SLOVENSKI PREDSTANDARD

oSIST-TS IEC/TS 62257-8-1:2006

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Priporočila za sisteme malih obnovljivih virov energije in hibridne sisteme za elektrifikacijo podeželja – 8-1. del: Izbira akumulatorjev in sistemov upravljanja akumulatorjev za samostojne sisteme elektrifikacije – Posebni primer za avtomobilske mokre svinčeno-kislinske akumulatorje, ki so na voljo v deželah v razvoju

Recommendations for small renewable energy and hybrid systems for rural electrification - Part 8-1: Selection of batteries and batteries management systems for stand-alone electrification systems - Specific case of automotive flooded lead-acid batteries available in developing countries

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Functions concerned

☐ Safety ☐ EMC ☐ Environment ☒ Quality assurance

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Title:

IEC 62257-8-1 TS Ed.1: Recommendations for small renewable energy and hybrid systems for rural electrification – Part 8-1 : Selection of batteries and batteries management systems for stand-alone electrification systems - Specific case of automotive flooded lead-acid batteries available in developing countries

Introductory note:

Rural electrification is one of the predominant policy actions designed to increase the well being of rural populations together with improved healthcare, education, personal advancement and economical development.

The purpose of Part 8-1 of the IEC 62257 is to specify the general requirements for batteries and batteries management systems used in stand-alone electrification systems. This document and the others of the 62257 series are only guidance and so cannot be international standards. Additionally their subject is still under technical development and so they shall be published as Technical Specifications.

Note: The IEC 62257 series of Technical Specifications is based on IEC/PAS 62111 (1999-07) and is developed in accordance with the PAS procedure.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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Recommendations for small renewable energy and hybrid systems for rural electrification – Part 8-1 : Selection of batteries and batteries management systems for stand-alone electrification systems - Specific case of automotive flooded lead-acid batteries available in developing countries

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- the required support cannot be obtained for the publication of an International Standard, despite repeated efforts, or
- The subject is still under technical development or where, for any other reason, there is the future but no immediate possibility of an agreement on an International Standard.

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

IEC 62257-8-1, which is a technical specification, has been prepared by of IEC technical committee 82: Solar photovoltaic energy systems.

This document is based on IEC/PAS 62111; it cancels and replaces the relevant parts of IEC/PAS 62111.

This technical specification is to be used in conjunction with:

IEC 62257-1:Recommendations for small renewable energy and hybrid systems for rural electrification – Part 1: General introduction to rural electrification

IEC 62257-2:Recommendations for small renewable energy and hybrid systems for rural electrification – Part 2: From requirements to a range of electrification systems

IEC 62257-3: Recommendations for small renewable energy and hybrid systems for rural electrification – Part 3: Project development and management

IEC 62257-4: Recommendations for small renewable energy and hybrid systems for rural electrification – Part 4: System selection and design

IEC 62257-5: Recommendations for small renewable energy and hybrid systems for rural electrification – Part 5: Safety rules - protection against electrical hazards

IEC 62257-6: Recommendations for small renewable energy and hybrid systems for rural electrification – Part -6: Acceptance, operation, maintenance and replacement

It is also to be used with future parts of this series as and when they are published.

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

Enquiry draft	Report on voting
82/XX/DTS	82/XX/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.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date[1)] 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.

1) The National Committees are requested to note that for this publication the maintenance result date is 2010

INTRODUCTION

The IEC 62257 series of documents 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. voltage below 500 V, d.c. voltage below 750 V and 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 don't 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.

For rural electrification project using PV systems, it is recommended to use solar batteries defined in the International Standard IEC 61427 Ed.2 "Secondary cells and batteries for solar photovoltaic energy systems – General requirements and methods of test".

Nevertheless in many situations, due to budget reasons, Project Implementers cannot afford solar photovoltaic batteries and use cheaper products. The most used and locally made products are automotive flooded lead–acid batteries, But these products are not designed for photovoltaic systems application. There is presently no test to discriminate, in a panel of models of such batteries, which one could provide the required service as a storage application for small PV individual electrification systems (IES-see 62257 2) in an economically viable way.

The purpose of Part 8-1 of the IEC 62257 is to propose tests for automotive lead acid batteries and batteries management systems used in small PV Individual Electrification Systems

This document and the others of the 62257 series are only guidance and so cannot be international standards. Additionally their subject is still under technical development and so they shall be published as Technical Specifications.

Note: The IEC 62257 series of Technical Specifications is based on IEC/PAS 62111 (1999-07) and is developed in accordance with the PAS procedure.

