SLOVENSKI STANDARD
SIST EN IEC 62446-2:2020

01-julij-2020

Fotonapetostni sistemi - Zahteve za preskušanje, dokumentiranje in vzdrževanje - 2. del: Sistemi, priključeni na omrežje - Vzdrževanje fotonapetostnih sistemov

Photovoltaic (PV) systems - Requirements for testing, documentation and maintenance - Part 2: Grid connected systems - Maintenance of PV systems

Ta slovenski standard je istoveten z: EN IEC 62446-2:2020

ICS:

27.160	Sončna energija	Solar energy engineering

SIST EN IEC 62446-2:2020 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 62446-2

May 2020

ICS 27.160

English Version

Photovoltaic (PV) systems - Requirements for testing, documentation and maintenance - Part 2: Grid connected systems - Maintenance of PV systems (IEC 62446-2:2020)

Systèmes photovoltaïques (PV) - Exigences pour les essais, la documentation et la maintenance - Partie 2: Systèmes connectés au réseau électrique - Maintenance des systèmes PV (IEC 62446-2:2020)

Photovoltaik(PV)-Systeme - Anforderungen an Prüfung, Dokumentation und Instandhaltung - Teil 2: Netzgekoppelte Systeme - Instandhaltung von PV-Systemen (IEC 62446-2:2020)

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

European foreword

The text of document 82/1656/FDIS, future edition 1 of IEC 62446-2, prepared by IEC/TC 82 "Solar photovoltaic energy systems" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62446-2:2020.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2021-01-22
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2023-04-22

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Standard IEC 62446-2:2020 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60300-3-3	NOTE	Harmonized as EN 60300-3-3
IEC 60891	NOTE	Harmonized as EN 60891
IEC 60904-1	NOTE	Harmonized as EN 60904-1

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

Clause 2 of IEC 62446-1:2016 is applicable, except as follows:

Add the following references:

Publication	Year	Title	EN/HD	Year
IEC/TS 61724-2	-	Photovoltaic system performance - Part 2: Capacity evaluation method	-	-
IEC/TS 61724-3	-	Photovoltaic system performance - Part 3: Energy evaluation method	-	-
IEC/TS 61836	2016	Solar photovoltaic energy systems - Terms, definitions and symbols	-	-
IEC 62020	-	Electrical accessories - Residual current monitors for household and similar uses (RCMs)	-	-
IEC 62446-1	2016	Photovoltaic (PV) systems - Requirements for testing, documentation and maintenance - Part 1: Grid connected systems - Documentation, commissioning tests and inspection	EN 62446-1	2016
IEC/TS 62446-3	2017	Photovoltaic (PV) systems - Requirements for testing, documentation and maintenance - Part 3: Photovoltaic modules and plants - Outdoor infrared thermography	-	-
IEC 62548	-	Photovoltaic (PV) arrays - Design requirements	-	-

IEC 62446-2

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Photovoltaic (PV) systems – Requirements for testing, documentation and maintenance – Part 2: Grid connected systems – Maintenance of PV systems

Systèmes photovoltaïques (PV) – Exigences pour les essais, la documentation et la maintenance – Partie 2: Systèmes connectés au réseau électrique – Maintenance des systèmes PV

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PHOTOVOLTAIC (PV) SYSTEMS – REQUIREMENTS FOR TESTING, DOCUMENTATION AND MAINTENANCE –

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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 62446-2 has been prepared by IEC technical committee 82: Solar photovoltaic energy systems.

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

FDIS	Report on voting
82/1656/FDIS	82/1676/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.

A list of all parts in the IEC 62446 series, published under the general title *Photovoltaic (PV) systems – Requirements for testing, documentation and maintenance*, can be found on the IEC website.

This International Standard is to be used in conjunction with IEC 62446-1:2016.

The requirements in IEC 62446-2 are to be used with the requirements in IEC 62446-1:2016, and supplement or modify clauses in IEC 62446-1:2016. All Clauses 1 to 9 of IEC 62446-1:2016 apply, including the applicable Annexes. When IEC 62446-2 contains clauses that add to, modify, or replace clauses in IEC 62446-1:2016, the relevant text of IEC 62446-1:2016 is to be applied with the required changes.

Clauses, subclauses, figures, tables and annexes additional to those in IEC 62446-1:2016 are numbered in continuation of the sequence existing in IEC 62446-1:2016.

The committee has decided that the contents of this publication 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
- amended.

INTRODUCTION

This Part 2 of IEC 62446 gives requirements and recommendations for the maintenance of PV systems, including periodic inspections, safety and performance related preventive maintenance, corrective maintenance and troubleshooting. Grid connected PV systems are generally considered to be a very low maintenance means of power generation. While this is true relative to conventional generation sources that utilize fuel and/or rotating machinery, PV systems do require some level of preventive and corrective maintenance to perform as anticipated over lifetimes that can exceed 20 years. The level of maintenance required or recommended for performance can vary considerably based on the owner's preference or contractual obligations for power production; however, a minimum level of monitoring or maintenance is critical for safety and reducing the risk of fire. Adherence to a minimum set of maintenance requirements is also integral to the goals of the IECRE Conformity Assessment system, which is intended to drive the licensing and certification of PV systems and plants from the design to the operations stage.

