IEC 62722-2-1

Edition 1.0 2014-11

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Luminaire performance –
Part 2-1: Particular requirements for LED luminaires

Performance des luminaires –
Partie 2-1: Exigences particulières relatives aux luminaires à LED

IEC 62722-2-1:2014-11(en-fr)

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Part 2-1: Particular requirements for LED luminaires

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International Standard IEC 62722-2-1 has been prepared by subcommittee 34D: Luminaires, of IEC technical committee 34: Lamps and related equipment.

This first edition of IEC 62722-2-1 cancels and replaces IEC PAS 62722-2-1. published in 2011. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the Publicly Available Specification.

a) The testing time is aligned with IEC 62717 and the option of 2 000 h is removed. Products containing modules not in compliance with IEC 62717 are now tested to 6 000 h.
b) Testing sample sizes have been modified to give valid statistical data.
c) The temperature reduction of 10 °C for street lanterns and floodlights has been removed.
d) Life definitions have been updated and aligned with IEC 62717.

The text of this standard is based on the following documents:

FDIS	Report on voting
34D/1147/FDIS	34D/1155/RVD

Full information on the voting for the approval of this standard 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 the parts in the IEC 62722 series, published under the general title *Luminaire performance* can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

INTRODUCTION

This standard is the conversion of IEC PAS 62722-2-1 into a full IEC performance standard for LED luminaires for general lighting applications. It acknowledges the need for relevant tests for luminaires using this new source of electrical light. The publication is seen in close context with simultaneously developed and edited publication of performance standards for luminaires in general and for LED modules. This standard does not consider luminaires designed for LED lamps, which are covered in IEC 62722-1. Changes in the LED luminaires standard will have impact on the LED module standards and vice versa, due to the behaviour of LED. Therefore, in the development of the present standard, mutual consultancy of experts of both products has taken place.

The provisions in the standard represent the technical knowledge of experts from the fields of the semiconductor (LED chip) industry and of those of the traditional electrical light sources and luminaires.

LUMINAIRE PERFORMANCE –

Part 2-1: Particular requirements for LED luminaires

1 Scope

This part of IEC 62722 specifies the performance requirements for LED luminaires, together with the test methods and conditions, required to show compliance with this standard. It applies to LED luminaires for general lighting purposes.

The following types of LED luminaires are distinguished.

– Type A – Luminaires using LED modules where compliance with IEC 62717[1] has been proven.

– Type B – Luminaires using LED modules where compliance with IEC 62717[1] has not been proven.

– Type C – Luminaires using a LED lamp and covered in IEC 62722-1.

The requirements of this standard only relate to type testing.

This standard does not cover Type C luminaires.

This standard does not cover LED luminaires that intentionally produce coloured light, neither does it cover luminaires using OLEDs (organic LEDs).

These performance requirements are additional to the requirements in IEC 62722-1, Clauses 1 to 9, except where in this Part 2-1 alternative methods of measurement or limits are specified.

As this standard has been simultaneously developed and edited with the standard for LED modules, where appropriate the compliance of the LED modules to the provisions of IEC 62717 may be transferred to the whole luminaire.

Life time of LED luminaires is in most cases much longer than the practical test times. Consequently, verification of manufacturer's life time claims cannot be made in a sufficiently confident way. For that reason the acceptance or rejection of a manufacturer's life time claim, past 25 % of rated life (with a maximum of 6 000 h), is out of the scope of this standard.

Instead of life time validation, this standard has opted for lumen maintenance categories at a defined finite test time. Therefore, the category number does not imply a prediction of achievable life time. The categories are lumen-depreciation character categories showing behaviour in agreement with manufacturer's information which is provided before the test is started.

In order to validate a life time claim, an extrapolation of test data is needed. A general method of projecting measurement data beyond limited test time is under consideration.

For explanation of recommended life time metrics see IEC 62717, Annex C.

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[1] To be published.

