



BSI Standards Publication

LED modules for general lighting - Performance requirements

National foreword

This British Standard is the UK implementation of EN 62717:2017+A2:2019. It is derived from IEC 62717:2014, incorporating amendment 1:2015 and amendment 2:2019. It supersedes BS EN 62717:2017, which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to IEC text carry the number of the IEC amendment. For example, text altered by IEC amendment 1 is indicated by A1 A1.

Where a common modification to an IEC amendment has been introduced, the tags carry the number of the amendment. For example, the common modifications introduced by CENELEC to IEC amendment 1 are indicated by C1 C1.

The UK participation in its preparation was entrusted to Technical Committee CPL/34/1, Electric lamps.

A list of organizations represented on this committee can be obtained on request to its secretary.

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© The British Standards Institution 2019
Published by BSI Standards Limited 2019

ISBN 978 0 580 95435 1

ICS 29.140.99

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 December 2017.

Amendments/corrigenda issued since publication

Date	Text affected
31 May 2019	Implementation of IEC amendment 2:2019 with CENELEC endorsement A2:2019

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 62717:2017/A2

April 2019

ICS 29.140.99

English Version

**LED modules for general lighting - Performance requirements
(IEC 62717:2014 , modified + A1:2015 , modified)**

Modules de LED pour éclairage général - Exigences de
performance
(IEC 62717:2014 , modifiée + A1:2015 , modifiée)

LED-Module für die Allgemeinbeleuchtung - Anforderungen
an die Arbeitsweise
(IEC 62717:2014 , modifiziert + A1:2015 , modifiziert)

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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EN 62717:2017/A2:2019 (E)

European foreword

This document (EN 62717:2017) consists of the text of IEC 62717:2014 and IEC 62717:2014/A1:2015 prepared by IEC/TC 34A, Lamps, together with the common modifications prepared by CLC/TC 34A, Lamps.

The following dates are fixed:

- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2018-02-20
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2020-02-20

Clauses, subclauses, notes, tables, figures and annexes which are additional to those in IEC 62717:2014 and IEC 62717:2014/A1:2015 are prefixed “Z”.

For the relationship with EU Directive(s) see informative Annexes ZZ, which are integral parts of this document.

This standard provides test methods related to parameters as prescribed by Commission Regulation (EC) 244/2009, Commission Regulation (EU) 1194/2012 and Commission Regulation (EU) 874/2012 while conformity assessment (sampling, conformity procedures as well as limits) for market surveillance are specified in the text of the above Regulations.

Endorsement notice

The text of the International Standard IEC 62717:2014 and IEC 62717:2014/A1:2015 was approved by CENELEC as a European Standard with agreed common modifications.

Foreword to amendment A2

The text of document 34A/2121/FDIS, future IEC 62717/A2, prepared by SC 34A "Lamps" of IEC/TC 34 "Lamps and related equipment" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62717:2017/A2:2019.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2019-11-28
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2022-02-28

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For the relationship with EU Directive(s), see informative Annexes ZZ included in EN 62717:2017.

Endorsement notice

The text of the International Standard IEC 62717:2014/A2:2019 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

IEC 62722-1:2014	NOTE	Harmonized as EN 62722-1:2016
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Annex ZA
(normative)

**Normative references to international publications
with their corresponding European publications**

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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60050-845	1987	International Electrotechnical Vocabulary. - Lighting	-	-
IEC 60068-2-14	-	Environmental testing - Part 2-14: Tests - Test N: Change of temperature	EN 60068-2-14	2009
IEC 60068-3-5	2001	Environmental testing -- Part 3-5: - Supporting documentation and guidance - Confirmation of the performance of temperature chambers	EN 60068-3-5	2002
IEC 60081	-	Double-capped fluorescent lamps - Performance specifications	EN 60081	1998
			A1	2002
			A2	2003
			A3	2005
			A4	2010
			A5	2013
			A6	2017
			A11	2018
IEC 61000-3-2	2005	Electromagnetic compatibility (EMC) - Part - 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)	-	-
+ A1	2008			
+ A2	2009			

