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# INTERNATIONAL STANDARD



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## Photovoltaic (PV) module safety qualification – Part 2: Requirements for testing

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## PHOTOVOLTAIC (PV) MODULE SAFETY QUALIFICATION –

## Part 2: Requirements for testing

## FOREWORD

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International Standard IEC 61730-2 has been prepared by IEC technical committee 82: Solar photovoltaic energy systems.

This second edition cancels and replaces the first edition of IEC 61730-2, issued in 2004 and its amendment 1 (2011), and constitutes a technical revision.

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

- a) Rearrange test sequences.
- b) MST 01: Visual inspection: added nameplate requirement and modified pass criteria.
- c) Added sharp edge test MST 06.
- d) Added insulation thickness test MST 04.
- e) MST 11: Accessibility test: defined force for test finger.
- f) MST 12: Cut susceptibility test: defined blade radius for cut test.
- g) MST 14: removed preconditioning requirement TC200 from Figure 1.
- h) MST 15: Partial discharge test removed.
- i) Renamed dielectric breakdown test MST 16 to insulation test.
- j) MST 21: Temperature test: rewritten test procedure; removed short circuit mode; allow alternative indoor test method.
- k) MST 23: Fire test: subclause rewritten; fire test requirements related to national building codes; moved optional test description to informative annex.
- l) Added ignitability test MST 24.
- m) MST 26: Reverse current overload test: changed specification of wooden board.
- n) MST 32: Module breakage test: defined new dimensions of impactor to allow other filling compounds; consider variety of mounting techniques for glass breakage test; reduced impact height to only 300 mm; corrected diameter of opening according to referenced standard (65 cm<sup>2</sup> instead of 6,5 cm<sup>2</sup>).
- o) Added screw connection test MST 33.
- p) Added peel test MST 35 for proof of cemented joints.
- q) Added lap shear strength test MST 36 for proof of cemented joints.
- r) Added materials creep test MST 37.
- s) Added PV module test sequence with moisture and UV to stress polymers to Figure 1. The new UV sequence was added as a response to the Kyoto meeting, where it was decided to add a coupon test and a PV module test sequence. As it is not possible to perform the ISO UV test on PV modules (no affordable equipment available) it was decided to rely on already available PV module test equipment. R&D work has shown that cycling UV and HF are best to age polymers in PV modules.
- t) Added new sequence for Pollution Degree (PD) testing (sequence B1).
- u) Added annex: Recommendations for testing of PV modules from production.

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

FDIS	Report on voting
82/1129/FDIS	82/1147/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.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website 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.

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# PHOTOVOLTAIC (PV) MODULE SAFETY QUALIFICATION –

## Part 2: Requirements for testing

### 1 ~~Scope and object~~

~~This part of IEC 61730 describes the testing requirements for photovoltaic (PV) modules in order to provide safe electrical and mechanical operation during their expected lifetime. Specific topics are provided to assess the prevention of electrical shock, fire hazards, and personal injury due to mechanical and environmental stresses. IEC 61730-1 pertains to the particular requirements of construction. This part of IEC 61730 outlines the requirements of testing.~~

~~This standard attempts to define the basic requirements for various application classes of photovoltaic modules, but it cannot be considered to encompass all national or regional building codes. The specific requirements for marine and vehicle applications are not covered. This standard is not applicable to modules with integrated AC inverters (AC modules).~~

~~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 safety and performance evaluation of a photovoltaic module design.~~

~~The test sequences of this standard are arranged in an optimal way so that tests of IEC 61215 or IEC 61646 can be used as basic preconditioning tests.~~

The scope of IEC 61730-1 is also applicable to this part of IEC 61730. While IEC 61730-1 outlines the requirements of construction, this part of the standard lists the tests a PV module is required to fulfill for safety qualification. IEC 61730-2 is applied for safety qualification only in conjunction with IEC 61730-1.

~~NOTE 4~~ The sequence of tests required in this standard may not test for all possible safety aspects associated with the use of PV modules in all possible applications. This standard utilizes the best sequence of tests available at the time of its writing. There are some issues – such as the potential danger of electric shock posed by a broken PV module in a high voltage system – that should be addressed by the systems design, location, restrictions on access and maintenance procedures.

