

INTERNATIONAL STANDARD



**Photovoltaic (PV) arrays –
Part 1: Design requirements**



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**Photovoltaic (PV) arrays –
Part 1: Design requirements**

INTERNATIONAL
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CONTENTS

FOREWORD.....	6
1 Scope.....	8
2 Normative references	8
3 Terms, definitions, symbols and abbreviated terms.....	11
3.1 Terms and definitions.....	11
3.2 Symbols.....	17
3.3 Abbreviated terms.....	20
4 Compliance with IEC 60364 series	20
5 PV array system configuration	21
5.1 General.....	21
5.1.1 Functional configuration of a PV system	21
5.1.2 PV system topologies	21
5.1.3 Array electrical diagrams	22
5.1.4 Use of PCE with multiple DC inputs	28
5.1.5 PV arrays using DCUs	28
5.1.6 Series-parallel configuration	33
5.1.7 Batteries in systems	33
5.1.8 Backfeed and reverse currents	34
5.1.9 Considerations due to prospective fault current conditions within a PV array.....	34
5.1.10 Considerations due to operating temperature	34
5.1.11 Performance issues	35
5.1.12 Potential induced degradation.....	36
5.1.13 Corrosion.....	36
5.1.14 Mechanical design	36
5.1.15 Mechanical loads on PV structures	37
6 Safety issues.....	39
6.1 General.....	39
6.2 Protection against electric shock.....	39
6.2.1 General	39
6.2.2 Protective measure: double or reinforced insulation.....	39
6.2.3 Protective measure: extra-low-voltage provided by SELV or PELV.....	39
6.3 Protection against thermal effects	39
6.3.1 General	39
6.3.2 Protection against fire caused by arcs	40
6.3.3 Protection against arc flash	40
6.4 Protection against the effects of insulation faults	40
6.4.1 General	40
6.4.2 Segregation of PV circuits from other circuits	41
6.4.3 Earth fault detection and indication requirements.....	41
6.5 Protection against overcurrent	47
6.5.1 General	47
6.5.2 Requirement for overcurrent protection.....	47
6.5.3 Requirements for overcurrent protection of circuits	48
6.5.4 Overcurrent protection for PV systems connected to batteries	50
6.5.5 Overcurrent protection location.....	51
6.6 Protection against effects of lightning and overvoltage.....	51

6.6.1	General	51
6.6.2	Protection against overvoltage.....	52
7	Selection and erection of electrical equipment.....	53
7.1	General.....	53
7.2	Component requirements.....	54
7.2.1	General	54
7.2.2	Current rating of PV circuits.....	54
7.2.3	PV modules	55
7.2.4	PV array and PV string combiner boxes.....	56
7.2.5	Fuses	57
7.2.6	Circuit breakers used for overcurrent protection	57
7.2.7	Isolation means and isolation means with breaking capabilities	58
7.2.8	Cables.....	60
7.2.9	Plugs, sockets and connectors in PV circuits	62
7.2.10	Wiring in combiner boxes.....	63
7.2.11	Bypass diodes	63
7.2.12	Blocking diodes	64
7.2.13	Power conversion equipment (PCE) including DC conditioning units (DCUs)	64
7.3	Location and installation requirements	65
7.3.1	Isolation means	65
7.3.2	Earthing and bonding arrangements	67
7.3.3	Wiring system.....	70
8	Acceptance.....	74
9	Operation/maintenance.....	74
10	Marking and documentation.....	74
10.1	Equipment marking	74
10.2	Requirements for signs	74
10.3	Identification of a PV installation	74
10.4	Labelling of PV array and PV string combiner boxes	74
10.5	Labelling of isolation means.....	75
10.5.1	General	75
10.5.2	PV array isolation means with breaking capabilities	75
10.6	Warning sign for anti-PID equipment.....	75
10.7	Documentation.....	75
Annex A (informative)	Examples of signs	76
Annex B (informative)	Examples of system earthing configurations in PV arrays.....	77
Annex C (informative)	Blocking diode	80
C.1	General.....	80
C.2	Use of blocking diodes to prevent overcurrent/fault current in arrays.....	80
C.3	Examples of blocking diode use in fault situations.....	80
C.3.1	General	80
C.3.2	Short circuit in PV string	80
C.4	Specification of blocking diode.....	82
C.5	Heat dissipation design for blocking diode	82
Annex D (informative)	Arc fault detection and interruption in PV arrays.....	84
Annex E (normative)	DVC limits.....	85

