



TECHNICAL SPECIFICATION



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

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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CONTENTS

FOREWORD	7
INTRODUCTION	10
1 Scope	12
2 Normative references	12
3 Terms and definitions	13
4 Characteristics of lamps and lighting appliances	17
4.1 Product categories	17
4.2 System measurements and observations	17
4.2.1 General	17
4.2.2 Design, manufacture, and marketing	17
4.2.3 Durability and workmanship	19
4.2.4 Electrical characteristics	21
4.2.5 Photometric performance measures	22
4.2.6 Photometric durability measures	23
4.2.7 Self-declaration aspects	24
5 Product specification	24
5.1 General	24
5.2 Applications	25
5.3 Quality assurance principles	26
5.3.1 General	26
5.3.2 Rationale for dividing quality, warranty, and performance	26
5.4 Product specification framework description	26
5.4.1 General	26
5.4.2 Product specification template	27
5.4.3 Tolerances	30
5.4.4 Quality standards criteria	31
5.4.5 Warranty requirements criteria	36
5.4.6 Performance criteria	36
6 Quality test method (QTM)	38
6.1 General	38
6.2 Applications	39
6.3 Sampling requirements	39
6.4 Laboratory requirements	39
6.5 Testing requirements	39
6.6 Recommended test programme	42
6.6.1 General	42
6.6.2 Reporting	44
7 Market check method (MCM)	44
7.1 General	44
7.2 Applications	45
7.3 Sampling requirements	45
7.4 Laboratory requirements	45
7.5 Testing requirements	46
7.6 Recommended tests programme	47
7.7 Report requirements	48

Annex A (informative) Example quality standards and performance criteria for off-grid lighting market support programme qualification	49
A.1 Overview.....	49
A.2 Test requirements	49
A.3 Quality standards	49
A.4 Warranty requirements.....	51
A.5 Performance criteria	51
Annex B (informative) Example quality standards, warranty requirements, and performance criteria for bulk procurement qualification (“sample tender”)	52
B.1 Overview.....	52
B.2 Test requirements	52
B.3 Product category requirements	52
B.4 Quality standards.....	52
B.5 Warranty requirements.....	54
B.6 Performance criteria	54
B.7 Performance criteria tolerance	54
Annex C (normative) Manufacturer self-reported information.....	55
C.1 Background.....	55
C.2 Outcomes	55
C.3 Solicited information	55
Annex D (normative) Product sampling	56
D.1 Background.....	56
D.2 Test outcomes	56
D.3 Related tests.....	56
D.4 Procedure	56
Annex E (normative) Power supply requirements for testing.....	57
E.1 Background.....	57
E.2 Related tests.....	57
E.3 Equipment requirements	57
E.3.1 DC systems	57
E.3.2 AC systems	57
E.4 Reporting.....	58
Annex F (normative) Visual screening.....	59
F.1 Background.....	59
F.2 Test outcomes	59
F.3 Related tests.....	59
F.4 Procedure	59
F.4.1 Properties, features, and information	59
F.4.2 Specifications	61
F.4.3 Functionality and internal inspection	62
F.5 Reporting.....	63
Annex G (normative) Sample preparation	66
G.1 Background.....	66
G.2 Test outcomes	66
G.3 Related tests.....	66
G.4 Procedure	66
G.4.1 General	66
G.4.2 Equipment requirements.....	66

G.4.3	Test prerequisites	67
G.4.4	Procedure	67
G.5	Calculations	68
G.6	Reporting	68
Annex H (normative)	Voltage and frequency settings, voltage measurement points, and product stabilization procedures	69
H.1	Background	69
H.2	Related tests	69
H.3	Equipment requirements	69
H.4	Procedure	69
H.4.1	Test setup	69
H.4.2	Standard operating voltages	70
H.4.3	Frequency selection	71
H.4.4	Stabilization period	71
H.5	Reporting	72
Annex I (normative)	Light output	73
I.1	Background	73
I.2	Test outcomes	73
I.3	Related tests	73
I.4	Procedure	73
I.5	Calculations	74
I.6	Reporting	74
Annex J (normative)	Light distribution	75
J.1	Background	75
J.2	Test outcomes	75
J.3	Related tests	75
J.4	Procedure	75
J.5	Calculations	75
J.6	Reporting	76
Annex K (normative)	Input voltage range	77
K.1	Background	77
K.2	Test outcomes	77
K.3	Related tests	77
K.4	Procedure	78
K.4.1	General	78
K.4.2	Equipment requirements	78
K.4.3	Test prerequisites	78
K.4.4	Apparatus	78
K.4.5	Procedure	78
K.5	Calculations	80
K.6	Reporting	80
Annex L (normative)	Lumen maintenance	82
L.1	Background	82
L.2	Test outcomes	82
L.3	Related tests	82
L.4	Procedure	82
L.5	Calculations	82
Annex M (normative)	Cycling	83

