

© Copyright SEK. Reproduction in any form without permission is prohibited.

Solceller – Konstruktions- och typgodkännande av solcellsmoduler och enheter med koncentrator (CPV)

*Concentrator photovoltaic (CPV) modules and assemblies –
Design qualification and type approval*

Som svensk standard gäller europastandarden EN 62108:2008. Den svenska standarden innehåller den officiella engelska språkversionen av EN 62108:2008.

Nationellt förord

Europastandarden EN 62108:2008

består av:

- **europastandardens ikraftsättningsdokument**, utarbetat inom CENELEC
- **IEC 62108, First edition, 2007 - Concentrator photovoltaic (CPV) modules and assemblies - Design qualification and type approval**

utarbetad inom International Electrotechnical Commission, IEC.

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.

SEK Svensk Elstandard

Box 1284
164 29 Kista
Tel 08-444 14 00
www.elstandard.se

**Concentrator photovoltaic (CPV) modules and assemblies -
Design qualification and type approval
(IEC 62108:2007)**

Modules et ensembles photovoltaïques
à concentration -
Qualification de la conception
et homologation
(CEI 62108:2007)

Konzentrator-Photovoltaik(CPV)-Module
und -Anordnungen -
Bauarteignung und Bauartzulassung
(IEC 62108:2007)

This European Standard was approved by CENELEC on 2008-02-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the 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 text of document 82/494/FDIS, future edition 1 of IEC 62108, prepared by IEC TC 82, Solar photovoltaic energy systems, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 62108 on 2008-02-01.

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) 2008-11-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2011-02-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 62108:2007 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 60904-1	NOTE Harmonized as EN 60904-1:2006 (not modified).
IEC 61730-1	NOTE Harmonized as EN 61730-1:2007 (modified).
IEC 61730-2	NOTE Harmonized as EN 61730-2:2007 (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.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60068-2-21	2006	Environmental testing - Part 2-21: Tests - Test U: Robustness of terminations and integral mounting devices	EN 60068-2-21	2006
IEC 61215	2005	Crystalline silicon terrestrial photovoltaic (PV) modules - Design qualification and type approval	EN 61215	2005
ISO/IEC 17025	2005	General requirements for the competence of testing and calibration laboratories	EN ISO/IEC 17025	2005
ANSI/UL 1703	2002	Flat-Plate Photovoltaic Modules and Panels	-	-

CONTENTS

1	Scope and object.....	7
2	Normative references	7
3	Terms and definitions	7
4	Sampling	8
5	Marking	9
6	Testing	9
7	Pass criteria	10
8	Report	18
9	Modifications	18
10	Test procedures	18
10.1	Visual inspection	18
10.1.1	Procedure.....	19
10.1.2	Major visual defects.....	19
10.1.3	Requirements	19
10.2	Electrical performance measurement.....	19
10.2.1	Purpose.....	19
10.2.2	Outdoor side-by-side I-V measurement.....	19
10.2.3	Solar simulator I-V measurement.....	21
10.2.4	Dark I-V measurement.....	21
10.3	Ground path continuity test.....	22
10.3.1	Purpose.....	22
10.3.2	Procedure.....	22
10.3.3	Requirements	22
10.4	Electrical insulation test.....	22
10.4.1	Purpose.....	22
10.4.2	Procedure.....	22
10.4.3	Requirements	23
10.5	Wet insulation test.....	23
10.5.1	Purpose.....	23
10.5.2	Procedure.....	23
10.5.3	Requirements	24
10.6	Thermal cycling test	24
10.6.1	Purpose.....	24
10.6.2	Test sample.....	24
10.6.3	Procedure.....	24
10.6.4	Requirements	25
10.7	Damp heat test.....	26
10.7.1	Purpose.....	26
10.7.2	Test sample.....	26
10.7.3	Procedure.....	26
10.7.4	Requirements	27
10.8	Humidity freeze test	27
10.8.1	Purpose.....	27
10.8.2	Test sample.....	27

