



BSI Standards Publication

Guidelines for principal component reliability testing for LED light sources and LED luminaires

National foreword

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TECHNICAL SPECIFICATION

Guidelines for principal component reliability testing for LED light sources and LED luminaires

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ELECTROTECHNICAL
COMMISSION

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CONTENTS

| | |
|---|----|
| FOREWORD..... | 6 |
| INTRODUCTION..... | 8 |
| 1 Scope..... | 9 |
| 2 Normative references | 9 |
| 3 Terms and definitions | 10 |
| 4 Component test conditions | 13 |
| 5 LED package and interconnects | 14 |
| 5.1 General..... | 14 |
| 5.2 Sampling requirements | 14 |
| 5.3 Production requirements | 14 |
| 5.4 Assembly of LED packages on test boards..... | 15 |
| 5.5 Moisture preconditioning | 15 |
| 5.6 Thermal characteristics | 15 |
| 5.7 Pre- and post-stress electrical and photometric requirements | 15 |
| 5.8 Pre- and post-stress visual inspection..... | 15 |
| 5.9 Solderability and resistance to soldering heat | 15 |
| 5.9.1 Solderability..... | 15 |
| 5.9.2 Resistance to soldering heat (RSH-reflow) test..... | 15 |
| 5.10 Failure criteria..... | 16 |
| 5.11 Initial qualification tests for LED packages | 16 |
| 5.11.1 General | 16 |
| 5.11.2 Temperature and operation stress | 17 |
| 5.11.3 Thermo-mechanical stress..... | 18 |
| 5.11.4 Temperature and humidity stress..... | 18 |
| 5.11.5 Electrical stress – ESD-HBM | 19 |
| 5.11.6 Environmental stress | 19 |
| 5.12 Initial qualification test for LED package interconnects – VVF | 20 |
| 5.13 Accelerated stress tests for LED package interconnects | 20 |
| 5.13.1 General | 20 |
| 5.13.2 Interconnect temperature cycling (TMCL) | 21 |
| 6 Optical materials..... | 21 |
| 6.1 General..... | 21 |
| 6.2 Optical material test samples | 22 |
| 6.3 Moisture preconditioning | 22 |
| 6.4 Pre- and post-stress photometric measurements..... | 22 |
| 6.5 Adhesion test..... | 23 |
| 6.6 Pre- and post-stress visual inspection..... | 23 |
| 6.7 Failure criteria..... | 23 |
| 6.8 Initial qualification tests | 23 |
| 6.8.1 Relative humidity (RH)..... | 23 |
| 6.8.2 Boiling water (BW)..... | 24 |
| 6.8.3 Oven water (OW)..... | 24 |
| 6.8.4 High temperature exposure (HTE) | 24 |
| 6.9 Accelerated stress tests..... | 24 |
| 6.9.1 Prediction models | 24 |
| 6.9.2 Temperature and humidity (TH) | 25 |

| | | |
|--------|--|----|
| 6.9.3 | Temperature and light exposure (TL) | 25 |
| 6.10 | Light-transmitting materials | 26 |
| 6.11 | Light-reflecting materials | 26 |
| 6.11.1 | Dichroic-coated glass and aluminium-coated glass | 26 |
| 6.11.2 | Aluminium-coated plastic | 26 |
| 6.11.3 | White plastic/non-coated plastic | 26 |
| 6.12 | Optical converters | 27 |
| 7 | Electronic subassemblies | 27 |
| 7.1 | General | 27 |
| 7.2 | Sampling requirements | 27 |
| 7.3 | Production requirements | 27 |
| 7.4 | Pre- and post-stress electrical requirements | 28 |
| 7.5 | Pre- and post-stress visual inspection | 28 |
| 7.6 | Failure criteria | 28 |
| 7.7 | Initial qualification tests | 28 |
| 7.7.1 | Temperature and operation stress (PTC) | 28 |
| 7.7.2 | Humidity and operation stress (HOT) | 29 |
| 7.8 | Accelerated stress tests | 29 |
| 7.8.1 | Prediction models | 29 |
| 7.8.2 | Temperature, humidity and operation stress (sequential ALT) | 29 |
| 8 | Active and passive cooling systems | 30 |
| 8.1 | General | 30 |
| 8.2 | Cooling system test samples | 31 |
| 8.3 | Moisture preconditioning | 32 |
| 8.4 | Thermal resistance test | 32 |
| 8.5 | Performance parameter test | 32 |
| 8.6 | Pre- and post-stress cooling performance requirements | 32 |
| 8.7 | Pre- and post-stress visual inspection | 32 |
| 8.8 | Failure criteria | 32 |
| 8.9 | Initial qualification tests | 33 |
| 8.9.1 | General | 33 |
| 8.9.2 | Dust | 33 |
| 8.10 | Accelerated stress tests | 34 |
| 8.10.1 | General | 34 |
| 8.10.2 | Cyclic temperature test (CT) with humidity and with/without operational stress | 34 |
| 8.10.3 | Temperature life test (TLT) passive cooling system | 34 |
| 8.10.4 | Temperature life test (TLT) active cooling system | 35 |
| 9 | Construction materials | 35 |
| 9.1 | General | 35 |
| 9.2 | Mechanical components and interconnects | 36 |
| 9.3 | Mechanical interfaces between different components | 36 |
| 9.4 | Chemical interactions | 37 |
| 10 | Final product testing | 38 |
| 10.1 | General | 38 |
| 10.2 | Principal component reliability in the final product | 38 |
| 10.3 | Minimum validated AST time | 39 |
| 10.4 | Final product qualification for reliability | 40 |
| 11 | Product updates | 40 |

