# IEC TS 62257-12-1

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# TECHNICAL SPECIFICATION

colour inside

## Recommendations for renewable energy and hybrid systems for rural electrification –
## Part 12-1: ~~Selection~~ Laboratory evaluation of lamps and lighting appliances for off-grid electricity systems

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

## Part 12-1: ~~Selection~~ Laboratory evaluation of lamps and lighting appliances for off-grid electricity systems

## FOREWORD

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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.**

The main task of IEC technical committees is to prepare International Standards. In exceptional circumstances, a technical committee may propose the publication of a Technical Specification when

- 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 62257-12-1, which is a Technical Specification, has been prepared by IEC technical committee 82: Solar photovoltaic energy systems.

This third edition cancels and replaces the second edition published in 2015. This edition constitutes a technical revision.

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

Title modified.

- Annex A and Annex B were combined into a single Annex A to eliminate duplicate tables and simplify the document. Annex A in this third edition now covers recommendations and requirements for both market support programmes and bulk procurement programs. Annex A provides specific examples for quality standards, warranty requirements, and performance criteria for off-grid lighting products.

This Technical Specification is to be used in conjunction with other parts of the IEC 62257 series.

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

| Enquiry draft | Report on voting |
|---|---|
| 82/1617/DTS | 82/1642A/RVDTS |

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 renewable energy and hybrid systems for rural electrification*, 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 publication will remain unchanged until the stability date indicated on the IEC website 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.

**IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.**

# INTRODUCTION

The IEC 62257 series provides support and strategies for organizations 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 1 000 V, and DC nominal voltage below 1 500 V.

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,
- 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 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 affordable 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 ~~strategies for~~ of lamps and lighting appliances for off-grid electricity systems, including product specifications and tests. 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 lighting appliances in off-grid applications.

This part of IEC 62257 presents a quality assurance framework that includes product specifications (a framework for interpreting test results) and test methods. ~~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.~~

The intended users of this document are:

- 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 like~~

  ~~– 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 (for example, standardized specifications sheets),~~

  ~~– access to a business network or trade group,~~

  ~~– business support and development services,~~

  ~~– access to market intelligence, and~~

  ~~– participation in consumer awareness campaigns.~~

- Manufacturers and distributors that 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.~~

- Bulk procurement programmes that facilitate or place large orders ~~for devices from a distributor or manufacturer~~ of products; ~~Bulk procurement programmes often use quality assurance to~~ and,

  ~~– provide devices to a particular, relatively small group of end-users whose needs are understood (for example, project developers and implementers for an electrification project may include quality assurance requirements in the general specification 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.~~

- Trade regulators ~~are typically~~ such as government policymakers and officials who craft and implement trade and tax policy. ~~Regulators often use quality assurance requirements to~~

  ~~– qualify for exemption from tax or duties, and~~

  ~~– establish requirements for customs.~~

~~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.

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

## Part 12-1: ~~Selection~~ Laboratory evaluation of lamps and lighting appliances for off-grid electricity systems

## 1 Scope

This part of IEC 62257 establishes the framework for creating a product specification for lamps and lighting appliances to serve as the basis for evaluating quality for a particular context. Product specifications include minimum requirements for quality standards, warranty requirements, and/or performance criteria. 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.

This document applies to lamps and lighting appliances for off-grid electricity systems that have the following characteristics:

- The power supply is AC or DC:
  - AC nominal voltages up to 250 V;
  - DC nominal voltages up to 48 V.
- The light source is CFL, linear fluorescent, or LED.
- Operation of the lamp or lighting appliance does not require any components to be supplied by the testing laboratory other than lampholders, wire, connectors, and a power supply.
- The lamp or lighting appliance does not include a battery or energy source (for example, a photovoltaic module or electromechanical generator).