Annex F (normative) Determination of maximum voltage and maximum currents in PV circuits	86
F.1 $U_{OC\ MAX}$	86
F.1.1 PV array maximum voltage	86
F.1.2 PV strings constructed using DC conditioning units	87
F.2 String maximum current	88
F.3 Calculation of potential fault currents originating from the array	88
F.3.1 General	88
F.3.2 String	88
F.3.3 Sub-array	88
F.3.4 Array	88
F.4 K_I factor – general	89
F.5 K_{Corr} factor – under unique environmental conditions	89
F.6 K_{Corr} factor – non optimally oriented monofacial arrays	90
F.7 K_{Corr} factor – bifacial arrays	90
F.8 K_{Corr} factor – for arrays containing non-optimally oriented bifacial modules	91
Annex G (normative) Backfeed current and PV reverse currents under fault conditions	92
G.1 General	92
G.2 Illustrated examples	92
G.3 Backfeed currents and PV reverse currents where subarrays are not combined in the PCE	94
Annex H (normative) Anti-PID	96
H.1 General	96
H.2 DC bias applied during night	96
H.3 DC bias applied to array output	97
H.4 DC bias applied to AC system	98
Annex I (informative) Arc flash	100
Annex J (normative) Qualification of DCU group voltage	101
J.1 Overview	101
J.2 Test 1: Maximum voltage operational test procedure	101
J.3 Test 2: Overvoltage test	101
Bibliography	103
Figure 1 – General functional configuration of a PV powered system	21
Figure 2 – PV array diagram – single string example	23
Figure 3 – PV array diagram – multiple parallel string example	24
Figure 4 – PV array diagram – multiple parallel string example with array divided into sub-array	25
Figure 5 – PV array example using a PCE with multiple MPPT DC inputs	26
Figure 6 – PV array example using a PCE with multiple DC inputs internally connected to a common DC bus	27
Figure 7 – PV string constructed using DCUs	29
Figure 8 – Example of partial DCU string	30
Figure 9 – PV parallel strings constructed using DCUs	31
Figure 10 – PV string(s) connected to DCUs	32

Figure 11 – Example of a PV array diagram where strings are grouped under one overcurrent protection device per group	50
Figure 12 – Examples of reinforced protection of wiring	62
Figure 13 – PV array exposed conductive parts functional earthing/bonding decision tree	68
Figure 14 – Exposed conductive parts earthing in a PV array	69
Figure 15 – Examples of string wiring with minimum loop area	73
Figure A.1 – Example of sign required on PV array combiner boxes (10.4)	76
Figure A.2 – Example of switchboard sign for identification of PV on a building	76
Figure B.1 – Functionally earthed system topologies	77
Figure B.2 – Non-earth-referenced system topologies	78
Figure B.3 – Non-separated system topologies	79
Figure C.1 – Effect of blocking diode where there is a short circuit in PV string	81
Figure C.2 – Effect of blocking diode where there is an earth fault on a system with earthing on the minus side	81
Figure C.3 – Effect of blocking diode where there is an earth fault on a system with positive side earthing	82
Figure D.1 – Examples of types of arcs in PV arrays	84
Figure G.1 – Backfeed from inverter with single PV input and external battery	92
Figure G.2 – Inverter with multiple PV inputs and external battery	93
Figure G.3 – Backfeed where subarrays are combined externally to PCE	94
Figure H.1 – Example anti-PID control using bias on DC side at night	96
Figure H.2 – Example of anti-PID control using bias on DC side	97
Figure H.3 – Example of anti-PID control using bias on AC side	98
Table 1 – Requirements for different system types based on PCE separation and PV array functional earthing	43
Table 2 – Minimum insulation resistance thresholds for detection of failure of insulation to earth	44
Table 3 – Trip current of functional earthing overcurrent protection	46
Table 4 – Overcurrent protection nominal rating	49
Table 5 – Calculation of the critical length L_{crit}	52
Table 6 – Minimum current rating of circuits	55
Table 7 – Isolation means in PV array installations	65
Table E.1 – Summary of the limits of the decisive voltage classes	85
Table E.2 – Voltage correction factors for crystalline and multi-crystalline silicon PV modules	87
Table F.2 – Environmental conditions covered by $K_{Corr} = 1,0$	89
Table F.3 – Example K_{Corr} values at different orientations and tilt for 47° north latitude	90