The objective of this standard is to provide the testing sequence intended to verify the safety of PV modules whose construction has been assessed by IEC 61730-1. The test sequence and pass criteria are designed to detect the potential breakdown of internal and external components of PV modules that would result in fire, electric shock, and/or personal injury. The standard defines the basic safety test requirements and additional tests that are a function of the PV module end-use applications. Test categories include general inspection, electrical shock hazard, fire hazard, mechanical stress, and environmental stress.

~~NOTE 2~~ The additional testing requirements outlined in relevant ISO standards, or the national or local codes which govern the installation and use of these PV modules in their intended locations, should be considered in addition to the requirements contained within this standard.

### 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 60060-1, *High-voltage test techniques – Part 1: General definitions and test requirements*

~~IEC 60068-1, *Environmental testing – Part 1: General and guidance*~~

IEC 60068-2-1, *Environmental testing – Part 2-1: Tests – Test A: Cold*

~~IEC 60410, *Sampling plans and procedures for inspection by attributes*~~

IEC 60068-2-2, *Environmental testing – Part 2-2: Tests – Test B: Dry heat*

IEC 60068-3-5, *Environmental testing – Part 3-5: Supporting documentation and guidance; Confirmation of the performance of temperature chambers*

IEC 60598-1:2014, *Luminaires – Part 1: General requirements and tests*

IEC 60664-1:1992 2007, *Insulation co-ordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*

~~Amendment 2 (2002)~~

IEC 60695-2-10, *Fire hazard testing – Part 2-10: Glowing/hot-wire based test methods – Glow-wire apparatus and common test procedure*

IEC 60904-2, *Photovoltaic devices – Part 2: Requirements for photovoltaic reference solar cells devices*

~~IEC 60904-6, *Photovoltaic devices – Part 6: Requirements for reference solar modules*~~

IEC 60904-9, *Photovoltaic devices – Part 9: Solar simulator performance requirements*

IEC 60950-1:2005, *Information technology equipment – Safety – Part 1: General requirements*

IEC 61010-1, *Safety requirements for electrical equipment for measurement, control and laboratory use – Part 1: General requirements*

IEC 61032:1997, *Protection of persons and equipment by enclosures – Probes for verification*

IEC 61140, *Protection against electric shock – Common aspects for installation and equipment*

IEC 61215:2004 (all parts), ~~Crystalline silicon~~ *Terrestrial photovoltaic (PV) modules – Design qualification and type approval*

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

~~IEC 61646:1996, *Thin-film Terrestrial photovoltaic (PV) modules – Design qualification and type approval*~~

IEC 61730-1:2004 2016, *Photovoltaic (PV) module safety qualification – Part 1: Requirements for construction*

IEC 62790, *Junction boxes for photovoltaic modules – Safety requirements and tests*

ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*

ISO 813, *Rubber, vulcanized or thermoplastic – Determination of adhesion to a rigid substrate – 90 degree peel method*

ISO 4046-4, *Paper, board, pulps and related terms – Vocabulary – Part 4: Paper and board grades and converted products*

ISO 4587:2003, *Adhesives – Determination of tensile lap-shear strength of rigid-to-rigid bonded assemblies*

ISO 5893, *Rubber and plastics test equipment – Tensile, flexural and compression types (constant rate of traverse) – Specification*

ISO 8124-1, *Safety of toys – Part 1: Safety aspects related to mechanical and physical properties*

ISO 11925-2:2010, *Reaction to fire tests – Ignitability of products subjected to direct impingement of flame – Part 2: Single-flame source test*

ISO 23529, *Rubber – General procedures for preparing and conditioning test pieces for physical test methods*

~~ANSI/UL 514C, *Non-metallic outlet boxes, flush device boxes and covers*~~

~~ANSI/UL 790, *Tests for Fire Resistance of Roof Covering Materials*~~

~~ANSI/UL 1703, *Flat – Plate Photovoltaic Modules and Panels*~~

ANSI Z97.1:2009, ~~*American National Standard – Safety Glazing Materials Used in Buildings – Safety Performance Specifications and Methods of Test*~~

ANSI/UL 1703:2015, *Flat-plate photovoltaic modules and panels*

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



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**Photovoltaic (PV) module safety qualification –  
Part 2: Requirements for testing**

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

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# INTERNATIONAL ELECTROTECHNICAL COMMISSION

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## PHOTOVOLTAIC (PV) MODULE SAFETY QUALIFICATION –

### Part 2: Requirements for testing

#### 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 61730-2 has been prepared by IEC technical committee 82: Solar photovoltaic energy systems.

