SVENSK STANDARD SS-EN 60904-10

Fastställd	Utgåva	Sida	Ansvarig kommitté
2010-08-23	2	1 (1+13)	SEK TK 82

Solceller –
Del 10: Mätning av linearitet

Photovoltaic devices –
Part 10: Methods of linearity measurement

Som svensk standard gäller europastandarden EN 60904-10:2010. Den svenska standarden innehåller den officiella engelska språkversionen av EN 60904-10:2010.

Nationellt förord

Europastandarden EN 60904-10:2010

består av:

– **europastandardens ikraftsättningsdokument,** utarbetat inom CENELEC
– **IEC 60904-10, Second edition, 2009 - Photovoltaic devices - Part 10: Methods of linearity measurement**

utarbetad inom International Electrotechnical Commission, IEC.

Tidigare fastställd svensk standard SS-EN 60904-10, utgåva 1, 1998, gäller ej fr o m 2013-03-01.

ICS 27.160

Denna standard är fastställd av SEK Svensk Elstandard,
som också kan lämna upplysningar om **sakinnehållet** i standarden.
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Standarder underlättar utvecklingen och höjer elsäkerheten

Det finns många fördelar med att ha gemensamma tekniska regler för bl a säkerhet, prestanda, dokumentation, utförande och skötsel av elprodukter, elanläggningar och metoder. Genom att utforma sådana standarder blir säkerhetskraven tydliga och utvecklingskostnaderna rimliga samtidigt som marknadens acceptans för produkten eller tjänsten ökar.

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SEK är Sveriges röst i standardiseringsarbetet inom elområdet

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Stora delar av arbetet sker internationellt

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Standardiseringsarbetet inom SEK är organiserat i referensgrupper bestående av ett antal tekniska kommittéer som speglar hur arbetet inom IEC och CENELEC är organiserat.

Arbetet i de tekniska kommittéerna är öppet för alla svenska organisationer, företag, institutioner, myndigheter och statliga verk. Den årliga avgiften för deltagandet och intäkter från försäljning finansierar SEKs standardiseringsverksamhet och medlemsavgift till IEC och CENELEC.

Var med och påverka!

Den som deltar i SEKs tekniska kommittéarbete har möjlighet att påverka framtida standarder och får tidig tillgång till information och dokumentation om utvecklingen inom sitt teknikområde. Arbetet och kontakterna med kollegor, kunder och konkurrenter kan gynnsamt påverka enskilda företags affärsutveckling och bidrar till deltagarnas egen kompetensutveckling.

Du som vill dra nytta av dessa möjligheter är välkommen att kontakta SEKs kansli för mer information.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 60904-10

March 2010

ICS 27.160

Supersedes EN 60904-10:1998

English version

Photovoltaic devices - Part 10: Methods of linearity measurement

(IEC 60904-10:2009)

Dispositifs photovoltaïques - Partie 10: Méthodes de mesure de la linéarité (CEI 60904-10:2009)

Photovoltaische Einrichtungen - Teil 10: Messverfahren für die Linearität (IEC 60904-10:2009)

CENELEC

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

Central Secretariat: Avenue Marnix 17, B - 1000 Brussels

Ref. No. EN 60904-10:2010 E

SEK Svensk Elstandard

Foreword

The text of document 82/582/FDIS, future edition 2 of IEC 60904-10, prepared by IEC TC 82, Solar photovoltaic energy systems, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60904-10 on 2010-03-01.

This European Standard supersedes EN 60904-10:1998.

