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Terrestrial photovoltaic (PV) modules for consumer products – Design qualification and type approval

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TERRESTRIAL PHOTOVOLTAIC (PV) MODULES FOR CONSUMER PRODUCTS – DESIGN QUALIFICATION AND TYPE APPROVAL

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

Draft	Report on voting
82/1899/DTS	82/1931/RVDTS

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 Technical Specification 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. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

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- withdrawn,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

TERRESTRIAL PHOTOVOLTAIC (PV) MODULES FOR CONSUMER PRODUCTS – DESIGN QUALIFICATION AND TYPE APPROVAL

1 Scope

This document is intended to apply to terrestrial modules for consumer applications for outdoor operation shorter than those qualified to IEC 61215. The useful service life of modules so qualified depends on their design, their environment and the conditions under which they are operated.

This document classes those PV modules into Category 1, Category 2, and Category 3 with respectively low, medium and high expected outdoor exposure. For the purposes of designing this document, Category 1 (mobile applications) is for applications such as smart phone charging which most likely have “low” outdoor exposure. Category 2 (portable applications) is for emergency power/hiking/camping applications with “medium” outdoor exposure and it needs to have mechanical durability testing due to repeated deployment, potential for being dropped, and other mechanical stresses. Category 3 (attached applications) is for “high” outdoor exposure for applications, such as for motor homes, but is not intended for long-term utility or long-term household rooftop applications. A summary of product categories and potential applications is presented in Annex A.

Category 1 products are intended for installation where general user access and contact to uninsulated live parts is anticipated. Modules are not be combined in series strings operating at more than 35 V (V_{oc}) and do not have a system voltage rating above 35 V. These PV modules are not intended for use in parallel with other PV modules or energy sources, unless the combination provides protection from reverse current and overvoltage protection. The short-circuit current is less than 8 A and the maximum power is less than 240 W when tested under standard test conditions.

This document does not address the particularities of PV modules with integrated electronics, such as energy storage devices, charge controllers, batteries, inverters which may be sold in conjunction with the PV modules. This specification is intended to qualify the PV portion of these devices. It may, however, be used as a basis for testing such PV modules, but does not qualify the electronic portion.

This document does not apply to modules used with concentrators.

The purpose of the test sequence is to determine the electrical, thermal, and mechanical durability characteristics of the module, and to show that the module is capable of withstanding outdoor exposure for different outdoor durations designated as “low”, “medium”, and “high”. Mobile and attached applications are considered to require lower mechanical durability than portable applications, which are more prone to mechanical damage. However, the actual outdoor exposure limits of the modules depend on their design, their environment and the conditions under which they are operated.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60269-6, *Low-voltage fuses – Part 6: Supplementary requirements for fuse-links for the protection of solar photovoltaic energy systems*

IEC 60904-1, *Photovoltaic devices – Part 1: Measurement of photovoltaic current-voltage characteristics*

IEC TS 60904-1-2:2019, *Photovoltaic devices – Part 1-2: Measurement of current-voltage characteristics of bifacial photovoltaic (PV) devices*

IEC 60904-3, *Photovoltaic devices – Part 3: Measurement principles for terrestrial photovoltaic (PV) solar devices with reference spectral irradiance data*

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

IEC 61215-1:2021, *Terrestrial photovoltaic (PV) modules – Design qualification and type approval – Part 1: Test requirements*

IEC 61215-1-1:2021, *Terrestrial photovoltaic (PV) modules – Design qualification and type approval – Part 1-1: Special requirements for testing of crystalline silicon photovoltaic (PV) modules*

IEC 61215-1-2:2021, *Terrestrial photovoltaic (PV) modules – Design qualification and type approval – Part 1-2: Special requirements for testing of thin-film Cadmium Telluride (CdTe) based photovoltaic (PV) modules*

IEC 61215-1-3:2021, *Terrestrial photovoltaic (PV) modules – Design qualification and type approval – Part 1-3: Special requirements for testing of thin-film amorphous silicon based photovoltaic (PV) modules*

IEC 61215-1-4:2021, *Terrestrial photovoltaic (PV) modules – Design qualification and type approval – Part 1-4: Special requirements for testing of thin-film Cu(In,GA)(S,Se)2 based photovoltaic (PV) modules*

IEC 61215-2:2021, *Terrestrial photovoltaic (PV) modules – Design qualification and type approval – Part 2: Test procedures*

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

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

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

IEC TS 62915, *Photovoltaic (PV) modules – Type approval, design and safety qualification – Retesting*