This second edition cancels and replaces the first edition of IEC 61730-2, issued in 2004 and its amendment 1 (2011), and constitutes a technical revision.

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

- a) Rearrange test sequences.
- b) MST 01: Visual inspection: added nameplate requirement and modified pass criteria.
- c) Added sharp edge test MST 06.
- d) Added insulation thickness test MST 04.
- e) MST 11: Accessibility test: defined force for test finger.
- f) MST 12: Cut susceptibility test: defined blade radius for cut test.

- g) MST 14: removed preconditioning requirement TC200 from Figure 1.
- h) MST 15: Partial discharge test removed.
- i) Renamed dielectric breakdown test MST 16 to insulation test.
- j) MST 21: Temperature test: rewritten test procedure; removed short circuit mode; allow alternative indoor test method.
- k) MST 23: Fire test: subclause rewritten; fire test requirements related to national building codes; moved optional test description to informative annex.
- l) Added ignitability test MST 24.
- m) MST 26: Reverse current overload test: changed specification of wooden board.
- n) MST 32: Module breakage test: defined new dimensions of impactor to allow other filling compounds; consider variety of mounting techniques for glass breakage test; reduced impact height to only 300 mm; corrected diameter of opening according to referenced standard (65 cm<sup>2</sup> instead of 6,5 cm<sup>2</sup>).
- o) Added screw connection test MST 33.
- p) Added peel test MST 35 for proof of cemented joints.
- q) Added lap shear strength test MST 36 for proof of cemented joints.
- r) Added materials creep test MST 37.
- s) Added PV module test sequence with moisture and UV to stress polymers to Figure 1. The new UV sequence was added as a response to the Kyoto meeting, where it was decided to add a coupon test and a PV module test sequence. As it is not possible to perform the ISO UV test on PV modules (no affordable equipment available) it was decided to rely on already available PV module test equipment. R&D work has shown that cycling UV and HF are best to age polymers in PV modules.
- t) Added new sequence for Pollution Degree (PD) testing (sequence B1).
- u) Added annex: Recommendations for testing of PV modules from production.

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

FDIS	Report on voting
82/1129/FDIS	82/1147/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.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website 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.

**IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.**

# PHOTOVOLTAIC (PV) MODULE SAFETY QUALIFICATION –

## Part 2: Requirements for testing

### 1 Scope

The scope of IEC 61730-1 is also applicable to this part of IEC 61730. While IEC 61730-1 outlines the requirements of construction, this part of the standard lists the tests a PV module is required to fulfill for safety qualification. IEC 61730-2 is applied for safety qualification only in conjunction with IEC 61730-1.

The sequence of tests required in this standard may not test for all possible safety aspects associated with the use of PV modules in all possible applications. This standard utilizes the best sequence of tests available at the time of its writing. There are some issues – such as the potential danger of electric shock posed by a broken PV module in a high voltage system – that should be addressed by the system design, location, restrictions on access and maintenance procedures.

The objective of this standard is to provide the testing sequence intended to verify the safety of PV modules whose construction has been assessed by IEC 61730-1. The test sequence and pass criteria are designed to detect the potential breakdown of internal and external components of PV modules that would result in fire, electric shock, and/or personal injury. The standard defines the basic safety test requirements and additional tests that are a function of the PV module end-use applications. Test categories include general inspection, electrical shock hazard, fire hazard, mechanical stress, and environmental stress.

The additional testing requirements outlined in relevant ISO standards, or the national or local codes which govern the installation and use of these PV modules in their intended locations, should be considered in addition to the requirements contained within this standard.