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

Part 8-1 : Selection of batteries and batteries management systems for stand-alone electrification systems - Specific case of automotive flooded lead-acid batteries available in developing countries

1 Scope

The document proposes simple, cheap, comparative tests in order to discriminate easily, in a panel of automotive flooded lead-acid batteries the most appropriate model for PV Individual Electrification Systems.

It could be particularly useful for Project Implementers to test in laboratories of developing countries, the capability of locally made car or truck batteries to be used for their project.

Furthermore battery testing specifications usually need too costly and too much sophisticated test equipment to be applied in developing countries laboratories.

The tests provided in this document allow to assess batteries performances according to the General Specification of the project (see IEC 62257-2) and batteries associated with their Battery Management System (BMS) in a short time and with common technical means. They can be performed locally, as close as possible to the real site operating conditions.

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

This document is not a type approval standard. It is a technical specification to be used as guidelines and does not replace any existing IEC standard on batteries.

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 60050-486, International electro technical vocabulary (IEV) – Part 486: Secondary cells and batteries

IEC 60721-1, Classification of environmental conditions – Part 1: Environmental parameters and their severities

IEC 61427-Ed2, Secondary cells and batteries for photovoltaic energy systems (PVES)- general requirements and methods of test

IEC 61340-4-1 Electrostatics - Part 4-1: Standard test methods for specific applications - Electrical resistance of floor coverings and installed floors

3 Terms and definitions

For the purpose of this document, the definitions and terms for secondary cells and batteries given in IEC 60050-486 apply.

3.1
electrochemical cell or battery [IEV 486-01-01]
an electrochemical system capable of storing in chemical form the electric energy received and which can give it back by conversion

3.2
secondary cell [IEV 486-01-02]
an assembly of electrodes and electrolyte which constitutes the basic unit of a secondary battery

3.3
storage battery (secondary battery) [IEV 486-01-03]
two or more secondary cells connected together and used as a source of electric energy

3.4
lead-acid battery [IEV 486-01-04]
storage battery in which the electrodes are made mainly from lead and the electrolyte is a sulfuric acid solution.

3.5
terminal (pole) [IEV 486-02-16]
a conductive part provided for the connection of a cell or battery to external conductors.

3.6
density
dimensionless magnitude expressing the ratio of the electrolyte mass to the water mass occupying the same volume at 4°C

3.7
electrolyte [IEV 486-02-19]
a liquid or solid phase containing mobile ions which render the phase ionically conductive.

3.8
dry charged battery
a secondary battery stored without electrolyte whose plates are dry and in a charged state.

3.9
self discharge [IEV 486-03-27]
loss of chemical energy due to spontaneous reactions within the battery when not connected to an external circuit

Note 1: This reaction also exists when charging and discharging.

Note 2:The auto discharge current varies with the voltage applied on the terminals of the cells, temperature, age and type of cells.

3.10
observed battery capacity
quantity of electricity or electrical charge that a battery in high state of charge can deliver under the proposed test conditions. In practice, battery capacity is expressed in ampere-hours(Ah),

3.11
nominal capacity [IEV 486-03-21]
a suitable approximate quantity of electricity, used to identify the capacity of a cell or a battery.

Note: this value is usually expressed in ampere-hours (Ah),

3.12
rated capacity (of a cell or a battery) [IEV 486-03-21]
the quantity of electricity, declared by the manufacturer, which a cell or a battery can deliver under specified conditions after a full charge

NOTE: The rated capacity shown on the battery label is given for a discharge period which depends on the technology used in the battery:

NOTE : The capacity of a battery is higher when it is discharged slowly. For example, variations are in the order of 10 % to 20 % between a capacity measured over 5 hours and a capacity measured over 100 hours .

3.13
short-circuit current [IEV 486-03-26]
the maximum current given by a battery into a circuit of a very low resistance compared with that of the battery, under specified conditions.

3.14
charge rate[IEV 486-03-06]
the current at which a battery is charged.

3.15
ambient temperature[IEV 486-03-12]
temperature of the medium in the immediate vicinity of a battery

3.16
gassing [IEV 486-03-24]
the formation of gas produced by electrolysis of the electrolyte

3.17
constant current charge[IEV 486-03-24]
a charge during which the current is maintained at a constant value.

3.18
initial charge
a commissioning charge given to a new battery to bring it to the fully charged state

3.19
cycle [IEV 486-03-28]
a sequence of a discharge followed by a charge or a charge followed by a discharge of a battery under specified conditions.

3.20
commissioning [IEV 486-03-28]
final checking of installation and operation of a battery on site.

3.21
BMS
battery management system (or battery charge/discharge controller)

4 Batteries and battery management system selection

4.1 Batteries technical characteristics

4.1.1 Battery cases

Batteries cases shall be made of suitable materials capable of withstanding impacts and shocks and resistant to acid..