

**PV GAP
RECOMMENDED
SPECIFICATION**

PVRS 11

2005-03

**Portable solar photovoltaic (PV) lanterns.
Blank detail specification –**

**Approval under the IEC System for
Conformity Testing and Certification of
Electrical Equipment and Components
(IECEE).**

PV GAP RECOMMENDED SPECIFICATION

PVRS 11

2005-02

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FOREWORD

- 1) PV GAP (Global Approval Program for Photovoltaics) is a not-for-profit international organization, dedicated to the sustained growth of global photovoltaics (PV) markets to meet energy needs world-wide in an environmentally sound manner. Its mission is to promote and encourage the use of internationally accepted standards, quality management processes and organizational training in the design, fabrication, installation, sales and services of PV systems. To this end, it joins with PV related industries, international organizations, testing laboratories, government agencies, financing institutions, non-governmental organizations, and private foundations, in developing and developed countries.
- 2) PV GAP co-operates closely with the International Electrotechnical Commission (IEC) in respect of standardization (principally with IEC Technical Committee N° 82, Solar Photovoltaic Energy Systems) and certification (with the IEC System for Conformity Testing and Certification of Electrical Equipment and Components, IECCE).

PV GAP publishes specifications that have been developed and recommended by experts from the PV industry and other organizations, to be used as interim, recommended specifications until the corresponding IEC standards can be completed. The acceptance of these PV GAP "Recommended Specifications" is voluntary. PV GAP only recommends these specifications but disclaims any liability for their utilization.

It should be noted that, as soon as a corresponding IEC standard is issued, the PV GAP "Recommended Specification" is withdrawn. This is announced on the PV GAP website www.pvgap.org, together with information about the new IEC standard.

- 3) *(to be added when the present PV GAP Recommended Specification has been approved by the PV GAP Executive Board)* The present PV GAP Recommended Specification has been endorsed by the PV GAP Technical Committee and approved by the PV GAP Executive Board. Members of the Technical Committee and the Executive Board are listed on the website www.pvgap.org).
- 4) General enquiries about PV GAP may be addressed to the publisher, which is the PV GAP Secretariat, c/o IEC Central Office, 3 rue de Varembé, Box 31, CH 1211 Geneva 20, Switzerland, E-mail rk@iec.ch, TP +41 22 919 02 16, TF +41 22 919 03 01.

The publisher will be pleased to receive any comments from users of this PV GAP Recommended Specification. All comments will be acknowledged.

While every effort has been made to ensure the accuracy of the contents of this PV GAP Recommended Specification, the publisher can accept no responsibility for any errors that may have occurred.

PORTABLE SOLAR PHOTOVOLTAIC (PV) LANTERNS

Blank detail specification —

Approval under the IEC

System for Conformity Testing and Certification of Electrical Equipment (IECEE)

1 General

1.1 Scope

This PV GAP Recommended Specification is a blank detail specification applicable to portable solar photovoltaic (PV) lanterns, of assessed quality.

This specification references PVRS 11A requirements and methods of test to be used in detail specifications derived from this specification, and lists the technical criteria that are necessary and sufficient to assess the quality of the portable solar PV lanterns in accordance with the IECEE approval procedure described in IECEE 03.

1.2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this PV GAP Recommended Specification.

1. PVRS 11A : month 2005, *Portable solar photovoltaic (PV) lanterns — Design qualification and type approval*
2. IECEE 03: 2008-10, *Rules of Procedure of the Scheme of the IECEE for Mutual Recognition of Conformity Assessment Certificates for Electrotechnical Equipment and Components (CB-FCS).*

1.3 Informative reference

Operating Guide of the CB-FCS Scheme, see www.iecee.org

1.4 Front page of detail specification

The layout of the front page of detail specification shall be as follows (see key below)

(1)	IECEE PVRS 11 AAxxxx Edition: 200x Page 1 of x	(2)
Portable solar photovoltaic (PV) lantern, of assessed quality, in accordance with :		(4)
IECEE PVRS 11A : <i>month</i> , 2005	(3)	
Irradiation Classification		(5)
Electrical characteristics	(see 2.2)	(6)
Drawing or photograph	(7)	Applications : (8)
Constructional characteristics	(see 2.3)	(9)
Documentation	(see 2.4)	
User information included		
Technical manual available		
Principal components	(see 2.5)	(10)
Information about manufacturers who have lanterns approved according to this detail specification is available on the IECEE website www.iecee.org .		

Key to front page:

The numbers between brackets on the front page correspond to the following indications which should be given.