### 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 60060-1, *High-voltage test techniques – Part 1: General definitions and test requirements*

IEC 60068-2-1, *Environmental testing – Part 2-1: Tests – Test A: Cold*

IEC 60068-2-2, *Environmental testing – Part 2-2: Tests – Test B: Dry heat*

IEC 60068-3-5, *Environmental testing – Part 3-5: Supporting documentation and guidance; Confirmation of the performance of temperature chambers*

IEC 60598-1:2014, *Luminaires – Part 1: General requirements and tests*

IEC 60664-1:2007, *Insulation co-ordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*

IEC 60695-2-10, *Fire hazard testing – Part 2-10: Glowing/hot-wire based test methods – Glow-wire apparatus and common test procedure*

IEC 60904-2, *Photovoltaic devices – Part 2: Requirements for photovoltaic reference devices*

IEC 60904-9, *Photovoltaic devices – Part 9: Solar simulator performance requirements*

IEC 60950-1:2005, *Information technology equipment – Safety – Part 1: General requirements*

IEC 61010-1, *Safety requirements for electrical equipment for measurement, control and laboratory use – Part 1: General requirements*

IEC 61032:1997, *Protection of persons and equipment by enclosures – Probes for verification*

IEC 61140, *Protection against electric shock – Common aspects for installation and equipment*

IEC 61215 (all parts), *Terrestrial photovoltaic (PV) modules – Design qualification and type approval*

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

IEC 61730-1:2016, *Photovoltaic (PV) module safety qualification – Part 1: Requirements for construction*

IEC 62790, *Junction boxes for photovoltaic modules – Safety requirements and tests*

ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*

ISO 813, *Rubber, vulcanized or thermoplastic – Determination of adhesion to a rigid substrate – 90 degree peel method*

ISO 4046-4, *Paper, board, pulps and related terms – Vocabulary – Part 4: Paper and board grades and converted products*

ISO 4587:2003, *Adhesives – Determination of tensile lap-shear strength of rigid-to-rigid bonded assemblies*

ISO 5893, *Rubber and plastics test equipment – Tensile, flexural and compression types (constant rate of traverse) – Specification*

ISO 8124-1, *Safety of toys – Part 1: Safety aspects related to mechanical and physical properties*

ISO 11925-2:2010, *Reaction to fire tests – Ignitability of products subjected to direct impingement of flame – Part 2: Single-flame source test*

ISO 23529, *Rubber – General procedures for preparing and conditioning test pieces for physical test methods*

ANSI Z97.1:2009, *Standard – Safety Glazing Materials Used in Buildings – Safety Performance Specifications and Methods of Test*

ANSI/UL 1703:2015, *Flat-plate photovoltaic modules and panels*

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## COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

### QUALIFICATION POUR LA SÛRETÉ DE FONCTIONNEMENT DES MODULES PHOTOVOLTAÏQUES (PV) –

#### Partie 2: Exigences pour les essais

#### AVANT-PROPOS

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La Norme internationale IEC 61730-2 a été établie par le comité d'études 82 de l'IEC: Systèmes de conversion photovoltaïque de l'énergie solaire.

Cette deuxième édition annule et remplace la première édition de l'IEC 61730-2, parue en 2004 et son amendement 1 (2011). Elle constitue une révision technique.

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

- a) réorganisation des séquences d'essai;
- b) examen visuel MST 01: ajout de l'exigence relative à la plaque signalétique et modification des critères d'acceptation;
- c) ajout de l'essai des angles vifs MST 06;