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**PHOTOVOLTAIC (PV) ARRAYS –
Part 1: DESIGN REQUIREMENTS**

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IEC 62548-1 has been prepared by IEC technical committee 82: Solar photovoltaic energy systems. It is an International Standard.

This first edition cancels and replaces IEC 62548 published in 2016. This edition constitutes a technical revision.

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

- a) Revised provisions for systems including DC to DC conditioning units.
- b) Revision of mounting structure requirements.
- c) Revised cable requirements.
- d) Revision of Clause 6 on safety issues which includes provisions for protection against electric shock including array insulation monitoring and earth fault detection.
- e) Revision of 7.2.7 and 7.3 with respect to isolation means.

- f) Provisions for use of bifacial modules and modules mounted in non-optimal orientations.
- g) New Annex F containing: K_f factor calculations for bifacial and non-optimally oriented systems; anti-PID equipment and arc flash.

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

Draft	Report on voting
82/2174/FDIS	82/2193/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. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

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PHOTOVOLTAIC (PV) ARRAYS – Part 1: DESIGN REQUIREMENTS

1 Scope

This document sets out design requirements for photovoltaic (PV) arrays including DC array wiring, electrical protection devices, switching and earthing provisions. The scope includes all parts of the PV array and final power conversion equipment (PCE), but not including energy storage devices, loads or AC or DC distribution network supplying loads.

The object of this document is to address the design safety requirements arising from the particular characteristics of photovoltaic systems. Direct current systems, and PV arrays in particular, pose some hazards in addition to those derived from conventional AC power systems, including the ability to produce and sustain electrical arcs with currents that are not greater than normal operating currents.

In systems supplying AC loads or circuits, the safety requirements mentioned in this document are however critically dependent on the inverters associated with PV arrays complying with the requirements of IEC 62109-1, IEC 62109-2 and IEC 62109-3.

Installation requirements are also critically dependent on compliance with the IEC 60364 series (see Clause 4).

PV arrays of less than 100 W and less than 35 V DC open circuit voltage at STC are not covered by this document.

PV arrays in grid interconnected systems connected to medium or high voltage systems are not covered in this document, except as required by IEC TS 62738. Variations and additional requirements for large-scale ground-mounted PV power plants with restricted access to personnel are addressed in IEC TS 62730.

Additional requirements may be needed for more specialized installations, for example concentrating systems, tracking systems or building integrated PV.

This document also includes extra protection requirements of PV arrays when they are directly connected with batteries at the DC level.

Attention is drawn to the co-existence of IEC 60364-7-712 and IEC 62548. Both standards have been developed in close coordination, respectively by IEC technical committees 64 and 82.

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 60228, *Conductors of insulated cables*

IEC 60269-1, *Low-voltage fuses – Part 1: General requirements*

IEC 60269-6, *Low-voltage fuses – Part 6: Supplementary requirements for fuse-links for the protection of solar photovoltaic energy systems*