| | |
|--|--------|
| Annex A (informative) Application profiles | 42 |
| Annex B (informative) Acceleration models | 43 |
| B.1 General..... | 43 |
| B.2 Arrhenius model..... | 43 |
| B.3 Eyring model..... | 44 |
| B.4 Coffin-Manson model..... | 44 |
| B.5 Norris-Landzberg model..... | 44 |
| B.6 (Inverse) power law..... | 45 |
| B.7 Peck model..... | 45 |
| B.8 Generalized Eyring model | 45 |
| B.9 Sample size calculation | 46 |
| B.10 Basic guidelines..... | 47 |
| B.11 Example..... | 47 |
| Annex C (informative) System reliability..... | 49 |
| C.1 General..... | 49 |
| C.2 Basic principles..... | 49 |
| C.3 Testing on the system level..... | 49 |
| C.4 System reliability prediction | 50 |
| C.4.1 General | 50 |
| C.4.2 Block diagrams..... | 50 |
| C.4.3 Fault tree..... | 51 |
| C.4.4 Markov chains | 51 |
| C.4.5 Bayesian networks..... | 51 |
| C.4.6 Chi-square..... | 52 |
| Annex D (informative) Qualification flowcharts | 54 |
| D.1 General..... | 54 |
| D.2 Qualification flowcharts of principal components | 54 |
| Annex E (informative) Physical analysis for principal components..... | 59 |
| E.1 General..... | 59 |
| E.2 DPA for LED packages and interconnects | 59 |
| E.3 DPA for optical materials | 60 |
| E.4 PA for electronics | 60 |
| E.5 PA for active and passive cooling systems..... | 61 |
| E.6 DPA for mechanical | 61 |
| Annex F (normative) Principal component test report | 62 |
| Bibliography..... | 64 |
| Figure D.1 – Qualification flowchart for LED package and interconnects | 54 |
| Figure D.2 – Qualification flowchart for optical materials | 55 |
| Figure D.3 – Qualification flowchart for electronic subassemblies | 56 |
| Figure D.4 – Qualification flowchart for active and passive cooling systems..... | 57 |
| Figure D.5 – Qualification flowchart for construction materials | 58 |
| Table 1 – Mapping the LED package interconnects qualification tests to the useable acceleration model with typical range of the acceleration factor | 20 |
| Table 2 – Duration (cycles) of temperature application..... | 21 |
| Table 3 – Mapping of the optical-material related accelerated stress tests | 24 |

| | |
|--|----|
| Table 4 – Mapping the electronic subassembly qualification tests to the useable acceleration model with typical range of the acceleration factor | 29 |
| Table 5 – Example ALT profile for an electronic subassembly | 30 |
| Table 6 – Examples of stressors, affected part of the cooling systems and its reliability effect. | 31 |
| Table 7 – Mapping the cooling system qualification tests to the useable acceleration model with typical range of the acceleration factor | 34 |
| Table 8 – List of undesired chemicals in LED products for general lighting. | 38 |
| Table 9 – Influence of the principal components on the final product..... | 39 |
| Table 10 – Example list of validated AST times..... | 40 |
| Table 11 – Minor and major change list per principal component. | 41 |
| Table A.1 – Example of two application profiles | 42 |
| Table B.1 – Sample sizes versus confidence and reliability level assuming $L = T \times AF$ | 47 |
| Table B.2 – Example of calculated acceleration factors..... | 48 |
| Table C.1 – Example test scheme and results for Chi-square..... | 53 |
| Table F.1 – Example overview reporting format | 63 |

