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## Solcellssystem – Prestanda – Del 1: Övervakning

*Photovoltaic system performance –  
Part 1: Monitoring*

Som svensk standard gäller europastandarden EN IEC 61724-1:2021. Den svenska standarden innehåller den officiella engelska språkversionen av EN IEC 61724-1:2021.

### Nationellt förord

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- **IEC 61724-1, Second edition, 2021 - Photovoltaic system performance - Part 1: Monitoring**

utarbetad inom International Electrotechnical Commission, IEC.

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English Version

**Photovoltaic system performance - Part 1: Monitoring  
(IEC 61724-1:2021)**

Performances des systèmes photovoltaïques - Partie 1:  
Surveillance  
(IEC 61724-1:2021)

Betriebsverhalten von Photovoltaik-Systemen - Teil 1:  
Überwachung  
(IEC 61724-1:2021)

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## **European foreword**

The text of document 82/1904/FDIS, future edition 2 of IEC 61724-1, prepared by IEC/TC 82 "Solar photovoltaic energy systems" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 61724-1:2021.

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) 2022-05-25
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2024-08-25

This document supersedes EN 61724-1:2017 and all of its amendments and corrigenda (if any).

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### **Endorsement notice**

The text of the International Standard IEC 61724-1:2021 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

IEC 60904-3 NOTE Harmonized as EN IEC 60904-3

## 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](http://www.cenelec.eu).

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60050-131	-	International Electrotechnical Vocabulary- (IEV) - Part 131: Circuit theory		-
IEC 60904-2	-	Photovoltaic devices - Part 2: Requirements for photovoltaic reference devices	EN 60904-2	-
IEC 60904-5	-	Photovoltaic devices - Part 5: Determination of the equivalent cell temperature (ECT) of photovoltaic (PV) devices by the open-circuit voltage method	EN 60904-5	-
IEC 60904-7	-	Photovoltaic devices - Part 7: Computation of the spectral mismatch correction for measurements of photovoltaic devices	EN IEC 60904-7	-
IEC 61215	series	Terrestrial photovoltaic (PV) modules Design qualification and type approval	EN IEC 61215	series
IEC 61557-12	-	Electrical safety in low voltage distribution-systems up to 1 000 V AC and 1 500 V DC - Equipment for testing, measuring or monitoring of protective measures - Part 12: Power metering and monitoring devices (PMD)		-
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		Solar photovoltaic energy systems - Terms, definitions and symbols		-
IEC 62053-22	-	Electricity metering equipment - Part 22: requirements - Part 22: Static meters for AC active energy (classes 0,1S, 0,2S and 0,5S)	EN IEC 62053-22	-

## EN IEC 61724-1:2021 (E)

IEC 62670-3	-	Photovoltaic concentrators (CPV) –EN 62670-3 Performance testing - Part 3: Performance measurements and power rating	-
IEC 62817	2014	Photovoltaic systems - Design qualification of solar trackers	EN 62817 2015
ISO/IEC Guide 98-1 -		Uncertainty of measurement – Part 1:- Introduction to the expression of uncertainty in measurement	-
ISO/IEC Guide 98-3 -		Uncertainty of measurement - Part 3:- Guide to the expression of uncertainty in measurement (GUM:1995)	-
ISO 9060	2018	Solar energy - Specification and classification of instruments for measuring hemispherical solar and direct solar radiation	
ISO 9488		Solar energy - Vocabulary	EN ISO 9488



IEC 61724-1

Edition 2.0 2021-07

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

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**Photovoltaic system performance –  
Part 1: Monitoring**

**Performances des systèmes photovoltaïques –  
Partie 1: Surveillance**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