Identification of the detail specification

- (1) The name of the National Standards Organization under whose authority the detail specification is published and, if applicable, the organization from whom the detail specification is available.
- (2) The IECEE logo and the number allotted to the completed detail specification by the National Standards Organization or the IECEE Member Body (IECEE PVRS 11 is the IECEE provisional document reference allocated by the IECEE Secretariat to the blank detail specification PVRS 11 published by PV GAP. AA is the country identifier, e.g. CN for China, FR for France, DE for Germany, IN for India, US for USA).
- (3) The number and the year of availability of the IEC standard or provisional document accepted for use by the IECEE concerning test and measurement procedures for the lantern; also national reference, if different.

Identification of the lantern

- (4) If different from the IEC number, the national number of the detail specification, date of issue and any further information required by the national system, together with any amendment numbers.
- (5) Irradiation Classification : according to annex A, table A-1, of normative reference 1.
- (6) Electrical characteristics.
- (7) An outline drawing or photograph. Alternatively, this may be given in an annex to the detail specification, but (7) should always contain an illustration of the general appearance of the lantern.
- (8) Applications : for example, general lighting in any environment, lighting for specific task, portable emergency indoor light source.
- (9) Constructional characteristics.
- (10) Documentation and principal components.

2 Technical specifications

2.1 General

Solar PV module	Wp
Battery	V, AH, type, system (e.g. Lead Acid)
Application	
Lamp type	
Lamp wattage	W
Luminous efficacy of the lamp	lumens/watt
Light coverage of the lantern	degrees, e.g. 360 degrees
Daily Run Time (DRT) under testing conditions	h
Irradiation classification under testing conditions	(see annex A)
Manufacturer's specified design load	Wh
Days of autonomy under testing conditions	days
Operating temperature, design figure	deg C

2.2 Electrical characteristics

Inverter type	quasi sine wave or sine wave
Lamp current crest factor	
Inverter frequency	in the range 20-35 kHz
Inverter efficiency	%
Inverter idle current	mA
Charging method	e.g. series pulsed, two step
Indication of charging state	
Indication of load disconnect state	
Protection against open-circuit	
Protection against short-circuit	
Protection against reverse polarity	
System voltage	V
Maximum load current	A
Storage capacity	Ah
Daily Run Time under testing conditions	h
Autonomy under testing conditions	days
Consumption when power turned off (maximum self-consumption)	mA
Cable to module, type	
Cable to module, length	m
Cable connectors, type	
Switch, type	

2.3 Mechanical characteristics

Lamp fixing position

Case material

Light diffuser

Size (shipping) without solar PV module mm x mm x mm

Weight (shipping) without solar PV module kg

Size (shipping) with stated solar PV module mm x mm x mm

Weight (shipping) with stated solar PV module kg

2.4 Documentation

See clause 7 of this specification.

2.5 Principal components

Component	Quantity	Nominal rating specified by the component manufacturer	Type approval organization or testing laboratory	Type approval number or test report number
Solar PV module				
Charge controller				
Battery				
Lamp				

2.6 Additional information (not for inspection purposes)

- design lifetime for each of the principal system components (including number of switching cycles for lamps, with the on and off periods specification)
- electromagnetic compatibility (transient and emission disturbance)
- pre-assembled cable (cable lengths (m))
- mounting set (including module support (wooden pole, steel pipe, etc.))
- maintenance (battery topping-up, cleaning of solar modules in dusty areas, or maintenance free)
- number of connections
- level indicator (of electrical energy available)
- accessories, e.g. mains charger, vehicle charge cable
- rain proof (when vertical), dust proof, insect proof
- ability to stand in water of a stated depth
- ability to operate in any orientation
- temperature compensated charging
- shutdown warning
- socket output for e.g. mobile phone charging
- automatic switch-on function at loss of ambient light

3 Approval procedure

3.1 General

The approval procedure shall be in accordance with IECEE 03

NOTE Approval includes current registration/certification to ISO 9001 (see 5.1 h of IECEE 03)

3.2 Primary stage of manufacture

The primary stage of manufacture is that stage (or those stages) of the manufacturing operation at which, and beyond which, the manufacturer shall demonstrate that he has control over all aspects of the processes that affect the quality of the finished product.

NOTE – A manufacturer, himself, does not necessarily have direct control of all aspects of any preceding processes, although he does have the responsibility for accepting the quality achieved by them.

This may be that stage of the manufacturing operation at which partly manufactured components can be evaluated economically without precise knowledge of the preceding processes.

The primary stage of manufacture is the interconnection of the components to form the complete lantern.

