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PRE-STANDARD



LED modules for general lighting – Performance requirements

INTERNATIONAL
ELECTROTECHNICAL
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

LED MODULES FOR GENERAL LIGHTING – PERFORMANCE REQUIREMENTS

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A PAS is a technical specification not fulfilling the requirements for a standard, but made available to the public.

IEC/PAS 62717 has been prepared by subcommittee 34A: Lamps, of IEC technical committee 34: Lamps and related equipment.

The text of this PAS is based on
the following document:

This PAS was approved for
publication by the P-members of
the committee concerned as
indicated in the following document

Draft PAS	Report on voting
34A/1444/PAS	34A/1462/RVD

Following publication of this PAS, which is a pre-standard publication, the technical committee or subcommittee concerned may transform it into an International Standard.

This PAS shall remain valid for an initial maximum period of 3 years starting from the publication date. The validity may be extended for a single period up to a maximum of 3 years, at the end of which it shall be published as another type of normative document, or shall be withdrawn.

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

This first edition of a performance PAS for LED modules for general lighting applications acknowledges the need for relevant tests for this new source of electrical light, sometimes called “solid state lighting”. The publication is closely related to simultaneously developed and edited performance standards publications (or PAS) for luminaires in general and for LED-luminaires. Changes in the LED module PAS will have an impact on the luminaire standards and vice versa, due to the behaviour of LEDs. Therefore, in the development of the present PAS, a close collaboration of experts on both products has taken place.

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

Three types of LED-modules are covered: with integral controlgear, with means of control on board, but with separate controlgear (“semi-ballasted”), and with complete external controlgear.

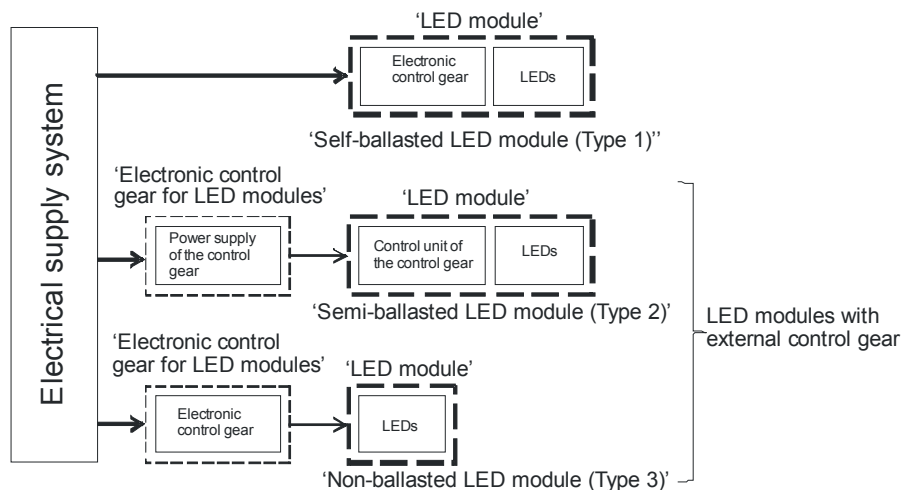
LED MODULES FOR GENERAL LIGHTING – PERFORMANCE REQUIREMENTS

1 Scope

This PAS specifies the performance requirements for LED modules, together with the test methods and conditions, required to show compliance with this PAS.

The following types of LED modules are distinguished (see Figure 1):

- Type 1: Self-ballasted LED modules for use on d.c. supplies up to 250 V or on a.c. supplies up to 1 000 V at 50 Hz or 60 Hz;
- Type 2: LED modules operating with external controlgear connected to the mains voltage, and having further control means inside (“semi-ballasted”) for operation under constant voltage, constant current or constant power;
- Type 3: LED modules where the complete controlgear is separate from the module for operation under constant voltage, constant current or constant power.



The power supply of the controlgear for semi-ballasted LED modules (Type 2) is an electronic device capable of controlling currents, voltage or power within design limits.

The control unit of the controlgear for semi-ballasted LED modules (Type 2) is an electronic device to control the electrical energy to the LED's.

A LED module with external controlgear can be either a non-ballasted LED module or a semi-ballasted LED module.

Figure 1 – Types of LED modules

The requirements of this PAS relate only to type testing.

Recommendations for whole product testing or batch testing are under consideration.

This PAS covers LED modules that intentionally produce white light, based on inorganic LEDs.

These performance requirements are additional to the requirements in IEC 62031 safety standard for LED modules.

Life time of LED modules 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, because projecting test data further in time is not standardised. 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 PAS.

Instead of life time validation, this PAS has opted for lumen maintenance codes at a defined finite test time. Therefore, the code 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 are 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.

The pass/fail criterion of the life time test as defined in this PAS is different from the life time metrics claimed by manufacturers. For explanation of recommended life time metrics, see Annex C.

NOTE 1 When modules are operated in a luminaire, the claimed performance data can deviate from the values established via this PAS due to e.g. luminaire components that impact the performance of the module.

NOTE 2 The external electronic controlgears for LED modules as mentioned in Type 2 and Type 3 are not part of the testing against the requirements of this PAS.

NOTE 3 For protection for water and dust ingress, see Clause B.4.

It may be expected that self-ballasted LED modules which comply with this PAS will start and operate satisfactorily at voltages between 92 % and 106 % of rated supply voltage. LED modules with external controlgear are expected to start and operate satisfactorily in combination with the specified controlgear complying with IEC 61347-2-13 and IEC 62384. All LED modules are expected to start and operate satisfactorily when operated under the conditions specified by the module manufacturer and in a luminaire complying with IEC 60598-1.

For compliance with EMC requirements, reference is made to regional requirements. For relevant standards, see Bibliography.

NOTE It should be regarded that only those types of LED modules are subject to EMC requirements which

- in case of harmonic current are directly connected to the mains and have active elements on board;
- in case of radiated or conducted disturbances are directly connected to the mains (Type 1) or to a battery;
- in case of immunity are directly connected to the mains (Type 1) or to a battery.

2 Normative references

The following referenced documents are indispensable for the application 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 60050-845, *International Electrotechnical Vocabulary – Part 845: Lighting*

IEC 60068-2-14, *Environmental testing – Part 2-14: Tests – Test N: Change of temperature*

IEC 60081:1997, *Double-capped fluorescent lamps – Performance specifications*

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

IEC/TR 61341, *Method of measurement of centre beam intensity and beam angle(s) of reflector lamps*

IEC 61347-2-13, *Lamp controlgear – Part 2-13: Particular requirements for d.c. or a.c. supplied electronic controlgear for LED modules*

IEC 62031:2008, *LED modules for general lighting – Safety specifications*

IEC 62384, *DC or AC supplied electronic control gear for LED modules – Performance requirements*

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

CIE 13.3:1995 (CD008-1995 included), *Method of measuring and specifying colour rendering properties of light sources*

CIE 121:1996, *The photometry and goniophotometry of luminaires*

CIE 177:2007, *Colour rendering of white LED light sources*