



SLOVENSKI STANDARD
SIST EN 60904-2:2001
01-september-2001

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Photovoltaic devices -- Part 2: Requirements for reference solar cells

Photovoltaische Einrichtungen -- Teil 2: Anforderungen an Referenz-Solarzellen

Dispositifs photovoltaïques -- Partie 2: Exigences relatives aux cellules solaires de référence

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Ta slovenski standard je istoveten z: **EN 60904-2:1993**

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ICS:

27.160 Ú [} } æ } ^ i * } æ Solar energy engineering

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EUROPEAN STANDARD

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ENGLISH VERSION

Photovoltaic devices
Part 2: Requirements for reference solar cells
(IEC 904-2:1989)

Dispositifs photovoltaïques
Deuxième partie: Exigences
relatives aux cellules solaires
de référence
(CEI 904-2:1989)

Photovoltaische Einrichtungen
Teil 2: Anforderungen an
Referenz-Solarzellen
(IEC 904-2:1989)

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

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

Central Secretariat: rue de Stassart 35, B-1050 Brussels

FOREWORD

The CENELEC questionnaire procedure, performed for finding out whether or not the International Standard IEC 904-2:1989 could be accepted without textual changes, has shown that no common modifications were necessary for the acceptance as European Standard.

The reference document was submitted to the CENELEC members for formal vote and was approved by CENELEC as EN 60904-2 on 6 July 1993.

The following dates were fixed:

- latest date of publication of an identical national standard (dop) 1994-08-01
- latest date of withdrawal of conflicting national standards (dow) 1994-08-01

For products which have complied with the relevant national standard before 1994-08-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 1999-08-01.

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ENDORSEMENT NOTICE
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The text of the International Standard IEC 904-2:1989 was approved by CENELEC as a European Standard without any modification.

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**CEI
IEC
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Dispositifs photovoltaïques

Deuxième partie:

Exigences relatives aux cellules solaires
de référence

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Photovoltaic devices

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Part 2:

Requirements for reference solar cells



Numéro de référence
Reference number
CEI/IEC 904-2: 1989

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

PHOTOVOLTAIC DEVICES

PART 2: REQUIREMENTS FOR REFERENCE SOLAR CELLS

FOREWORD

- 1) The formal decisions or agreements of the IEC on technical matters, prepared by Technical Committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.
- 2) They have the form of recommendations for international use and they are accepted by the National Committees in that sense.
- 3) In order to promote international unification, the IEC expresses the wish that all National Committees should adopt the text of the IEC recommendation for their national rules in so far as national conditions will permit. Any divergence between the IEC recommendation and the corresponding national rules should, as far as possible, be clearly indicated in the latter.
- 4) The IEC has not laid down any procedure concerning marking as an indication of approval and has no responsibility when an item of equipment is declared to comply with one of its recommendations.

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PREFACE

This standard has been prepared by IEC Technical Committee No. 82: Solar photovoltaic energy systems.

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

Six Months' Rule	Report on Voting
82(C0)11	82(C0)18

Full information on the voting for the approval of this standard can be found in the Voting Report indicated in the above table.

PHOTOVOLTAIC DEVICES

PART 2: REQUIREMENTS FOR REFERENCE SOLAR CELLS

1 Scope

This standard gives requirements for the classification, selection, packaging, marking, calibration and care of crystalline silicon reference solar cells.

2 Description

A reference solar cell is a specially calibrated cell, which is used to measure irradiance or to set simulator irradiance levels in terms of a reference solar spectral irradiance distribution.

There are two types:

- Primary: a reference cell whose calibration is based on a radiometer or standard detector conforming to the standard World Radiometric Reference (W.R.R).
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- Secondary: a reference cell calibrated in natural or simulated sunlight against a primary reference cell.

3 Selection

At least two solar cells shall be selected for calibration as reference cells. The spectral response of the selected cells shall be such that errors in performance measurement of the intended test (under natural sunlight or specific simulator) due to spectral response mismatch are less than $\pm 1\%$. The spectral mismatch error shall be calculated by the method described in the relevant IEC standard (under consideration).

Reference cells shall be stable devices, that is their photovoltaic characteristics shall not change by more than 5% of the initial calibration (see Clause 10).

4 Temperature measurement

Means shall be provided for measuring the reference cell junction temperature to an accuracy of ± 1 °C.

5 Electrical connections

The electrical connections to the reference cell shall consist of a four-wire contact system (Kelvin probe).

6 Calibration

Each reference cell shall be calibrated in terms of its short-circuit current at $(25 \pm 2)^\circ\text{C}$ per unit of irradiance with the reference spectral irradiance distribution $[\text{AW}^{-1} \cdot \text{m}^2]$.

The standard methods of calibrating both primary and secondary reference cells are described in Clauses 11 and 12. The relative spectral response and the temperature coefficient of short-circuit current of each reference cell shall be measured in accordance with the relevant IEC standards (under consideration).

7 Data sheet

Each time a reference cell is calibrated, the following information shall be recorded on a data sheet:

- Identification number
 - Type (primary or secondary)
 - Cell manufacturer
 - Material type
 - Type of package
 - Calibration organization
 - Site and date of calibration
 - Method of calibration (refer to standard)
 - Radiometer or standard lamp characteristics
 - Primary reference cell identification
 - Simulator characteristics
 - Type of temperature sensor
 - Relative spectral response
 - Temperature coefficient of short-circuit current
 - Calibration value $[\text{AW}^{-1} \cdot \text{m}^2]$ at S.T.C. (Standard Test Conditions)
 - Claimed accuracy
- } where applicable

8. Marking

Each reference cell shall carry a clear, indelible identification number for cross-reference to the relevant data sheet.

9 Packaging

9.1 Measurement in natural sunlight

The reference cells used for measurements in natural sunlight shall respond to variations in the geometrical distribution of the incident radiation in the same way as the test specimens (cells, sub-assemblies of cells, modules).