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Renewable energy off-grid systems – Part 9-5: Integrated systems – Laboratory evaluation of stand-alone renewable energy products for rural electrification

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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RENEWABLE ENERGY OFF-GRID SYSTEMS –

Part 9-5: Integrated systems – Laboratory evaluation of stand-alone renewable energy products for rural electrification

FOREWORD

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IEC TS 62257-9-5 has been prepared by IEC technical committee 82: Solar photovoltaic energy systems. It is a Technical Specification.

This fifth edition cancels and replaces the fourth edition issued in 2018. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) Decreased the sample size to 2 for QTM tests and changed the minimum stock for warehouse sampling to 150 units regardless of the number of samples selected.
b) Defined a new renewal test method that is distinct from the market check method.

c) Removed the example product specification template.

d) Added the PV module wiring inspection, partial shading test, bending or folding test, and visual inspection steps for PV modules.

e) Simplified the visual screening procedure by removing requirements to measure or record unnecessary information and convey information using photos when possible.

f) Made the light distribution test, charging efficiency test, and continuation of the lumen maintenance test to 2 000 h optional.

g) Improved accuracy of the solar operation efficiency calculation for products that do not fully utilize the PV module energy generation capacity.

h) Added steps to S.4.2.5 to minimize battery discharge before the full-battery run time test.

i) Added a detailed procedure for assessment of conformal coatings on printed circuit boards.

j) Removed the PV overvoltage protection test procedure for products with batteries that cannot be disconnected in normal operation.

k) Removed the dynamic measurement for DC ports; added procedures for steady-state measurement of USB ports supporting fast-charging protocols such as USB Power Delivery.

l) Added power consumption measurement for computers; modified television set power consumption test conditions to better match typical use.

m) Corrected the energy service calculations for appliance combinations including lights that automatically step down to a lower setting.

The text of this Technical Specification is based on the following documents:

Draft	Report on voting
82/2289/DTS	82/2312/RVDTS

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this Technical Specification is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 62257 series, published under the general title *Renewable energy off-grid systems*, can be found on the IEC website.

Future standards in this series will carry the new general title as cited above. Titles of existing standards in this series will be updated at the time of the next edition.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

INTRODUCTION

The IEC 62257 series provides support and strategies for 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 are not considered as all inclusive to rural electrification. The documents 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 costs. 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 document is to specify laboratory test methods for evaluating the quality assurance of stand-alone renewable energy products. This document is specifically related to renewable energy products that are packaged and made available to end-use consumers at the point of purchase as single, stand-alone products that do not require additional system components to function.

The term "stand-alone renewable energy product" is used in this document to describe this class of products. Other equivalent terms, including "off-grid solar" or "rechargeable," are often used by manufacturers, distributors, and other stakeholders to describe these products. Many of these systems meet the definition of type T_2I (individual electrification systems with energy storage) in IEC TS 62257-2.

The intended users of this document are:

- Market support programmes that support the off-grid lighting market with financing, consumer education, awareness, and other services;
- Manufacturers, distributors, and other companies in order to verify the quality and performance of products;
- Bulk procurement programmes that facilitate or place large orders of products; and,
- Trade regulators such as government policymakers and officials who craft and implement trade and tax policy.

This document 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. 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. The tests and inspections are designed to be widely applicable across different markets, countries, and regions.