SVENSK STANDARD SS-EN 61646

Fastställd	Utgåva	Sida	Ansvarig kommitté
2008-12-15	2	1 (1+42)	SEK TK 82

Solceller –
Konstruktions- och typgodkännande av solcellsmoduler i tunnfilmsteknik

Thin-film terrestrial photovoltaic (PV) modules –
Design qualification and type approval

Som svensk standard gäller europastandarden EN 61646:2008. Den svenska standarden innehåller den officiella engelska språkversionen av EN 61646:2008.

Nationellt förord

Europastandarden EN 61646:2008

består av:

– **europastandardens ikraftsättningsdokument,** utarbetat inom CENELEC
– **IEC 61646, Second edition, 2008 - Thin-film terrestrial photovoltaic (PV) modules - Design qualification and type approval**

utarbetad inom International Electrotechnical Commission, IEC.

Tidigare fastställd svensk standard SS-EN 61646, utgåva 1, 1997, gäller ej fr o m 2011-06-01.

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.

Många standarder inom elområdet beskriver tekniska lösningar och metoder som åstadkommer den elsäkerhet som föreskrivs av svenska myndigheter och av EU.

SEK är Sveriges röst i standardiseringsarbetet inom elområdet

SEK Svensk Elstandard svarar för standardiseringen inom elområdet i Sverige och samordnar svensk medverkan i internationell och europeisk standardisering. SEK är en ideell organisation med frivilligt deltagande från svenska myndigheter, företag och organisationer som vill medverka till och påverka utformningen av tekniska regler inom elektrotekniken.

SEK samordnar svenska intressenters medverkan i SEKs tekniska kommittéer och stödjer svenska experters medverkan i internationella och europeiska projekt.

Stora delar av arbetet sker internationellt

Utformningen av standarder sker i allt väsentligt i internationellt och europeiskt samarbete. SEK är svensk nationalkommitté av International Electrotechnical Commission (IEC) och Comité Européen de Normalisation Electrotechnique (CENELEC).

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 61646

August 2008

ICS 27.160

Supersedes EN 61646:1997

English version

Thin-film terrestrial photovoltaic (PV) modules - Design qualification and type approval

(IEC 61646:2008)

Modules photovoltaïques (PV) en couches minces pour application terrestre - Qualification de la conception et homologation
(CEI 61646:2008)

Terrestrische Dünnschicht-Photovoltaik (PV)-Module - Bauarteignung und Bauartzulassung
(IEC 61646:2008)

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

Ref. No. EN 61646:2008 E

SEK Svensk Elstandard

Foreword

The text of document 82/512/FDIS, future edition 2 of IEC 61646, prepared by IEC TC 82, Solar photovoltaic energy systems, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61646 on 2008-06-01.

This European Standard supersedes EN 61646:1997.

EN 61646:2008 includes the following significant technical changes with respect to EN 61646:1997:

The major change is in the pass/fail criteria. It no longer relies on meeting a plus/minus criterion before and after each test, but rather on meeting the rated power after all of the tests have been completed and the modules have been light-soaked. This was done to eliminate the technology-specific preconditioning necessary to accurately measure the changes caused by the test. (Some modules lose power in light while others lose power during dark heat.) Since all modules must work after exposure to light, this seemed like a good approach and will streamline the test procedure, hopefully reducing the testing cost.

– updated normative references;

– added a definition of “minimum value of maximum output power”;

– modified the wording in major visual defects to allow some bending and misalignment without failure;

– added requirements to the report from EN ISO/IEC 17025;

– removed the “Twist Test” as was done from EN 61215, since no one has ever failed this test;

– made the pass/fail criteria for insulation resistance and wet leakage current dependent on the module area;

– added the temperature coefficient of power (δ) to the required measurements;

– modified temperature coefficient section to allow for measurements under natural sunlight or a solar simulator;

– deleted reference plate method from NOCT;

– added apparatus sections to those test procedures that did not have apparatus sections in EN 61646:1997;

– rewrote the hot-spot test;

– eliminated edge dip method from wet leakage current test;

– changed mechanical load test to 3 cycles to be consistent with other standards;

– added bypass diode thermal test.

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)	2009-03-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2011-06-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61646:2008 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 60904-5	NOTE Harmonized as EN 60904-5:1995 (not modified).
IEC 60904-8	NOTE Harmonized as EN 60904-8:1998 (not modified).