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## CONTENTS

FOREWORD.....	6
INTRODUCTION.....	8
1 Scope.....	10
2 Normative references.....	10
3 Terms and definitions .....	11
4 Monitoring system classification .....	15
5 General .....	16
5.1 Measurement precision and uncertainty .....	16
5.2 Calibration .....	16
5.3 Repeated elements .....	16
5.4 Power consumption .....	16
5.5 Documentation .....	16
5.6 Inspection .....	16
6 Data acquisition timing and reporting .....	16
6.1 Samples, records, and reports .....	16
6.2 Timestamps .....	18
6.3 Parameter names.....	18
7 Required measurements .....	18
8 Irradiance.....	23
8.1 Sensor types.....	23
8.2 General requirements.....	23
8.2.1 Overview .....	23
8.2.2 Sensor requirements.....	23
8.2.3 Sensor locations .....	24
8.2.4 Recalibration.....	25
8.2.5 Soiling mitigation .....	25
8.2.6 Dew and frost mitigation.....	25
8.2.7 Inspection and maintenance.....	26
8.2.8 Sensor alignment.....	26
8.3 Measurements .....	26
8.3.1 Global horizontal irradiance.....	26
8.3.2 In-plane irradiance .....	26
8.3.3 In-plane rear-side irradiance.....	27
8.3.4 In-plane rear-side irradiance ratio.....	27
8.3.5 Horizontal albedo.....	27
8.3.6 Direct normal irradiance .....	27
8.3.7 Diffuse horizontal irradiance .....	27
8.3.8 Spectrally matched irradiance .....	27
8.3.9 In-plane irradiance for concentrator systems.....	28
8.3.10 Spectral irradiance for concentrator systems .....	29
8.3.11 Circumsolar measurements for concentrator systems.....	29
8.3.12 Satellite remote sensing of irradiance .....	30
9 Environmental factors .....	31
9.1 PV module temperature.....	31
9.2 Ambient air temperature .....	31



9.3	Wind speed and direction .....	32
9.4	Soiling ratio.....	32
9.5	Rainfall .....	33
9.6	Snow .....	33
9.7	Humidity .....	33
10	Tracker system.....	33
10.1	Single-axis trackers.....	33
10.2	Dual-axis trackers .....	33
10.2.1	Monitoring.....	33
10.2.2	Pointing error sensor alignment.....	33
11	Electrical measurements.....	34
11.1	Inverter-level measurements .....	34
11.2	Plant-level measurements .....	34
12	Data processing and quality check .....	35
12.1	Night.....	35
12.2	Quality check .....	35
12.2.1	Removing invalid readings .....	35
12.2.2	Treatment of missing data .....	35
13	Calculated parameters.....	36
13.1	Overview.....	36
13.2	Summations .....	36
13.3	Irradiation .....	36
13.4	Electrical energy .....	37
13.4.1	General .....	37
13.4.2	DC output energy.....	37
13.4.3	AC output energy .....	37
13.5	Array power rating.....	37
13.5.1	DC power rating.....	37
13.5.2	AC power rating .....	38
13.6	Yields .....	38
13.6.1	General .....	38
13.6.2	PV array energy yield.....	38
13.6.3	Final system yield .....	38
13.6.4	Reference yield.....	39
13.6.5	Bifacial reference yield.....	39
13.7	Yield losses .....	39
13.7.1	General .....	39
13.7.2	Array capture loss.....	39
13.7.3	Balance of systems (BOS) loss.....	40
13.8	Efficiencies .....	40
13.8.1	Array (DC) efficiency.....	40
13.8.2	System (AC) efficiency .....	40
13.8.3	BOS efficiency .....	40
14	Performance metrics.....	41
14.1	Overview.....	41
14.2	Summations .....	41
14.3	Performance ratios.....	41
14.3.1	Performance ratio .....	41

14.3.2	Temperature-corrected performance ratios .....	42
14.3.3	Bifacial performance ratios .....	44
14.4	Performance indices .....	44
15	Data filtering .....	45
15.1	Use of available data .....	45
15.2	Filtering data to specific conditions .....	45
15.3	Reduced inverter, grid, or load availability .....	45
Annex A (informative)	Sampling interval .....	46
A.1	General considerations .....	46
A.2	Time constants .....	46
A.3	Aliasing error .....	46
A.4	Example .....	47
Annex B (informative)	Module temperature sensor selection and attachment .....	48
B.1	Objective .....	48
B.2	Sensor and material selection .....	48
B.2.1	Optimal sensor types .....	48
B.2.2	Optimal tapes .....	48
B.2.3	Cyanoacrylate adhesives and backsheet integrity .....	49
B.3	Sensor attachment .....	49
B.3.1	Permanent versus temporary .....	49
B.3.2	Attachment location .....	49
B.3.3	Bifacial modules .....	49
B.3.4	Method .....	49
Annex C (normative)	Soiling measurement using clean and soiled PV reference device pair .....	52
C.1	Overview .....	52
C.2	Equipment .....	52
C.3	Normalization .....	52
C.4	Measurement method 1 – max power reduction due to soiling .....	53
C.5	Measurement method 2 – short-circuit current reduction due to soiling .....	53
C.6	Non-uniform soiling .....	53
C.7	Daily average value .....	54
C.8	Renormalization .....	54
Annex D (informative)	Derate factors .....	55
Annex E (normative)	Systems with local loads, storage, or auxiliary sources .....	57
E.1	System types .....	57
E.2	Parameters and formulas .....	59
Bibliography	.....	66
Figure 1	– Possible elements of PV systems .....	8
Figure 2	– Samples, records and reports .....	17
Figure B.1	– Sensor attachment, permanent .....	50
Figure B.2	– Sensor attachment, temporary .....	50
Figure B.3	– Sensor element wire strain relief .....	51
Figure E.1	– Energy flow between possible elements of different PV system types .....	57
Table 1	– Sampling and recording interval requirements .....	18