Luminaires are included in the definition of “lighting appliances” if packaged together with a lamp intended to be used with the luminaire. Luminaires without lamps are not included in the scope of this document.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60068-2-6, *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)*

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

IEC 60598-1, *Luminaires – Part 1: General requirements and tests*

IEC 60598-2-1, *Luminaires – Part 2-1: Particular requirements – Fixed general purpose luminaires*

IEC TS 61836, *Solar photovoltaic energy systems – Terms, definitions and symbols*

~~IEC TS 62257-9-5, *Recommendations for small renewable energy and hybrid systems for rural electrification – Part 9-5: Integrated system – Selection of stand-alone lighting kits for rural electrification*~~

IEC TS 62257-9-5:2018, *Recommendations for renewable energy and hybrid systems for rural electrification – Part 9-5: Integrated systems – Laboratory evaluation of stand-alone renewable energy products for rural electrification*

~~CIE 084, *The measurement of luminous flux*~~

~~CIE 127, *Measurement of LEDs*~~

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

~~IESNA LM-79-08, *Electrical and photometric measurement of solid state lighting products*~~

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# TECHNICAL SPECIFICATION

**Recommendations for renewable energy and hybrid systems for rural electrification –**
**Part 12-1: Laboratory evaluation of lamps and lighting appliances for off-grid electricity systems**



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

## Part 12-1: Laboratory evaluation of lamps and lighting appliances for off-grid electricity systems

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- 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 62257-12-1, which is a Technical Specification, has been prepared by IEC technical committee 82: Solar photovoltaic energy systems.

This third edition cancels and replaces the second edition published in 2015. This edition constitutes a technical revision.

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

Title modified.

- Annex A and Annex B were combined into a single Annex A to eliminate duplicate tables and simplify the document. Annex A in this third edition now covers recommendations and requirements for both market support programmes and bulk procurement programs. Annex A provides specific examples for quality standards, warranty requirements, and performance criteria for off-grid lighting products.

This Technical Specification is to be used in conjunction with other parts of the IEC 62257 series.

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

| Enquiry draft | Report on voting |
|---|---|
| 82/1617/DTS | 82/1642A/RVDTS |

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 renewable energy and hybrid systems for rural electrification*, 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 publication will remain unchanged until the stability date indicated on the IEC website 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.

# INTRODUCTION

The IEC 62257 series provides support and strategies for organizations 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 1 000 V, and DC nominal voltage below 1 500 V.

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,
- 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 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 affordable 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 lamps and lighting appliances for off-grid electricity systems, including product specifications and tests. 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 lighting appliances in off-grid applications.

This part of IEC 62257 presents a quality assurance framework that includes product specifications (a framework for interpreting test results) and test methods.

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 and distributors that need 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.

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

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

## Part 12-1: Laboratory evaluation of lamps and lighting appliances for off-grid electricity systems

## 1 Scope

This part of IEC 62257 establishes the framework for creating a product specification for lamps and lighting appliances to serve as the basis for evaluating quality for a particular context. Product specifications include minimum requirements for quality standards, warranty requirements, and/or performance criteria. 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.

This document applies to lamps and lighting appliances for off-grid electricity systems that have the following characteristics:

- The power supply is AC or DC:
  - AC nominal voltages up to 250 V;
  - DC nominal voltages up to 48 V.
- The light source is CFL, linear fluorescent, or LED.
- Operation of the lamp or lighting appliance does not require any components to be supplied by the testing laboratory other than lampholders, wire, connectors, and a power supply.
- The lamp or lighting appliance does not include a battery or energy source (for example, a photovoltaic module or electromechanical generator).

Luminaires are included in the definition of “lighting appliances” if packaged together with a lamp intended to be used with the luminaire. Luminaires without lamps are not included in the scope of this document.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60068-2-6, *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)*

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

IEC 60598-1, *Luminaires – Part 1: General requirements and tests*

IEC 60598-2-1, *Luminaires – Part 2-1: Particular requirements – Fixed general purpose luminaires*

IEC TS 61836, *Solar photovoltaic energy systems – Terms, definitions and symbols*

IEC TS 62257-9-5: 2018, *Recommendations for renewable energy and hybrid systems for rural electrification – Part 9-5: Integrated systems – Laboratory evaluation of stand-alone renewable energy products for rural electrification*