10.8.3	Procedure.....	27
10.8.4	Requirements	27
10.9	Hail impact test	28
10.9.1	Purpose.....	28
10.9.2	Apparatus.....	28
10.9.3	Procedure.....	28
10.9.4	Requirements	29
10.10	Water spray test	29
10.10.1	Purpose.....	29
10.10.2	Procedure.....	29
10.10.3	Requirements	30
10.11	Bypass/blocking diode thermal test.....	30
10.11.1	Purpose.....	30
10.11.2	Test sample.....	30
10.11.3	Apparatus	30
10.11.4	Procedure.....	30
10.11.5	Requirements	31
10.12	Robustness of terminations test.....	31
10.12.1	Purpose.....	31
10.12.2	Types of terminations	31
10.12.3	Procedure.....	31
10.12.4	Requirements	32
10.13	Mechanical load test.....	32
10.13.1	Purpose.....	32
10.13.2	Procedure.....	32
10.13.3	Requirements	33
10.14	Off-axis beam damage test.....	33
10.14.1	Purpose.....	33
10.14.2	Special case	33
10.14.3	Procedure.....	33
10.14.4	Requirements	34
10.15	Ultraviolet conditioning test	34
10.15.1	Purpose.....	34
10.15.2	Procedure.....	34
10.16	Outdoor exposure test	34
10.16.1	Purpose.....	34
10.16.2	Procedure.....	34
10.16.3	Requirements	35
10.17	Hot-spot endurance test	35
Annex A (informative) Summary of test conditions and requirements		36
Bibliography.....		38
Figure 1 – Schematic of point-focus dish PV concentrator.....		11
Figure 2 – Schematic of linear-focus trough PV concentrator		12
Figure 3 – Schematic of point-focus Fresnel lens PV concentrator		13
Figure 4 – Schematic of linear-focus Fresnel lens PV concentrator		14

Figure 5 – Schematic of a heliostat CPV	15
Figure 6 – Qualification test sequence for CPV modules	16
Figure 7 – Qualification test sequence for CPV assemblies.....	17
Figure 8 – Temperature and current profile of thermal cycle test (not to scale)	26
Figure 9 – Profile of humidity-freeze test conditions.....	28
Table 1 – Terms used for CPVs	8
Table 2 – Allocation of test samples to typical test sequences	10
Table 3 – Thermal cycle test options for sequence A	25
Table 4 – Pre-thermal cycle test options for sequence B.....	27
Table 5 – Humidity freeze test options for sequence B.....	27

CONCENTRATOR PHOTOVOLTAIC (CPV) MODULES AND ASSEMBLIES – DESIGN QUALIFICATION AND TYPE APPROVAL

1 Scope and object

This International Standard specifies the minimum requirements for the design qualification and type approval of concentrator photovoltaic (CPV) modules and assemblies suitable for long-term operation in general open-air climates as defined in IEC 60721-2-1. The test sequence is partially based on that specified in IEC 61215 for the design qualification and type approval of flat-plate terrestrial crystalline silicon PV modules. However, some changes have been made to account for the special features of CPV receivers and modules, particularly with regard to the separation of on-site and in-lab tests, effects of tracking alignment, high current density, and rapid temperature changes, which have resulted in the formulation of some new test procedures or new requirements.

The object of this test standard is to determine the electrical, mechanical, and thermal characteristics of the CPV modules and assemblies and to show, as far as possible within reasonable constraints of cost and time, that the CPV modules and assemblies are capable of withstanding prolonged exposure in climates described in the scope. The actual life of CPV modules and assemblies so qualified will depend on their design, production, 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 60068-2-21:2006, *Environmental testing – Part 2-21: Tests – Test U: Robustness of terminations and integral mounting devices*

IEC 61215:2005, *Crystalline silicon terrestrial photovoltaic (PV) modules – Design qualification and type approval*

ISO/IEC 17025:2005, *General requirements for the competence of testing and calibration laboratories*

ANSI/UL 1703 ed.3 March 15, 2002: *Flat-Plate Photovoltaic Modules and Panels*