It may be expected that LED luminaires which comply with this standard will start and operate satisfactorily at voltages between 92 % and 106 % of rated supply voltage and at an ambient air temperature within the declared range of the manufacturer.

Evaluation of LOR (light output ratio) for LED luminaire is under consideration.

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

IEC 60598-2-3, *Luminaires – Part 2-3: Particular requirements – Luminaires for road and street lighting*

IEC 60598-2-5[2], *Luminaires – Part 2-5: Particular requirements – Floodlights*

IEC 62031, *LED modules for general lighting – Safety specifications*

IEC 62504, *General lighting – LEDs and LED modules – Terms and definitions*

IEC 62717[2], *LED modules for general lighting – Performance requirements*

IEC 62722-1, *Luminaire performance – Part 1: General requirements*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 62717 and IEC 62504, as well as the following apply.

3.1
LED luminaire
luminaire designed to incorporate one or more LED light source(s)

3.2
family of LED luminaires
group of LED luminaires that have

– LED modules with the same method of control and operation (semi-integrated, integrated);
– LED modules with the same classification according to the method of installation (reference is made to IEC 62031, Clause 6) and using LED module of same family as specified in 6.2 of IEC 62717 and the same class of protection against electrical shock;
– the same design characteristics distinguished by common features of materials, components, and/or method of processing and heat management.

2 To be published.

3.3
rated ambient performance temperature
t_q
highest ambient temperature around the luminaire related to a rated performance of the luminaire under normal operating conditions, both as declared by the manufacturer or responsible vendor

Note 1 to entry: Rated ambient performance temperature is expressed in °C.

Note 2 to entry: For a given life time, the t_q temperature is a fixed value, not a variable.

Note 3 to entry: There can be more than one t_q temperature, depending on the life time claim,.3.4.

3.4
rated median useful life <of LED luminaires>
length of time during which 50 % (B_{50}) of a population of operating LED luminaires of the same type have parametrically failed, under standard test conditions as declared by the manufacturer or responsible vendor

3.5
LED luminaire luminous efficacy
quotient of the luminous flux emitted by the power consumed by the LED luminaire

4 Product information

Information on the parameters shown in Table 1 shall be provided by the manufacturer or responsible vendor on the product datasheets, leaflets or website.

Compliance is checked by inspection.

Table 1 – Product information

Ref	Parameter
a	Rated input power (in W)
b	Photometric code [1)]
c	Rated luminous flux (in lm)
d	Rated median useful life (h) and the associated rated lumen maintenance factor (x)
e	Rated abrupt failure value (%)
f	Lumen maintenance code [2)]
g	Rated chromaticity co-ordinate values both initial and maintained [3)]
h	Rated correlated colour temperature (CCT in K)
i	Rated colour rendering index (CRI)
j	Rated ambient temperature (t_q) related to performance for a luminaire [4)] (°C)
k	Rated LED luminaire luminous efficacy (in lm/W)
l	Ageing time, if different from 0 h
NOTE Regional legal requirements may apply and overrule.	
[1)] See Annex D of IEC 62717. [2)] See Table 6 of IEC 62717. [3)] See Table 5 of IEC 62717. [4)] See 6.2.	

5 Not used

6 Test conditions

6.1 General test conditions

Test conditions for testing electrical and photometric characteristics, lumen maintenance and life are given in Annex A.

All tests are measured on “*n*” LED luminaires of the same type. The number “*n*” shall be a minimum of products as given in Table 3. LED luminaires used in the endurance tests shall not be used in other tests.

Each sample luminaire shall comply with all the relevant tests except for the tests of 10.3 where one sample is required for each of the three separate tests mentioned in Table 2 and Table 3. In order to reduce the time of testing, the manufacturer or responsible vendor may submit additional luminaires or parts of luminaires provided that these are of the same materials and design as the original luminaire and that the results of the test are the same as if carried out on an identical luminaire.

LED luminaires with dimming control shall be adjusted to maximum output for all tests.

