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: [csc@iec.ch](mailto:csc@iec.ch).

#### A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

#### A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

#### Catalogue IEC - [webstore.iec.ch/catalogue](http://webstore.iec.ch/catalogue)

Application autonome pour consulter tous les renseignements bibliographiques sur les Normes internationales, Spécifications techniques, Rapports techniques et autres documents de l'IEC. Disponible pour PC, Mac OS, tablettes Android et iPad.

#### Recherche de publications IEC - [www.iec.ch/searchpub](http://www.iec.ch/searchpub)

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études,...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

#### IEC Just Published - [webstore.iec.ch/justpublished](http://webstore.iec.ch/justpublished)

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et aussi une fois par mois par email.

#### Electropedia - [www.electropedia.org](http://www.electropedia.org)

Le premier dictionnaire en ligne de termes électroniques et électriques. Il contient 20 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans 15 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

#### Glossaire IEC - [std.iec.ch/glossary](http://std.iec.ch/glossary)

65 000 entrées terminologiques électrotechniques, en anglais et en français, extraites des articles Termes et Définitions des publications IEC parues depuis 2002. Plus certaines entrées antérieures extraites des publications des CE 37, 77, 86 et CISPR de l'IEC.

#### Service Clients - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: [csc@iec.ch](mailto:csc@iec.ch).



# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

---

**Terrestrial photovoltaic (PV) modules – Design qualification and type approval –  
Part 1-1: Special requirements for testing of crystalline silicon photovoltaic (PV)  
modules**

**Modules photovoltaïques (PV) pour applications terrestres – Qualification de la  
conception et homologation –  
Partie 1-1: Exigences particulières d'essai des modules photovoltaïques (PV) au  
silicium cristallin**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
ELECTROTECHNIQUE  
INTERNATIONALE

---

ICS 27.160

ISBN 978-2-8322-3195-1

**Warning! Make sure that you obtained this publication from an authorized distributor.  
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

## CONTENTS

FOREWORD.....	3
1 Scope and object.....	5
2 Normative references.....	5
3 Terms and definitions .....	5
4 Test samples.....	5
5 Marking and documentation .....	5
6 Testing.....	5
7 Pass criteria.....	6
8 Major visual defects.....	6
9 Report.....	6
10 Modifications.....	6
11 Test flow and procedures.....	6
11.1 Visual inspection (MQT 01) .....	6
11.2 Maximum power determination (MQT 02).....	6
11.3 Insulation test (MQT 03).....	6
11.4 Measurement of temperature coefficients (MQT 04) .....	6
11.5 Measurement of nominal module operating temperature (NMOT) (MQT 05).....	6
11.6 Performance at STC (MQT 06.1) and NMOT (MQT 06.2).....	6
11.7 Performance at low irradiance (MQT 07).....	6
11.8 Outdoor exposure test (MQT 08) .....	6
11.9 Hot-spot endurance test (MQT 09).....	7
11.9.1 Purpose.....	7
11.9.2 Classification of cell interconnection.....	7
11.9.3 Apparatus.....	7
11.9.4 Procedure.....	7
11.9.5 Final measurements.....	7
11.9.6 Requirements .....	7
11.10 UV preconditioning test (MQT 10).....	7
11.11 Thermal cycling test (MQT 11).....	7
11.12 Humidity-freeze test (MQT 12).....	7
11.13 Damp heat test (MQT 13).....	7
11.14 Robustness of terminations test (MQT 14) .....	7
11.15 Wet leakage current test (MQT 15).....	7
11.16 Static mechanical load test (MQT 16) .....	8
11.17 Hail test (MQT 17).....	8
11.18 Bypass diode thermal test (MQT 18).....	8
11.19 Stabilization (MQT 19).....	8
11.19.4 Other stabilization procedures.....	8
11.19.5 Initial stabilization (MQT 19.1).....	8
11.19.6 Final stabilization (MQT 19.2).....	8



## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**TERRESTRIAL PHOTOVOLTAIC (PV) MODULES –  
DESIGN QUALIFICATION AND TYPE APPROVAL –****Part 1-1: Special requirements for testing of  
crystalline silicon photovoltaic (PV) modules**

## 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.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61215-1-1 has been prepared by IEC technical committee 82: Solar photovoltaic energy systems.

This edition cancels and replaces the second edition of IEC 61215, issued in 2005, and constitutes a technical revision.

This standard is to be read in conjunction with IEC 61215-1:2016 and IEC 61215-2:2016.

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

FDIS	Report on voting
82/1047/FDIS	82/1075/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.

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.

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

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.

## **TERRESTRIAL PHOTOVOLTAIC (PV) MODULES – DESIGN QUALIFICATION AND TYPE APPROVAL –**

### **Part 1-1: Special requirements for testing of crystalline silicon photovoltaic (PV) modules**

#### **1 Scope and object**

This part of IEC 61215 lays down IEC requirements for the design qualification and type approval of terrestrial photovoltaic modules suitable for long-term operation in general open air climates, as defined in IEC 60721-2-1. This standard is intended to apply to all crystalline silicon terrestrial flat plate modules.

This standard 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 current, voltage and power levels expected at the design concentration.

The object of this test sequence is to determine the electrical and thermal 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 in climates described in the scope. The actual lifetime expectancy of modules so qualified will depend on their design, their environment and the conditions under which they are operated.

This standard defines PV technology dependent modifications to the testing procedures and requirements per IEC 61215-1:2016 and IEC 61215-2:2016.

#### **2 Normative references**

The normative references of IEC 61215-1:2016 and IEC 61215-2:2016 are applicable without modifications.

**koniec náhľadu – text ďalej pokračuje v platenej verzii STN**