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**GUIDELINES FOR PRINCIPAL COMPONENT RELIABILITY
TESTING FOR LED LIGHT SOURCES AND LED LUMINAIRES**

FOREWORD

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

IEC TS 62861, which is a Technical Specification, has been prepared by subcommittee 34A: Lamps, of IEC technical committee 34: Lamps and related equipment.

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

| | |
|---------------|------------------|
| Enquiry draft | Report on voting |
| 34A/1884/DTS | 34A/1966/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 document 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 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.

INTRODUCTION

LED products depend generally on how balanced its principal components are in terms of their reliability. It is not only the LED components that determine product performance, but also other parts of the LED product play an equally important role. For instance, electronic subassemblies, optics, mechanics and the involved cooling method play such a role.

This Technical Specification envisions a methodology, which addresses separate subcomponent reliability data, to provide a basis for statistical system reliability design. Standardized reporting formats and flowcharts are presented.

Next, protocols based on accelerated methods are given to estimate system reliability of the final product using subcomponent data.

Verification of LED product lifetime is based on a 'test to pass' principle, which means the components of the product under test are evaluated to give equivalent reliability confidence to that which would be achieved by real-time life testing of the complete LED product. The tests described in this Technical Specification are divided into: initial qualification tests (IQT) giving confidence of basic component robustness, but not linked to any specific lifetime projection, and accelerated stress tests (AST) giving confidence of reliability to a specific lifetime (within the specified constraints of the test).

Since the approach foreseen in this Technical Specification covers a generic methodology, it can be seen as guidance related to relevant product performance standards, such as the LED lamp performance standard IEC 62612, the LED module performance standard IEC 62717 and LED luminaire performance standard IEC 62722-2-1. This Technical Specification is not recommended for use as a normative reference to the LED product performance standards.

This Technical Specification addresses the need for a document giving guidance that is developed according to consensus procedures and in itself is normative in nature, while at the same time recognizing that LED technology for lighting products is still in an emerging phase. This Technical Specification approaches an International standard in terms of detail and completeness.

GUIDELINES FOR PRINCIPAL COMPONENT RELIABILITY TESTING FOR LED LIGHT SOURCES AND LED LUMINAIRES

1 Scope

This Technical Specification provides guidelines for establishing confidence in product reliability using principal component testing for LED light sources and LED luminaires for general lighting. It includes methods and criteria using initial qualification tests and accelerated stress tests of the principal components. The performance of any principal component will influence the performance of the final product.

Techniques to validate full lifetime claims and lumen maintenance projection are outside the scope of this Technical Specification.

The following principal components are included in the testing if they are used as an integral part for the LED light source or LED luminaire:

- LED package and interconnects;
- optical materials;
- electronic subassemblies;
- cooling systems, both active (e.g. fans) and passive (e.g. thermal interface material);
- construction materials.

This Technical Specification is not recommended for use as a normative reference to the LED product performance standards.

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 60068-2-20:2008, *Environmental testing – Part 2-20: Tests – Test T: Test methods for solderability and resistance to soldering heat of devices with leads*

IEC 60068-2-27:2008, *Basic environmental testing procedures – Part 2: Tests – Test Ea and guidance: Shock*

IEC 60068-2-30:2005, *Environmental testing – Part 2-30: Tests – Test Db: Damp heat, cyclic (12 h + 12 h cycle)*

IEC 60068-2-42:2003, *Environmental testing – Part 2-42: Tests – Test Kc: Sulphur dioxide test for contacts and connections*

IEC 60068-2-43:2003, *Environmental testing – Part 2-43: Tests – Test Kd: Hydrogen sulphide test for contacts and connections*

IEC 60068-2-58:2015, *Environmental testing – Part 2-58: Tests – Test Td: Test methods for solderability, resistance to dissolution of metallization and to soldering heat of surface mounting devices (SMD)*