- d) ajout de l'essai d'épaisseur de l'isolant MST 04;
- e) essai d'accessibilité MST 11: définition de la force pour le doigt d'essai;
- f) essai de susceptibilité aux rayures MST 12: définition d'un rayon de lame pour l'essai aux rayures;
- g) essai MST 14: suppression de l'exigence de préconditionnement TC200 dans la Figure 1;
- h) suppression de l'essai de décharge partielle MST 15;
- i) rebaptisation de l'essai de claquage diélectrique MST 16 sous le nom d'essai diélectrique;
- j) essai en température MST 21: réécriture de la procédure d'essai; suppression du mode court-circuit; utilisation permise d'une méthode d'essai en intérieur alternative;
- k) essai de résistance au feu MST 23: réécriture du paragraphe; spécification des exigences d'essai de résistance au feu relatives aux codes de construction nationaux; déplacement de la description des essais facultatifs dans une annexe informative;
- l) ajout de l'essai d'allumabilité MST 24;
- m) essai de surcharge de courant inverse MST 26: modification de la spécification relative à la planche de bois;
- n) essai de détérioration du module MST 32: définition de nouvelles dimensions pour l'outil d'impact afin d'admettre d'autres composés de remplissage; étude de techniques de montage variées pour l'essai de bris de verre; diminution de la hauteur d'impact à 300 mm seulement; correction du diamètre d'ouverture conformément à la norme référencée (65 cm<sup>2</sup> au lieu de 6,5 cm<sup>2</sup>);
- o) ajout de l'essai des raccords vissés MST 33;
- p) ajout de l'essai de pelage MST 35 pour l'évaluation des joints collés;
- q) ajout de l'essai de cisaillement longitudinal MST 36 pour l'évaluation des joints collés;
- r) ajout de l'essai de fluage des matériaux MST 37;
- s) ajout, dans la Figure 1, de la séquence d'essais à l'humidité et aux rayons ultraviolets des modules PV pour évaluer la résistance des matériaux polymères aux contraintes. La nouvelle séquence d'essais aux UV a été ajoutée en réponse à la réunion de Kyoto, où il a été décidé d'ajouter un essai d'éprouvette ainsi qu'une séquence d'essai des modules PV. Etant donné que l'essai ISO aux UV ne peut pas être réalisé sur les modules PV (aucun équipement abordable n'est disponible), il a été décidé de s'appuyer sur les équipements d'essai de modules PV déjà disponibles. Les travaux de R&D ont montré que les cycles d'UV et de hautes fréquences (HF) sont les mieux adaptés pour évaluer le vieillissement des matériaux polymères dans les modules PV;
- t) ajout d'une nouvelle séquence pour l'essai de degré de pollution (PD) (séquence B1);
- u) ajout de l'Annexe intitulée "Recommandations relatives aux essais de modules PV issus de la production".

Le texte de cette norme est issu des documents suivants:

FDIS	Rapport de vote
82/1129/FDIS	82/1147/RVD

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

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# QUALIFICATION POUR LA SÛRETÉ DE FONCTIONNEMENT DES MODULES PHOTOVOLTAÏQUES (PV) –

## Partie 2: Exigences pour les essais

### 1 Domaine d'application

Le domaine d'application de l'IEC 61730-1 s'applique également à la présente partie de l'IEC 61730. Alors que l'IEC 61730-1 définit les exigences de construction, la présente partie de la norme répertorie les essais auxquels un module PV doit satisfaire à des fins de qualification pour la sûreté de fonctionnement. L'IEC 61730-2 n'est appliquée à des fins de qualification pour la sûreté de fonctionnement que conjointement à l'IEC 61730-1.

La séquence d'essais exigée dans la présente norme peut ne pas soumettre à l'essai tous les aspects de sécurité potentiels associés à l'utilisation des modules PV dans toutes les applications possibles. La présente norme utilise la meilleure séquence d'essais disponible au moment de la rédaction de la présente norme. Il convient de tenir compte de certains problèmes (tels que le danger potentiel de chocs électriques posés par un module PV cassé dans un système à haute tension) dans le cadre de la conception du système, de la localisation, des restrictions d'accès et des procédures de maintenance.

L'objectif de la présente norme est de fournir la séquence d'essais destinée à vérifier la sûreté des modules PV dont la construction a été évaluée par l'IEC 61730-1. La séquence d'essais et les critères d'acceptation sont conçus pour détecter le claquage éventuel de composants internes et externes des modules PV, qui entraînerait des incendies, des chocs électriques et/ou des dommages corporels. La norme définit les exigences de base relatives aux essais de sécurité, ainsi que des essais supplémentaires qui sont fonction des applications finales du module PV. Les catégories d'essais incluent un contrôle général, les risques de chocs électriques, le risque de feu, les contraintes mécaniques et les contraintes environnementales.

