SLOVENSKI STANDARD
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Priporočila za sisteme malih obnovljivih virov energije in hibridne sisteme za elektrifikacijo podeželja - 9-5. del: Integrirani sistem - Uporaba prenosnih PV svetilk za projekte elektrifikacije podeželja

Recommendations for small renewable energy and hybrid systems for rural electrification - Part 9-5: Integrated system - Selection of portable PV lanterns for rural electrification projects

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Recommendations for small renewable energy and hybrid systems for rural electrification –

Part 9-5: Integrated system – Selection of portable PV lanterns for rural electrification projects

Commission Electrotechnique Internationale
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

RECOMMENDATIONS FOR SMALL RENEWABLE ENERGY AND HYBRID SYSTEMS FOR RURAL ELECTRIFICATION –

Part 9-5: Integrated system – Selection of portable PV lanterns for rural electrification projects

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Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC 62257-9-5, which is a technical specification, has been prepared by IEC technical committee 82: Solar photovoltaic energy systems.

This part of IEC 62257 is based on IEC/PAS 62111 (1999); it cancels and replaces the relevant parts of IEC/PAS 62111.

This part of IEC 62257 is to be used in conjunction with the IEC 62257 series.

The text of this technical specification is based on the following documents:

Enquiry draft	Report on voting
82/462A/DTS	82/477/RVC

Full information on the voting for the approval of this technical specification can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts of the IEC 62257 series, under the general title *Recommendations for small renewable energy and hybrid systems for rural electrification,* can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- transformed into an International Standard,
- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

INTRODUCTION

The IEC 62257 series intends to provide to different players involved in rural electrification projects (such as project implementers, project contractors, project supervisors, installers, etc.) documents for the setting up of renewable energy and hybrid systems with a.c. nominal voltage below 500 V, d.c. nominal voltage below 750 V and nominal power below 100 kVA.

These documents are recommendations:

- to choose the right system for the right place,
- to design the system,
- to operate and maintain the system.

These documents are focused only on rural electrification concentrating on but not specific to developing countries. They must not be considered as all inclusive to rural electrification. The documents try to promote the use of renewable energies in rural electrification; they do not deal with clean mechanisms developments at this time (CO_2 emission, carbon credit, etc.). Further developments in this field could be introduced in future steps.

This consistent set of documents is best considered as a whole with different parts corresponding to items for safety, sustainability of systems and at the lowest life cycle cost as possible. One of the main objectives is to provide the minimum sufficient requirements, relevant to the field of application that is: small renewable energy and hybrid off-grid systems.

The purpose of this part of IEC 62257 is to specify tests in order to help project developers and project implementers in the selection of relevant products (PV portable lanterns), able to match the techno-economic requirements of the project they have in charge, portable PV lantern. This technical specification and the others of the 62257 series are only guidance and so cannot be International Standards.

RECOMMENDATIONS FOR SMALL RENEWABLE ENERGY AND HYBRID SYSTEMS FOR RURAL ELECTRIFICATION –

Part 9-5: Integrated system – Selection of portable PV lanterns for rural electrification projects

1 Scope

This Technical Specification applies to portable solar photovoltaic lanterns (portable PV lantern). This specification is independent of the technology used to provide the light.

The tests provided in this specification are able to help the project implementer to discriminate easily the most appropriate product within some different market offer and choose among them those which match the requirements expressed in the GS of the electrification project (see IEC/TS 62257-3).

The specification also provides provisions of regulations and installation conditions to be complied with in order to ensure the life and proper operation of the selected lantern as well as the safety of people living in proximity to the installation.

This technical specification does not replace any existing IEC standard.

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 62262, *Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
illuminance (of an elementary surface) (symbol E)
the luminous flux received by an elementary surface divided by the area of this surface.

[IEV 723-08-30]

NOTE In the SI system of units illuminance is expressed in lux (lx) or lumens per square metre (lm/m^2).

1 lux is the illuminance produced on a surface of 1 square metre by a luminous flux of 1 lumen uniformly distributed over that surface.

3.2
capacity (of a cell or a battery)
quantity of electricity (electric charge), usually expressed in amperes-hour (Ah), which a fully charged battery can deliver under specified conditions

3.3
light application
light produced by the lantern to allow a given activity

NOTE Examples of categories of applications of the light are given in 5.1.