PHOTOVOLTAIC (PV) SYSTEMS – REQUIREMENTS FOR TESTING, DOCUMENTATION AND MAINTENANCE –

Part 2: Grid connected systems – Maintenance of PV systems

1 Scope

This clause of IEC 62446-1:2016 is applicable with the following exception:

Addition:

This Part 2 of IEC 62446 describes basic preventive, corrective, and performance related maintenance requirements and recommendations for grid-connected PV systems. The maintenance procedures cover:

- Basic maintenance of the system components and connections for reliability, safety and fire prevention
- Measures for corrective maintenance and troubleshooting
- Worker safety

This document also addresses maintenance activities for maximizing anticipated performance such as module cleaning and upkeep of vegetation. Special considerations unique to rooftop or ground-mounted systems are summarized. This document does not cover off-grid systems or systems that include batteries or other energy storage technologies; however, parts may be applicable to the PV circuits of those systems.

This document also does not cover maintenance of medium and high voltage a.c. equipment that are sometimes integral to larger scale systems, as those requirements are not specific to PV systems.

Maintenance of PV systems is often lumped into the catch-all term operations and maintenance (O&M.) This document does not address business or management operational processes (e.g. forecasting, utility pricing incentives, etc.) or other considerations driven by factors outside of basic system working condition, safety and performance.

The confirmation of a system's compliance with the appropriate design and installation standards is covered in Part 1 and takes place during initial project commissioning.

The objectives of this document are to:

- Identify a baseline set of maintenance requirements which may differ by system type (residential, commercial, utility scale), owner, or financing requirements.
- Identify additional maintenance steps that are recommended or optional.
- Identify factors to be used to determine appropriate maintenance intervals.
- Ensure that remote diagnostic methods are allowed as means for periodic verification, problem identification and early failure detection.
- Ensure that alternate means of achieving maintenance related requirements are allowed to accommodate for innovation, manufacturer specific methods, evolving customer requirements, etc.

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.

This clause of IEC 62446-1:2016 is applicable, with the following exception:

Addition

IEC TS 61724-2, *Photovoltaic system performance – Part 2: Capacity evaluation method*

IEC TS 61724-3, *Photovoltaic system performance – Part 3: Energy evaluation method*

IEC TS 61836:2016 , *Solar photovoltaic energy systems – Terms, definitions and symbols*

IEC 62020, *Electrical accessories – Residual current monitors for household and similar uses (RCMs)*

IEC 62446-1:2016, *Photovoltaic (PV) systems – Requirements for testing, documentation and maintenance – Part 1: Grid connected systems – Documentation, commissioning tests and inspection*

IEC TS 62446-3:2017, *Photovoltaic (PV) systems – Requirements for testing, documentation and maintenance – Part 3: Photovoltaic modules and plants – Outdoor infrared thermography*

IEC 62548, *Photovoltaic (PV) arrays – Design requirements*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC TS 61836 as well as those in Clause 3 of IEC 62446-1:2016 are applicable, with the following additions:

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

Addition:

3.17
support structure
equipment (also known as “racking”) used to physically support modules or groups of modules and position them in a fixed or moving orientation relative to the path of the sun

3.18
equipment pad
foundation typically (but not exclusively) made of concrete or cement used for mounting and securing inverters, disconnectors, transformers, or other equipment associated with a PV system

Note 1 to entry: Equipment pads are typically installed in ground-mount systems, or adjacent to buildings for large rooftop systems where equipment is too large to be wall-mounted.

3.19
combiner box
junction box in which the parallel connections for PV strings, subarrays or arrays are made

3.20
qualified person
person, who has acquired, through training, qualification or experience or a combination of these, the knowledge and skill enabling that person to perform the required task correctly

[SOURCE: IEC 62548:2016, 3.1.7 “competent person”]

3.21
PV array combiner box
junction box where PV sub-arrays are connected and which may also contain overcurrent protection and/or switch-disconnection devices

Note 1 to entry: Small arrays generally do not contain sub-arrays but are simply made up of strings whereas large arrays are generally made up of multiple sub-arrays.

[SOURCE: IEC 62548:2016, 3.1.36]

3.22
balance of system
in a renewable energy system, all components other than the mechanism used to harvest the resource (such as photovoltaic panels or modules)

3.23
lockout/tagout
LOTO
safety procedure used to ensure equipment is properly de-energized and prevented from being re-energized by a locking mechanism until service personnel deems it safe to do so

Note 1 to entry: LOTO is a practice applying to some countries. Different safety procedures, such as the “five safety rules” of EN 50110-1 for Europe, apply in different parts of the world.

3.24
personal protective equipment
PPE
any device or appliance designed to be worn or held by an individual for protection against one or more health and safety hazards whilst performing live working

[SOURCE: IEC 60050-651:2014, 651-23-01]

3.25
authorized personnel
persons approved or assigned by the system owner/operator to perform a specific type of duty or duties for which they are qualified, or to be at a specific location or locations at the installation site

3.26
wiring harness
cable assembly that aggregates the output of multiple PV string conductors along a single main conductor. The harness may or may not include fuse components on the individual string conductors

3.27
central inverter
inverter which has multiple sub-array or array circuits as inputs