M.1	Background.....	83
M.2	Test outcomes	83
M.3	Related tests.....	83
M.4	Procedure	83
M.4.1	General	83
M.4.2	Equipment requirements.....	83
M.4.3	Test prerequisites	84
M.4.4	Apparatus.....	84
M.4.5	Procedure.....	84
M.5	Calculations	84
M.6	Reporting	85
Annex N (normative)	Mechanical durability	86
N.1	Background.....	86
N.2	Test outcomes	86
N.3	Related tests.....	87
N.4	Procedures	87
N.4.1	General	87
N.4.2	Shipping vibration test	87
N.5	Reporting	88
Annex O (normative)	Physical ingress and water protection	89
O.1	Background.....	89
O.2	Test outcomes	89
O.3	Related tests.....	90
O.4	Procedure	90
O.5	Reporting	90
Annex P (normative)	Power consumption and power quality	91
P.1	Background.....	91
P.2	Test outcomes	91
P.3	Related tests.....	91
P.4	Procedure	91
P.4.1	DC power	91
P.4.2	AC power.....	92
P.5	Reporting.....	94
Bibliography.....		95
Figure 1 – The three components of a product specification.....		25
Figure 2 – Recommended sequence of testing for QTM		42
Figure H.1 – Test configuration		70
Figure M.1 – Plot of cycle life for 6 samples.....		85
Figure P.1 – Test configuration for the AC power consumption and power quality test if an external power meter is used		93
Table 1 – Applications of product specifications		25
Table 2 – Truth-in-advertising tolerance.....		28
Table 3 – Safety and durability standards		28
Table 4 – Power quality standards for AC products		29
Table 5 – End-user support standards		29

Table 6 – End-user support requirements	30
Table 7 – Lighting service criteria for performance assessment	30
Table 8 – Truth-in-advertising criteria for quality standards	32
Table 9 – Notes on common truth-in-advertising aspects	32
Table 10 – Safety and durability criteria for quality standards	33
Table 11 – Recommended level of water protection by product category.....	35
Table 12 – Power quality criteria for quality standards	35
Table 13 – End-user support criteria for quality standards	36
Table 14 – Criteria for warranty standards	36
Table 15 – Lighting service criteria for performance assessment	37
Table 16 – Lighting service benchmarks	38
Table 17 – Applications of product specifications	39
Table 18 – QTM testing requirements	40
Table 19 – Applications of MCM results	45
Table 20 – MCM testing requirements	46
Table A.1 – Truth-in-advertising tolerance	49
Table A.2 – Safety and durability standards	50
Table A.3 – Power quality standards for AC products.....	51
Table A.4 – End-user support requirements	51
Table A.5 – Lighting service criteria for performance assessment	51
Table B.1 – Truth-in-advertising tolerance	52
Table B.2 – Safety and durability standards	53
Table B.3 – Power quality standards for AC products.....	54
Table B.4 – End-user support requirements	54
Table B.5 – Lighting service criteria for performance assessment	54
Table C.1 – Manufacturer self-reported information outcomes.....	55
Table D.1 – Product sampling outcomes	56
Table F.1 – Visual screening test outcomes	59
Table H.1 – Standard operating voltage for several nominal system voltages.....	70
Table H.2 – Voltage and current reporting requirements	72
Table I.1 – Light output test outcomes	73
Table J.1 – Light distribution test outcomes	75
Table K.1 – Input voltage range test outcomes	77
Table K.2 – Recommended operating voltage range and maximum allowable voltage by nominal operating voltage	79
Table K.3 – Example table of operating voltage, current, voltage at DUT, and relative light output.....	81
Table L.1 – Lumen maintenance test outcomes	82
Table M.1 – Cycling test outcomes	83
Table N.1 – Mechanical durability test outcomes.....	86
Table O.1 – Water exposure and physical ingress protection test outcomes.....	89
Table P.1 – AC power quality test outcomes	91

INTERNATIONAL ELECTROTECHNICAL COMMISSION

RECOMMENDATIONS FOR RENEWABLE ENERGY AND HYBRID SYSTEMS FOR RURAL ELECTRIFICATION –

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

FOREWORD

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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 second edition cancels and replaces the first edition published in 2007. This edition constitutes a technical revision.

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

- Overall, the narrow focus on the needs of bulk procurement programmes has been shifted to a wider framework for structuring quality assurance using appropriate methods for a range of stakeholders including governments, manufacturers, buyers, and others.
- The document structure has been revised, with modular methods given in annexes.
- Normative references and definitions have been added to support the new document structure.
- The scope has been expanded from self-ballasted compact fluorescent lamps to include DC products and lighting appliances with LED, compact fluorescent, or linear fluorescent light sources.
- Several key test procedures have been created or modified:
 - manufacturer self-reported information;
 - random product sampling;
 - visual screening;
 - light output, distribution, and maintenance;
 - cycling test for fluorescent lights;
 - input voltage range;
 - mechanical durability;
 - physical ingress and water protection;
 - power quality and power consumption.

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
82/941/DTS	82/995/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 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.

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

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 part of IEC 62257 is to specify quality assurance strategies for 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.

- **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** 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** facilitate or place large orders for devices from a distributor or manufacturer. Bulk procurement programmes often use quality assurance to
 - 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 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 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 – 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 part of IEC 62257 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 part of IEC 62257.

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 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: Particular requirements. Section One: Fixed general purpose luminaires*

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 62257-12-1:2015 © IEC 2015 – 13 –

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*