3.4
life (of a lamp)
the total time for which a lamp has been operated before it becomes useless, or is considered to be so according to specified criteria

NOTE Lamp life is usually expressed in hours.

[IEV 845-07-61]

3.5
life test
test in which lamps are operated under specified conditions for a specified time or to the end of life and during which photometric and electrical measurements may be made at specified intervals

[IEV 845-07-62]

3.6
service life (of a battery)
the period of useful life of a battery under specified conditions

3.7
light output ratio (of a luminaire); luminaire efficiency (USA)
ratio of the total flux of the luminaire, measured under specified practical conditions with its own lamps and equipment, to the sum of the individual luminous fluxes of the same lamps when operated outside the luminaire with the same equipment, under specified conditions

[IEV 845-09-39]

3.8
light unit
assembly inside a casing of all parts such as lamps, optical apparatus, coloured glass, terminals, necessary to exhibit a light aspect

[821-02-38]

3.9
lighting performance
ability of a product to provide the right illuminance for a given application

3.10
illuminance meter
instrument for measuring illuminance

[IEV 845-05-16]

3.11
GS
general specification of the electrification project (see definition in IEC/TS 62257-3, 3.1)

3.12
IP degree
degree of protection provided by enclosures for electrical equipment against penetration by foreign bodies and dust/water.

3.13
IK code
degree of protection provided by enclosures for electrical equipment against external mechanical impacts

3.14
portable
capable to be carried by one person

NOTE The term “portable” implies often the additional ability to operate when carried.

[IEV 151-16-47]

3.15
luminaire
apparatus which distributes, filters or transforms the light transmitted from one or more lamps and which includes, except the lamps themselves, all the parts necessary for fixing and protecting the lamps and, where necessary, circuit auxiliaries together with the means for connecting them to the electric supply

[IEV 845-10-01]

4 System limits

A PV portable lantern comprises:

- a casing (including in most cases a luminaire);
- a PV source (integrated, supported by or completely separate from the casing);
- one or several light sources: Compact Fluoescent Lamp (CFL), leds;
- a battery;
- a power manager (battery charge and discharge controller);
- one or several light control/selection switches;
- cables and connectors (when PV source is separate from the casing);
- status indication device (optional).

NOTE If the light is provided by means of CFL, the latter could be tested according to IEC 62257-12-1 if necessary.

5 Model pre-selection

5.1 Specification of a model

5.1.1 Service to be provided

The project implementer shall define within the GS the required minimum level of illuminance, the minimum daily duration of lighting service and the lifetime.

The project implementer shall define within the GS the required minimum level of illuminance measured as defined in Annex A, the minimum daily duration of lighting service and the minimum expected lifetime of the lamp and the ballast.

Three lantern applications with different required illuminance could be considered:

Application 1 (A1): accurate activities such as reading, sewing, preparing meals, etc. (for example, illuminance > 200 lx could be considered as a basic performance needed for accurate activities on a table).

Application 2 (A2): common household activities such as taking meals, feeding animals, (indoor or outdoor), etc.; illuminance of 100 lx could be considered as a basic performance for this application.

Application 3 (A3): movements from one room to another with no other lighting; illuminance > 20 lx could be considered as a basic performance for this application

NOTE 1 For each of these activities, the required illuminance may differ from one user to another one.

NOTE 2 For a given distance between the lantern and the user, the lighting performance of the lantern may vary in relation to the installation mode of the lantern. The proposed tests are relative to different installation modes as explained in Annex A.

NOTE 3 Caution: Generally, manufacturers do not provide the illuminance but do provide the following information on the system:

- light output provided on a given duration (lm x h), for each level of application as indicated above and in relation to the installation mode of the lantern (laid on the ground or hung up);
- maximum service duration availability for a given application.

NOTE 4 Products must be tested for the same application. The position “standing” or “hung up” is dependant on the design of the product and should be as defined by the manufacturer.

5.1.2 Technical requirements

The project implementer shall also define the IP degree and IK code of the expected products.

Table 1 gives some values that could be considered as a minimum.

Table 1 – Suggested minimum values for IP and IK

Protection degree	Minimum suggested value
IP	33
IK	8

5.1.3 Operating conditions

The project implementer shall also define the operating conditions to which the portable PV lantern can be subjected. Examples of such conditions are given in Table 2.