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REDLINE VERSION

TECHNICAL SPECIFICATION

colour inside

Recommendations for ~~small~~ renewable energy and hybrid systems for rural electrification –
Part 9-5: Integrated systems – Selection of stand-alone lighting kits for rural electrification

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

Part 9-5: Integrated systems – Selection of stand-alone lighting kits for rural electrification

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This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

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c) Limits on total series resistance of the test apparatus have been added to test procedures.
d) Language has been added throughout to facilitate the testing of systems with appliances, including non-lighting appliances such as radios.
e) An alternative lumen maintenance test procedure using IESNA LM80-08 test data has been added.
f) Methods have been added for testing water and physical ingress protection for photovoltaic modules.
g) Procedures have been added for powering light points directly from a power supply during the lumen maintenance, light output, and light distribution tests.
h) Equipment requirements and recommended equipment specifications have been consolidated into the new Annex CC.
i) New optional test methods have been added to assess robustness to faults (Annex DD), characterize DC ports (Annex EE) and appliances (Annex FF), and synthesize test results to estimate the energy service capabilities and evaluate advertising claims for systems with multiple appliances (Annex GG).

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INTRODUCTION

IEC 62257 (all parts) ~~intends to provide to different players involved in rural electrification projects (such as project implementers, project contractors, project supervisors, installers, etc.) guidelines for the setting up of~~ provides support and strategies for and institutions involved in rural electrification projects. It documents technical approaches for designing, building, testing, and maintaining off-grid renewable energy and hybrid systems with AC nominal voltage below 500 V, DC nominal voltage below 750 V and nominal power below 100 kVA.

These documents are recommendations to support buyers who want to connect with good quality options in the market:

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

These documents are focused only on technical aspects of rural off-grid electrification concentrating on, but not specific to, developing countries. They ~~shall~~ are 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 mechanism developments at this time (CO_2 emission, carbon credit, etc.)~~ do not describe a range of factors that can determine project or product success: environmental, social, economic, service capabilities, and others.

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~~ costs ~~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 main objectives are to support the capabilities of households and communities that use small renewable energy and hybrid off-grid systems and inform organizations and institutions in the off-grid power market.

The purpose of this part of IEC 62257 is to specify quality assurance strategies for stand-alone lighting kits, including product specifications, tests, and a standardized specification sheet format. In addition to supporting the selection of products by project developers and implementers, quality assurance can help market support organizations, manufacturers, and governments achieve the goals they have for off-grid lighting projects.

The intended users of this part of IEC 62257 are listed below. In some clauses and subclauses of this part of IEC 62257, a description of the application of the subclause contents is offered to help provide context for each type of user.

a) Market support programmes are programmes that support the off-grid lighting market with financing, consumer education, awareness, and other services. Market support programmes often use quality assurance to qualify for access to services such as:
   - greenhouse gas reduction certifications or other incentives,
   - access to financing (trade or consumer finance),
   - use of a buyer seal and certification (government or non-governmental institutional backing, consumer or "business to business" seals),
   - participation in a public product information database (e.g. standardized specification sheets),
   - access to a business network or trade group,
   - business support and development services,
   - access to market intelligence, and

- participation in consumer awareness campaigns.

a) Manufacturers and distributors need to verify the quality and performance of products from different batches and potential business partners. Manufacturers and distributors often use quality assurance plans or requirements to:
   - support quality control processes at a manufacturing plant or upon receipt of goods from a contract manufacturer, and
   - choose products to distribute.

b) Bulk procurement programmes facilitate or place large orders for devices from a distributor or manufacturer. Bulk procurement programmes may use quality assurance to:
   - provide devices to a particular, relatively small group of end users whose needs are understood (e.g., project developers and implementers for an electrification project may include quality assurance requirements in the GS of an electrification project (see IEC TS 62257-3)), and
   - organize a subsidy, buy-down, or giveaway programme that will serve a broad set of users.

c) Trade regulators are typically government policymakers and officials who craft and implement trade and tax policy. Regulators may use quality assurance requirements to:
   - qualify for exemption from tax or duties, and
   - establish requirements for customs.