En plus des exigences contenues dans la présente norme, il convient de prendre en compte les exigences d'essai supplémentaires indiquées dans les normes ISO appropriées ou les codes nationaux ou locaux qui régissent l'installation et l'utilisation de ces modules dans leurs emplacements destinés.

### 2 Références normatives

Les documents suivants sont cités en référence de manière normative, en intégralité ou en partie, dans le présent document et sont indispensables pour son application. 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 60060-1, *Technique des essais à haute tension – Partie 1: Définitions et exigences générales*

IEC 60068-2-1, *Essais d'environnement – Partie 2-1: Essais – Essai A: Froid*

IEC 60068-2-2, *Essais d'environnement – Partie 2-2: Essais – Essai B: Chaleur sèche*

IEC 60068-3-5, *Essais d'environnement – Partie 3-5: Documentation d'accompagnement et guide – Confirmation des performances des chambres d'essai en température*

IEC 60598-1:2014, *Luminaires – Partie 1: Exigences générales et essais*

IEC 60664-1:2007, *Coordination de l'isolement des matériels dans les systèmes (réseaux) à basse tension – Partie 1: Principes, exigences et essais*

IEC 60695-2-10, *Essais relatifs aux risques du feu – Partie 2-10: Essais au fil incandescent/chauffant – Appareillage et méthode commune d'essai*

IEC 60904-2, *Dispositifs photovoltaïques – Partie 2: Exigences applicables aux dispositifs photovoltaïques de référence*

IEC 60904-9, *Dispositifs photovoltaïques – Partie 9: Exigences pour le fonctionnement des simulateurs solaires*

IEC 60950-1:2005, *Matériels de traitement de l'information – Sécurité – Partie 1: Exigences générales*

IEC 61010-1, *Règles de sécurité pour appareils électriques de mesurage, de régulation et de laboratoire – Partie 1: Exigences générales*

IEC 61032:1997, *Protection des personnes et des matériels par les enveloppes – Calibres d'essai pour la vérification*

IEC 61140, *Protection contre les chocs électriques – Aspects communs aux installations et aux matériels*

IEC 61215 (toutes les parties), *Modules photovoltaïques (PV) pour applications terrestres – Qualification de la conception et homologation*

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

IEC 61730-1:2016, *Qualification pour la sûreté de fonctionnement des modules photovoltaïques (PV) – Partie 1: Exigences pour la construction*

IEC 62790, *Boîtes de jonction pour modules photovoltaïques – Exigences de sécurité et essais*

ISO/IEC 17025, *Exigences générales concernant la compétence des laboratoires d'étalonnages et d'essais*

ISO 813, *Caoutchouc vulcanisé ou thermoplastique – Détermination de l'adhérence à un substrat rigide – Méthode par pelage à angle droit*

ISO 4046-4, *Papier, carton, pâtes et termes connexes – Vocabulaire – Partie 4: Catégories et produits transformés de papier et de carton*

ISO 4587:2003, *Adhésifs – Détermination de la résistance au cisaillement d'assemblages collés rigide sur rigide à recouvrement simple*

ISO 5893, *Appareils d'essai du caoutchouc et des plastiques – Types pour traction, flexion et compression (vitesse de translation constante) – Spécifications*

ISO 8124-1, *Sécurité des jouets – Partie 1: Aspects de sécurité relatifs aux propriétés mécaniques et physiques*

ISO 11925-2:2010, *Essais de réaction au feu – Allumabilité de produits soumis à l'incidence directe de la flamme – Partie 2: Essai à l'aide d'une source à flamme unique*

ISO 23529, *Caoutchouc – Procédures générales pour la préparation et le conditionnement des éprouvettes pour les méthodes d'essais physiques*

ANSI Z97.1:2009, *Standard – Safety Glazing Materials Used in Buildings – Safety Performance Specifications and Methods of Test* (disponible en anglais seulement)

ANSI/UL 1703:2015, *Flat-plate photovoltaic modules and panels* (disponible en anglais seulement)