Table 2 – Measured parameters and requirements .....	20
Table 3 – Multiplier referenced in Table 2 .....	23
Table 4 – Irradiance sensor requirements .....	24
Table 5 – Inverter-level electrical measurement requirements .....	34
Table 6 – Plant-level AC electrical output measurement requirements .....	34
Table 7 – Calculated parameters .....	36
Table 8 – Performance metrics .....	41
Table E.1 – Elements of different PV system types .....	58
Table E.2 – Parameters and formulas for different system types .....	59

# INTERNATIONAL ELECTROTECHNICAL COMMISSION

## PHOTOVOLTAIC SYSTEM PERFORMANCE –

### Part 1: Monitoring

#### FOREWORD

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International Standard IEC 61724-1 has been prepared by IEC technical committee 82: Solar photovoltaic energy systems.

This second edition cancels and replaces the first edition, published in 2017. This edition constitutes a technical revision.

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

- Monitoring of bifacial systems is introduced.
- Irradiance sensor requirements are updated.
- Soiling measurement is updated based on new technology.
- Class C monitoring systems are eliminated.
- Various requirements, recommendations and explanatory notes are updated.

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

FDIS	Report on voting
82/1904/FDIS	82/1925/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).

A list of all parts in the IEC 61724 series, published under the general title *Photovoltaic system performance*, can be found on the IEC website.

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](http://webstore.iec.ch) in the data related to the specific document. At this date, the document will be

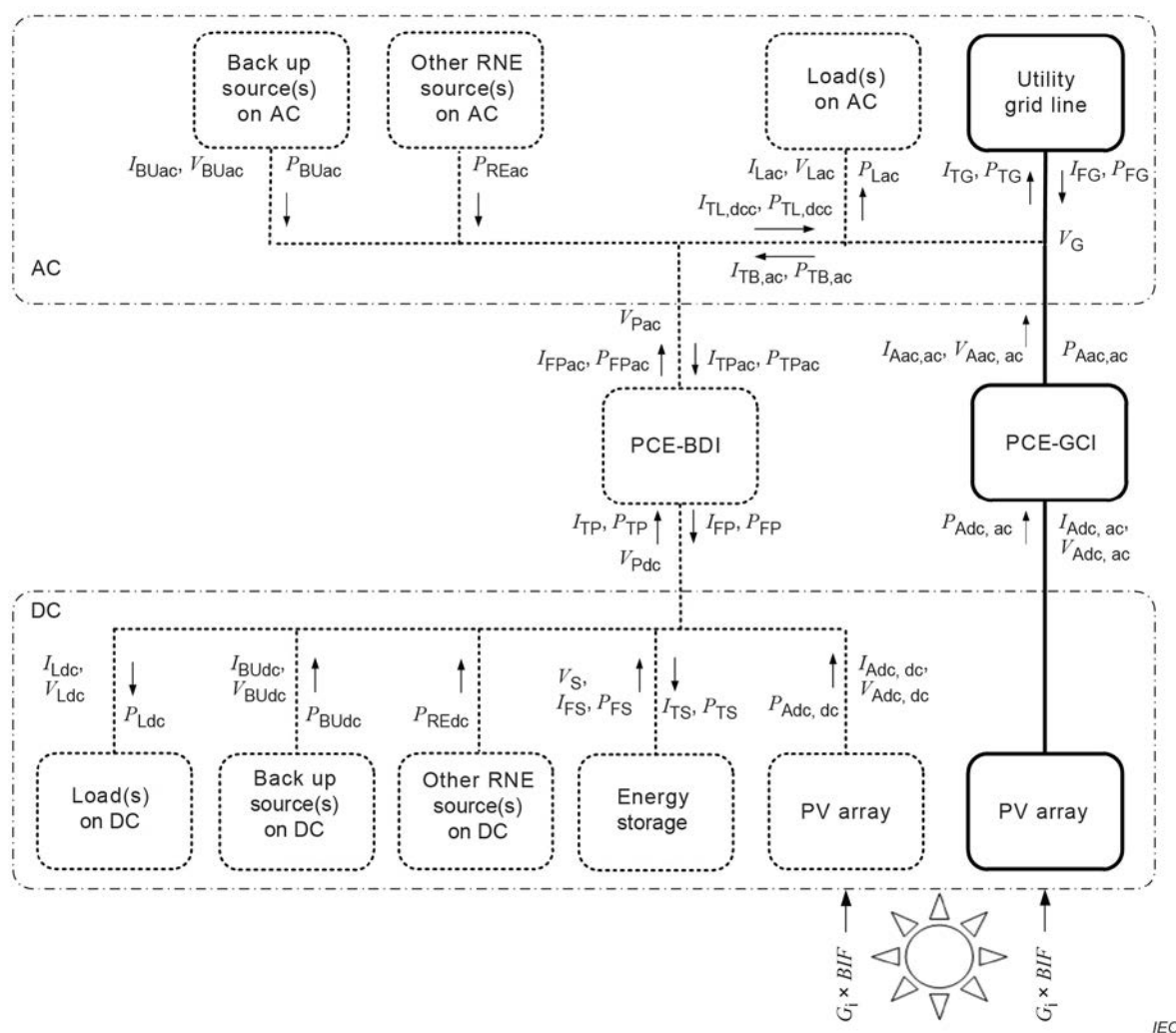
- reconfirmed,
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- amended.