The main technical changes with regard to the EN 60904-10:1998 are as follows:

– Added clause for two-lamp method for I_{SC} linearity.
– Changed standard deviation as a metric for linearity to percent deviation from linearity. This was done because a non-linear device can have a low standard deviation and percent deviation is the quantitative number that matters for the parameter of interest.
– Removed clause on spectral responsivity nonlinearity because it is not used by any PV testing / calibration group. For testing real PV devices it is difficult to make this error significant in the spectral mismatch correction factor while still passing I_{SC} linearity. Measuring the responsivity over the entire response range means that the device will probably fail the temperature linearity near the band edge.
– Added a clause to allow short circuit linearity with temperature or total irradiance to be determined from absolute spectral responsivity measurements. This data is routinely reported in PTB primary reference cell calibration certificates.
– Added report clause in compliance with ISO/IEC 17025 requirements.
– Often the temperature coefficient of short circuit current is very small so measurement errors can result in percent deviations outside the accepted range. Therefore, the following text was added to 7.3c): “If the temperature coefficient of short circuit current is less than 0,1 %/K, then the device can be considered linear with respect to this parameter.”

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

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2010-12-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2013-03-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60904-10:2009 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 60904-7	NOTE	Harmonized as EN 60904-7.
IEC 61829	NOTE	Harmonized as EN 61829.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following referenced documents are indispensable for the application 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 When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
IEC 60891	-	Photovoltaic devices - Procedures for temperature and irradiance corrections to measured I-V characteristics	EN 60891	-
IEC 60904-1	-	Photovoltaic devices - Part 1: Measurement of photovoltaic current-voltage characteristics	EN 60904-1	-
IEC 60904-3	-	Photovoltaic devices - Part 3: Measurement principles for terrestrial photovoltaic (PV) solar devices with reference spectral irradiance data	EN 60904-3	-
IEC 60904-8	-	Photovoltaic devices - Part 8: Measurement of spectral response of a photovoltaic (PV) device	EN 60904-8	-
IEC 60904-9	-	Photovoltaic devices - Part 9: Solar simulator performance requirements	EN 60904-9	-
IEC 61215	-	Crystalline silicon terrestrial photovoltaic (PV) modules - Design qualification and type approval	EN 61215	-
IEC 61646	-	Thin-film terrestrial photovoltaic (PV) modules - Design qualification and type approval	EN 61646	-
ISO/IEC 17025	-	General requirements for the competence of testing and calibration laboratories	EN ISO/IEC 17025	-

CONTENTS

PHOTOVOLTAIC DEVICES –

Part 10: Methods of linearity measurement

1 Scope and object

This part of IEC 60904 describes procedures used to determine the degree of linearity of any photovoltaic device parameter with respect to a test parameter. It is primarily intended for use by calibration laboratories, module manufacturers and system designers.

Photovoltaic (PV) module and system performance evaluations, and performance translations from one set of temperature and irradiance conditions to another frequently rely on the use of linear equations (see IEC 60891 and IEC 61829). This standard lays down the linearity requirements and test methods to ensure that these linear equations will give satisfactory results. Indirectly, these requirements dictate the range of the temperature and irradiance variables over which the equations can be used.

The methods of measurement described in this standard apply to all PV devices and are intended to be carried out on a sample or on a comparable device of identical technology. They should be performed prior to all measurement and correction procedures that require a linear device. The methodology used in this standard is similar to that specified in IEC 60891 in which a linear (straight-line) function is fitted to a set of data points using a least-squares fit calculation routine. The variation of the data from this function is also calculated, and the definition of linearity is expressed as an allowable variation percentage.

A device is considered linear when it meets the requirements of 7.3.

General procedures for determining the degree of linearity for these and any other performance parameter are described in Clauses 5 and 6.

2 Normative references

The following referenced documents are indispensable for the application 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 60891, *Photovoltaic devices – Procedures for temperature and irradiance corrections to measured I-V characteristics*

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

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

IEC 60904-8, *Photovoltaic devices – Part 8: Measurement of spectral response of a photovoltaic (PV) device*

IEC 60904-9, *Photovoltaic devices – Part 9: Solar simulator performance requirements*

IEC 61215, *Crystalline silicon terrestrial photovoltaic (PV) modules – Design qualification and type approval*

IEC 61646, *Thin-film terrestrial photovoltaic (PV) modules – Design qualification and type approval*

ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*