LED luminaires with adjustable CCT shall be adjusted/set to one fixed value as indicated by the manufacturer or responsible vendor.

LED luminaires of linear geometry and variable length shall be tested at a length at which the parameters are given (e.g. performance per x cm).

6.2 Luminaires using LED modules where compliance with IEC 62717 has been proven (Type A)

Only the tests for measurement of initial performance are to be conducted, when the LED module is operated within its temperature limit t_p.

The information for luminaire design given in IEC 62717, Clause B.1, requires LED modules to be operated within their t_p temperature limit. The t_p temperature shall be measured according to the thermal test procedure defined in 12.4 of IEC 60598-1, (normal operation). When the luminaire is operating at its own maximum rated ambient temperature for performance (t_q), the t_p limit (for the declared performance – Table 2, IEC 62717) of LED modules operating inside the luminaire shall not be exceeded. The test voltage for the luminaire shall be 1,00 times the rated voltage of the luminaire. In luminaires intended to be supplied with constant current, the test current shall be 1,00 times the rated current of the luminaire.

For luminaires for road and street lighting and floodlights intended for outdoor use only, the reduction of the measured temperature according to 3.12.1 of IEC 60598-2-3, and 5.12.1 of IEC 60598-2-5, respectively shall not be applied for the t_p temperature of the LED module.

The ambient performance temperature t_q is measured in a draught-proof enclosure, as the air temperature, at a position near one of the perforated walls on a level with the centre of the luminaire, see item e), Clause K.1 of IEC 60598-1.

6.3 Luminaires using LED modules where compliance with IEC 62717 has not been proven (Type B)

6.3.1 General

The manufacturer shall conduct testing for 25 % of rated life up to a maximum of 6 000 h.

6.3.2 Creation of module families to reduce test effort

6.3.2.1 General

The provisions of 6.2.1 of IEC 62717 apply to the LED luminaire.

6.3.2.2 Variations within family

The provisions of 6.2.2 of IEC 62717 apply to the LED luminaire.

6.3.2.3 Compliance testing of family members

The provisions of 6.2.3 of IEC 62717 apply to the LED luminaire.

6.4 Performance requirements

The performance criteria given in Table 2 applies for LED luminaires of Types A and B. All of the tested n LED luminaires shall have passed the performance requirements.

Table 2 – Performance criteria for which testing is required

Clause or subclause of this standard (in brackets clause or subclause of IEC 62717)	Testing	Luminaires of type A [a b]	Luminaires of type B
6.2	LED module performance temperature	x	x
7	Power	x	x
8.1	Luminous flux	x	x
8.2.3	Luminous intensity distribution [c]	x	x
8.2.4	Peak intensity value(s) [c d]	x	x
8.2.5	Beam angle value [c d]	x	x
8.3	Luminous efficacy	x	x
9.1	Initial chromaticity tolerance of the light source [e]	–	x
9.1	Maintained chromaticity tolerance of the light source [e]	–	x
9.2	Initial correlated colour temperature of the light source [e]	–	x
9.3	CRI initial [e]	–	x
9.3	CRI maintained [e]	–	x
10.2	Lumen maintenance	–	x
10.3 (10.3.2)	Temperature cycling, energised	–	x
10.3 (10.3.3)	Supply voltage switching	–	x
10.3 (10.3.4)	Accelerated operation life test	–	x
(x = required, – = not required) The required testing for each type of luminaire is indicated by an “x”.			

[a] Where the LED manufacturers provide data according to IEC 62717, the tests on the luminaire may be carried out according to the column for Type A luminaires.

[b] Testing requirements for Type A LED luminaires will depend on the requirements of IEC 62717. It is not the intention to re-measure the values of a product complying with its own standard. However where luminaires combine different LED modules in one luminaire, or where secondary optics are added in the luminaire, certain parameters may be required to be measured, e.g. if there is a mixing of colours, the final CRI and CCT need to be measured in the luminaire.