The manufacturers of the principal components, on whom the overall quality and reliability of the lantern is strongly dependent, shall each have a quality system that meets the requirements of ISO 9001 for the component manufacturing site.

If the manufacturer builds complete lanterns except for the batteries, then obtains the batteries in the country of use, these lanterns shall be tested and approved with the batteries he intends to use.

3.3 Subcontracting

Where an organization chooses to subcontract any process that affects product conformity with requirements, the organization shall ensure control over such processes. Control of such subcontracted processes shall be identified within the quality management system. (As specified in 4.1, General requirements, of ISO 9001:2000, with reference to outsourcing.)

Subcontracting of the primary and subsequent stages of manufacture (not including installation) is not permitted.

3.4 Technical requirements

Sampling, testing, pass criteria and classification of major defects shall be in accordance with normative reference 1.

NOTE This blank detail specification cannot add requirements that do not exist in normative reference 1.

Reporting, and issuing of the Conformity Assessment Certificate, shall be in accordance with IECEE 03 (see in particular clauses 7, 8 and 9) and clause 20 of normative reference 1.

3.5 Increased severity

Detail specifications derived from this blank detail specification may make the severities of test, the end-of-test requirements, or the sampling levels, more severe. These severities, or requirements, can never be made less stringent.

3.6 Preparation of detail specifications

An individual manufacturer may prepare a detail specification from this blank detail specification and submit it to the responsible national organization for verification of compliance to the IEC 60384-14 rules and the allocation of a number. After completion of the testing in accordance with IEC 60384-14 and in agreement with the chosen National Certification Body of the CB-FCS, the manufacturer or the responsible national organization shall publish the detail specification.

Alternatively, a group of manufacturers may act together to produce a common detail specification with one of them accepting the responsibility for the submission for verification and the allocation of a number, the procedure being the same as above.

The above actions may be in co-operation with one or more customers.

Detail specifications may also be prepared by a responsible national organization or by an IEC technical committee (in this case, IEC TC 82, Solar photovoltaic energy systems).

3.7 Product identification and traceability

The minimum period for maintenance of records shall be as prescribed by the National Certification Body referred to in 3.6 above .

4 Quality conformance inspection

Quality conformance inspection comprises the tests stated in table 1:

- group A: lot-by-lot (100% inspection) tests;
- group C: periodic tests.

All tests of table 1 are mandatory. Where a subgroup contains cumulative tests, the order of the tests is mandatory. Specimens subjected to tests denoted as destructive (D) shall not be released for delivery.

Table 1 — Test schedule for quality conformance inspection

Clause number and test of Normative reference 1	Destructive or non-destructive	Conditions of test	Performance requirements
GROUP A INSPECTION (100%) Subgroup A1 15.4 Check for completeness	ND		As in clause 15.4 of normative reference 1
GROUP B INSPECTION covering additional important characteristics None			

Clause number and test (see Note 1) of Normative reference 1	D or ND	Conditions of test	Sample size and acceptance criterion (see Note 1)			Performance requirements
			p	n	c	
GROUP C INSPECTION (periodic) Subgroup C1 15 and 16 Performance	ND	Clauses 15 and 16 of normative reference 1	24 See 5.1 of reference 1	3	1	As in clauses 15 and 16 of normative reference 1
NOTE 1 - In this table:	p	= periodicity (in months)		n	= sample size	
	c	= acceptance criterion (permitted number or non-conforming items)				

5 Modifications

Any change in the design, materials, components or processing of the system may require a repetition of some or all of the qualification tests to maintain approval.

Principal system components may be changed if they are of equivalent size and performance and if the component has equivalent certification. Example: 50W crystalline silicon PV module (with IECCE approval) from Supplier A with 50W crystalline silicon module (with IECCE approval) from Supplier B.

6 Marking

Marking of each component of the lantern shall be in accordance with clause 6 of normative reference 1. The detail specification may also require that, in addition, the following be marked:

PV module(s) if not integrated

- maximum power (W);
- maximum power current (A);
- maximum power voltage (V);
- maximum permissible system voltage (V);
- open-circuit voltage (V);
- short-circuit current (A);
- NOCT (°C).

Marking of the system package may also be required, for example

- manufacturer's name, monogram or symbol,
- type or model number,
- serial or batch number,
- precautionary warning concerning special requirements for storage or handling.

7 Documentation

A detailed manual in accordance with clause 9 of normative reference 1 shall be available.

User information shall be supplied with each lantern.

8 Annexes

Annexes may be included if necessary, to show more details of the lantern.

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