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 60068-1	-[1)]	Environmental testing - Part 1: General and guidance	EN 60068-1	1994[2)]
IEC 60068-2-21	-[1)]	Environmental testing - Part 2-21: Tests - Test U: Robustness of terminations and integral mounting devices	EN 60068-2-21	2006[2)]
IEC 60068-2-78	2001	Environmental testing - Part 2-78: Tests - Test Cab: Damp heat, steady state	EN 60068-2-78	2001[2)]
IEC 60410	-[1)]	Sampling plans and procedures for inspection by attributes	-	-
IEC 60721-2-1	-[1)]	Classification of environmental conditions - Part 2-1: Environmental conditions appearing in nature - Temperature and humidity	HD 478.2.1 S1	1989[2)]
IEC 60891	-[1)]	Procedures for temperature and irradiance corrections to measured I-V characteristics of crystalline silicon photovoltaic devices	EN 60891	1994[2)]
IEC 60904-1	2006	Photovoltaic devices - Part 1: Measurement of photovoltaic current-voltage characteristics	EN 60904-1	2006[2)]
IEC 60904-2	-[1)]	Photovoltaic devices - Part 2: Requirements for reference solar devices	EN 60904-2	2007[2)]
IEC 60904-3	-[1)]	Photovoltaic devices - Part 3: Measurement principles for terrestrial photovoltaic (PV) solar devices with reference spectral irradiance data	EN 60904-3	2008[2)]
IEC 60904-7	-[1)]	Photovoltaic devices - Part 7: Computation of spectral mismatch error introduced in the testing of a photovoltaic device	EN 60904-7	1998[2)]
IEC 60904-9	-[1)]	Photovoltaic devices - Part 9: Solar simulator performance requirements	EN 60904-9	2007[2)]
IEC 60904-10	-[1)]	Photovoltaic devices - Part 10: Methods of linearity measurement	EN 60904-10	1998[2)]
IEC 61215	-[1)]	Crystalline silicon terrestrial photovoltaic (PV) modules - Design qualification and type approval	EN 61215	2005[2)]

[1)] Undated reference.

[2)] Valid edition at date of issue.

Publication	Year	Title	EN/HD	Year
ISO/IEC 17025	-[1)]	General requirements for the competence of testing and calibration laboratories	EN ISO/IEC 17025	2005[2)]

CONTENTS

THIN-FILM TERRESTRIAL PHOTOVOLTAIC (PV) MODULES – DESIGN QUALIFICATION AND TYPE APPROVAL

1 Scope and object

This International Standard lays down requirements for the design qualification and type approval of terrestrial, thin-film photovoltaic modules suitable for long-term operation in general open-air climates as defined in IEC 60721-2-1. This standard is intended to apply to all terrestrial flat plate module materials not covered by IEC 61215.

The test sequence is derived from IEC 61215 for the design qualification and type approval of terrestrial crystalline silicon PV modules. However, it no longer relies on meeting a plus/minus criterion before and after each test, but rather on meeting a specified percentage of the rated minimum power after all of the tests have been completed and the modules have been light-soaked. This eliminates the technology-specific preconditioning necessary to accurately measure the changes caused by the test.

This standard does not apply to modules used with concentrators.

The object of this test sequence is to determine the electrical and thermal characteristics of the module and to show, as far as possible within reasonable constraints of cost and time, that the module is capable of withstanding prolonged exposure in climates described in the scope. The actual life expectancy of modules so qualified will depend on their design, their environment and the conditions under which they are operated.

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 60068-1*: Environmental testing – Part 1: General and guidance*

IEC 60068-2-21: *Environmental testing – Part 2-21: Tests – Test U: Robustness of terminations and integral mounting devices*

IEC 60068-2-78:2001, *Environmental testing – Part 2-78: Tests – Test Cab: Damp heat, steady state*

IEC 60410, *Sampling plans and procedures for inspection by attributes*

IEC 60721-2-1, *Classification of environmental conditions – Part 2-1: Environmental conditions appearing in nature – Temperature and humidity*

IEC 60891, *Procedures for temperature and irradiance corrections to measured I-V characteristics of crystalline silicon photovoltaic (PV) devices*

IEC 60904-1:2006, *Photovoltaic devices – Part 1: Measurements of photovoltaic current-voltage characteristics*

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