

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



**Photovoltaic system power conversion equipment – Design qualification and type approval**

**Matériel de conversion de puissance des systèmes photovoltaïques –  
Qualification de la conception et approbation de type**



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INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

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**PHOTOVOLTAIC SYSTEM POWER CONVERSION EQUIPMENT –  
DESIGN QUALIFICATION AND TYPE APPROVAL**

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IEC 62093 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 2005. This edition constitutes a technical revision.

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

- a) Title modified.
- b) This edition focusses on the design qualification of power conversion electronics (PCE), and eliminates the clauses associated with qualification testing of other balance of system components.
- c) While many clause titles remain the same as the first edition, substantial changes have been made.
- d) Whereas the first edition establishes requirements for the design qualification of balance-of-system components used in terrestrial photovoltaic (PV) systems, this edition is limited to power conversion equipment.

e) The test protocols have been changed.

The text of this International Standard is based on the following documents:

Draft	Report on voting
82/1963/FDIS	82/1983/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.

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).

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## PHOTOVOLTAIC SYSTEM POWER CONVERSION EQUIPMENT – DESIGN QUALIFICATION AND TYPE APPROVAL

### 1 Scope

This document lays down IEC requirements for the design qualification of power conversion equipment (PCE) suitable for long-term operation in terrestrial photovoltaic (PV) systems.

This document covers electronic power conversion equipment intended for use in terrestrial PV applications. The term PCE refers to equipment and components for electronic power conversion of electric power into another kind of electric power with respect to voltage, current, and frequency. This document is suitable for PCE for use in both indoor and outdoor climates as defined in IEC 60721-3-3 and IEC 60721-3-4. Such equipment may include, but is not limited to, grid-tied and off-grid DC-to-AC PCEs, DC-to-DC converters, battery charger converters, and battery charge controllers.

This document covers PCE that is connected to PV arrays that do not nominally exceed a maximum circuit voltage of 1 500 V DC. The equipment may also be connected to systems not exceeding 1 000 V AC at the AC mains circuits, non-main AC load circuits, and to other DC source or load circuits such as batteries. If particular ancillary parts whereby manufacturers and models are specified in the manual for use with the PCE, then those parts are tested with the PCE.

Exceptions:

- a) This document does not address characteristics of power sources other than PV systems, such as wind turbines, fuel cells, rotating machine sources, etc.
- b) This document does not address the characteristics of power electronic conversion equipment fully integrated into photovoltaic modules. Separate standards exist or are in development for those types of devices. It is, however, applicable to devices where the manufacturer explicitly specifies the capability of full detachment from and subsequent reattachment to the PV module or if the input and output terminals can be accessed and a specification sheet for the PCE is available. Devices meeting these requirements may be tested as individual samples independent from the PV module.
- c) This document does not apply to power conversion equipment with integrated (built-in) electrochemical energy storage (e.g. lead acid or lithium-ion). It is, however, applicable to equipment where the manufacturer specifies and permits complete removal of the electrochemical energy storage from the PCE so that stand-alone assessment of the PCE with the storage removed becomes possible.

The object of the test sequences contained herein is to establish a basic level of durability and to show, as far as it is possible within reasonable constraints of cost and time, that the PCE is capable of maintaining its performance after prolonged exposure to the simulated environmental stresses described herein that are based on the intended use conditions specified by the manufacturer. Optional tests contained herein may be selected depending on the intended installation, market, or special environmental conditions that the PCE is anticipated to experience. The categorization imposes differentiated test sequences and test severity levels reflecting the different requirements of mechanical and electrical components in different environments.

PCEs are grouped into categories based on size and installation environment.

The actual life expectancy of components so qualified depends on their design, their environment, and the conditions under which they are operated. Estimation of a lifetime and wear out is not generally covered by this document.