## INTRODUCTION

This document defines classes of photovoltaic (PV) performance monitoring systems and serves as guidance for monitoring system choices.

Figure 1 illustrates major elements comprising different PV system types. The main clauses of this document are written for grid-connected systems without local loads, energy storage, or auxiliary sources, as shown by the bold lines in Figure 1. Annex E includes some details for systems with additional components.

The PV array may include both fixed-axis and tracker systems and both flat-plate and concentrator systems.



### Key

RNE: renewable energy

PCE: power conditioning equipment

BDI: bi-directional inverter

GCI: grid-connected inverter

Bold lines denote simple grid-connected system without local loads, energy storage, or auxiliary sources.

**Figure 1 – Possible elements of PV systems**

The purposes of a performance monitoring system are diverse and could include comparing performance to design expectations and guarantees as well as detecting and localizing faults.

For comparing performance to design expectations and guarantees, the focus should be on system-level data and consistency between prediction and test methods.

For detecting and localizing faults there should be greater resolution at sub-levels of the system and an emphasis on measurement repeatability and correlation metrics.

The monitoring system should be adapted to the PV system's size and user requirements. In general, larger PV systems should have more monitoring points and higher accuracy sensors than smaller and lower-cost PV systems.

# PHOTOVOLTAIC SYSTEM PERFORMANCE –

## Part 1: Monitoring

### 1 Scope

This part of IEC 61724 outlines terminology, equipment, and methods for performance monitoring and analysis of photovoltaic (PV) systems. It also serves as a basis for other standards which rely upon the data collected.

### 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 60050-131, *International Electrotechnical Vocabulary (IEV) – Part 131: Circuit theory*

IEC 60904-2, *Photovoltaic devices – Part 2: Requirements for photovoltaic reference devices*

IEC 60904-5, *Photovoltaic devices – Part 5: Determination of the equivalent cell temperature (ECT) of photovoltaic (PV) devices by the open-circuit voltage method*

IEC 60904-7, *Photovoltaic devices – Part 7: Computation of the spectral mismatch correction for measurements of photovoltaic devices*

IEC 61215 (all parts), *Terrestrial photovoltaic (PV) modules – Design qualification and type approval*

IEC 61557-12, *Electrical safety in low voltage distribution systems up to 1 000 V AC and 1 500 V DC – Equipment for testing, measuring or monitoring of protective measures – Part 12: Power metering and monitoring devices (PMD)*

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, *Solar photovoltaic energy systems – Terms, definitions and symbols*

IEC 62053-22, *Electricity metering equipment – Particular requirements – Part 22: Static meters for AC active energy (classes 0,1S, 0,2S and 0,5S)*

IEC 62670-3, *Photovoltaic concentrators (CPV) – Performance testing – Part 3: Performance measurements and power rating*

IEC 62817:2014, *Photovoltaic systems – Design qualification of solar trackers*

ISO/IEC Guide 98-1, *Uncertainty of measurement – Part 1: Introduction to the expression of uncertainty in measurement*



ISO/IEC Guide 98-3, *Uncertainty of measurement – Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)*

ISO 9060:2018, *Solar energy – Specification and classification of instruments for measuring hemispherical solar and direct solar radiation*

ISO 9488, *Solar energy – Vocabulary*