

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE



**Photovoltaic (PV) module safety qualification –  
Part 1: Requirements for construction**

**Qualification pour la sûreté de fonctionnement des modules photovoltaïques (PV) –  
Partie 1: Exigences pour la construction**



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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**PHOTOVOLTAIC (PV) MODULE SAFETY QUALIFICATION –  
Part 1: Requirements for construction**

FOREWORD

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**This consolidated version of IEC 61730-1 consists of the first edition (2004) [documents 82/356/FDIS and 82/365/RVD], its amendment 1 (2011) [documents 82/659A/FDIS and 82/677/RVD] and its amendment 2 (2013) [documents 82/754/FDIS and 82/762/RVD]. It bears the edition number 1.2.**

**The technical content is therefore identical to the base edition and its amendments and has been prepared for user convenience. A vertical line in the margin shows where the base publication has been modified by amendments 1 and 2. Additions and deletions are displayed in red, with deletions being struck through.**

International Standard IEC 61730-1 has been prepared by IEC technical committee 82: Solar photovoltaic energy systems.

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

IEC 61730 consists of the following parts, under the general title *Photovoltaic (PV) module safety qualification*:

Part 1: Requirements for construction

Part 2: Requirements for testing

The committee has decided that the contents of the base publication and its amendments 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- withdrawn,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
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## PHOTOVOLTAIC (PV) MODULE SAFETY QUALIFICATION –

### Part 1: Requirements for construction

#### 1 Scope and object

This part of IEC 61730 describes the fundamental construction 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. This part of IEC 61730 pertains to the particular requirements of construction. IEC 61730-2 outlines the requirements of testing.

This standard attempts to define the basic requirements for various application classes of PV 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 coordinate 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 object of this document is to provide basic guidance in certifying the fundamental construction of photovoltaic modules presented for safety approval by testing under IEC 61730-2. These requirements are intended to minimise the misapplication and misuse of modules or the breakdown of internal components which would result in fire, electric shock and personal injury. The standard defines the basic safety construction requirements and additional tests that are a function of the module end-use applications.

Component requirements are intended to provide evidence of performance of that component appropriate to its application in the module construction and environment.

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

#### 2 Normative references

The following referenced documents are indispensable for the application 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 60065, Audio, video and similar electronic apparatus – Safety requirements*

*IEC 60112, Method for the determination of the proof and the comparative tracking indices of solid insulating materials*

*IEC 60130 (all parts), Connectors for frequencies below 3 MHz*

*IEC 60189-2, Low-frequency cables and wires with PVC insulation and PVC sheath – Part 2: Cables in pairs, triples, quads and quintuples for inside installations*

*IEC 60216-1, Electrical insulating materials – Thermal endurance properties – Part 1: Ageing procedures and evaluation of test results*

*IEC 60216-5, Electrical insulating materials – Thermal endurance properties – Part 5: Determination of relative thermal endurance index (RTE) of an insulating material*

IEC 60364-5-51, *Electrical installations of buildings – Part 5-51: Selection and erection of electrical equipment – Common rules*

IEC 60417-DB:2002<sup>1</sup>, *Graphical symbols for use on equipment*

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

IEC 60587, *Electrical insulating materials used under severe ambient conditions – Test methods for evaluating resistance to tracking and erosion*

IEC 60695-1-1, *Fire hazard testing – Part 1-1: Guidance for assessing the fire hazard of electrotechnical products – General guidelines*

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

IEC 60695-2-20, *Fire hazard testing – Part 2-20: Glowing/hot wire based test methods – Hot-wire coil ignitability – Apparatus, test method and guidance<sup>2</sup>*

IEC 60695-11-10, *Fire hazard testing – Part 11-10: Test flames 50 W horizontal and vertical flame test methods*

IEC 60695-11-20, *Fire hazard testing – Part 11-20: Test flames – 500 W flame test methods*

IEC 60947-1, *Low-voltage switchgear and controlgear – Part 1: General rules*

IEC 61140:2001, *Protection against electric shock – Common aspects for installation and equipment*

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

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

IEC 61721, *Susceptibility of a photovoltaic (PV) module to accidental impact damage (resistance to impact test)*

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

IEC 61984, *Connectors – Safety requirements and tests*

ISO 261, *ISO general purpose metric screw threads – General plan*

ISO 262, *ISO general purpose metric screw threads – Selected sizes for screws, bolts, and nuts*

ANSI/UL 746C, *Standard for Polymeric Materials – Use in Electrical Equipment Evaluation*

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

ASTM D2303-97, *Standard Test Methods for Liquid-Contaminant, Inclined-Plane Tracking and Erosion of Insulating Materials*

ASTM E162-02a, *Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source*

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<sup>1</sup> “DB” refers to the IEC on-line database.

<sup>2</sup> The 2004 edition of this publication was withdrawn in 2007. A new edition is currently under consideration.