This part of IEC 62257 establishes the framework for creating a product specification, the basis for evaluating quality for a particular context. Product specifications include minimum requirements for quality standards and warranty requirements~~, and/or performance targets~~. Products are compared to specifications based on test results and other information about the product. The product specification framework is flexible and can accommodate the goals of diverse organizations and institutions.

There is a range of tests outlined in this part of IEC 62257; some are simple enough to be completed in the field by project developers while others require laboratory equipment. The tests and inspections are designed to be widely applicable across different markets, countries, and regions.

Standardized specification sheets are also defined that can be used to communicate the test results. Combined with a set of product specifications, the information in the standardized specification sheet can inform the use of a quality and/or performance label.

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

Part 9-5: Integrated systems – Selection of stand-alone lighting kits for rural electrification

1 Scope

This part of IEC 62257, which is a Technical Specification, applies to stand-alone rechargeable electric lighting appliances or kits that can be installed by a typical user without employing a technician.

This part of IEC 62257 presents a quality assurance framework that includes product specifications (a framework for interpreting test results), test methods, and standardized specification sheets (templates for communicating test results).

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

~~IEC 60081:1997, *Double-capped fluorescent lamps – Performance specifications*~~
~~Amendment 1:2000~~
~~Amendment 2:2003~~
~~Amendment 3:2005~~
~~Amendment 4:2010~~

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

IEC 60891:2009, *Photovoltaic devices – Procedures for temperature and irradiance corrections to measured I-V characteristics*

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

IEC 61056-1:2012, *General purpose lead-acid batteries (valve-regulated types) – Part 1: General requirements, functional characteristics – Methods of test*

IEC 61215 (all parts), *Terrestrial photovoltaic (PV) modules – Design qualification and type approval*

IEC 61427-1:2013, *Secondary cells and batteries for renewable energy storage – General requirements and methods of test – Part 1: Photovoltaic off-grid application*

IEC 61672-1, *Electroacoustics – Sound level meters – Part 1: Specifications*

~~IEC 61951-1:2003, *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Portable sealed rechargeable single cells – Part 1: Nickel-cadmium*~~

IEC 61951-2:2011, *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Portable sealed rechargeable single cells – Part 2: Nickel-metal hydride*

IEC 61960:2011, *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Secondary lithium cells and batteries for portable applications*

IEC 62087-1:2015, *Audio, video, and related equipment – Determination of power consumption – Part 1: General*

IEC 62087-2:2015, *Audio, video, and related equipment – Determination of power consumption – Part 2: Signals and media*

IEC 62087-3:2015, *Audio, video, and related equipment – Determination of power consumption – Part 3: Television sets*

~~IEC 62509:2010, *Battery charge controllers for photovoltaic systems – Performance and functioning*~~

CIE 15:2004, *Colorimetry*

CIE 084, *The measurement of luminous flux*

CIE 13.3~~:1995~~, *Method of measuring and specifying colour rendering properties of light sources*

CIE 127, *Measurement of LEDs*

CIE 177~~:2007~~, *Colour rendering of white LED light sources*

IESNA LM-78-07, *IESNA approved method for total luminous flux measurement of lamps using an integrating sphere photometer*

IESNA LM-79-08, *IES approval method for electrical and photometric measurements of solid state lighting products*

IESNA LM-80-08, *Approved method: measuring lumen maintenance of LED light sources*

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

~~ISO 9001, *Quality management systems – Requirements*~~

~~PVRS 7A, *DC supplied lighting systems with fluorescent lamps for PV stand-alone systems*~~

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Part 9-5: Integrated systems – Selection of stand-alone lighting kits for rural electrification

IEC TS 62257-9-5:2016-06(en)

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