IEC 61000-4-7	-	Electromagnetic compatibility (EMC) - Part 4-7: Testing and measurement techniques - General guide on harmonics and interharmonics measurements and instrumentation, for power supply systems and equipment connected thereto	EN 61000-4-7	2002
			A1	2009
IEC 61347-2-13	-	Lamp controlgear - Part 2-13: Particular requirements for d.c. or a.c. supplied electronic controlgear for LED modules	EN 61347-2-13	2014
			A1	2017
IEC 62031	2008	LED modules for general lighting - Safety specifications	EN 62031	2008
IEC 62504	-	General lighting - Light emitting diode (LED) products and related equipment - Terms and definitions	EN 62504	2014
			A1	2018
IEC/TR 61341	-	Method of measurement of centre beam intensity and beam angle(s) of reflector lamps	EN 61341	2011
ANSI/IES LM-80-15	-	Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays and Modules		-
CIE 13.3	1995	Method of measurement and specifying colour rendering properties of light sources		-
CIE 177	2007	Colour rendering of white LED light sources		-
CIE S 025/E	2015	Test Method for LED Lamps, LED Luminaires and LED Modules		-

EN 62717:2017/A2:2019 (E)**Annex ZZA**
(informative)**Relationship between this European Standard and the ecodesign requirements of Commission Regulation (EC) No 244/2009 aimed to be covered**

This European Standard has been prepared under a Commission's standardization request M/495 to provide one voluntary means of conforming to the ecodesign requirements of Commission Regulation (EC) No 244/2009 of 18 March 2009 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for non-directional household lamps [2009 OJ L76].

Once this standard is cited in the Official Journal of the European Union under that Commission Regulation, compliance with the clauses of this standard given in Table ZZA.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding ecodesign requirements of that Regulation and associated EFTA regulations.

Table ZZA.1 – Correspondence between this European Standard and Commission Regulation (EC) No 244/2009 of 18 March 2009 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for non-directional household lamps [2009 OJ L76] and Commission's standardization request M/495

Ecodesign requirement of Regulation (EC) No 244/2009 [2009 OJ L76]	Clause(s) / subclause(s) of this EN	Remarks / Notes
Article 1	Annex A	Applicable parameter according to Article 1 a) chromaticity b) directional lamps c) luminous flux
Annex II, Article 1	7.1	LED module power
Annex II, Article 1	8.1	Luminous flux
-	Not covered in the standard	Lamp life time
-	Not covered in the standard	Lumen maintenance at the end of nominal life
Annex II, Table 5	Z1.5.3	Power factor (Only for LED modules operating on direct mains, LEDi Modules, Type 1)

WARNING 1 — Presumption of conformity stays valid only as long as a reference to this European Standard is maintained in the list published in the Official Journal of the European Union. Users of this standard should consult frequently the latest list published in the Official Journal of the European Union.

WARNING 2 — Other Union legislation may be applicable to the products falling within the scope of this standard.

EN 62717:2017/A2:2019 (E)**Annex ZZB**
(informative)**Relationship between this European Standard and the ecodesign requirements of Commission Regulation (EU) No 1194/2012 aimed to be covered**

This European Standard has been prepared under a Commission's standardization request M/495 to provide one voluntary means of conforming to the ecodesign requirements of Commission Regulation (EU) No 1194/2012 of 12 December 2012 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for directional lamps, light emitting diode lamps and related equipment [2012 OJ L342].

Once this standard is cited in the Official Journal of the European Union under that Commission Regulation, compliance with the clauses of this standard given in Table ZZB.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding ecodesign requirements of that Regulation and associated EFTA regulations.

Table ZZB.1 – Correspondence between this European Standard and Commission Regulation (EU) No 1194/2012 of 12 December 2012 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for directional lamps, light emitting diode lamps and related equipment [2012 OJ L342] and Commission's standardization request M/495

Ecodesign requirement of Regulation (EU) No 1194/2012 [2012 OJ L342]	Clause(s) / subclause(s) of this EN	Remarks / Notes
Article 1	Annex A	Applicable parameter according to Article 1 directional lamps
Annex III, Article 1.1	7.1	LED module power
Annex III, Article 1.1	8.1	Luminous flux (non-directional only)
Annex III, Article 1.1	Z1.3	Useful luminous flux (directional only)
Annex III, Article 1.1	Z1.4	Energy Efficiency Index
Annex III, Article 3.1.1	Z1.1	Beam angle
-	Not covered in the standard	Lamp life time
Annex III, Table 5	10.2	Lamp Survival Factor
Annex III, Table 5	10.2	Lumen maintenance at 6 000 h
Annex III, Table 5	Not covered in the standard	Lumen maintenance at the end of nominal life
Annex III, Table 5	10.3.3	Number of switching cycles before failure
Annex III, Table 5	10.3.2	Premature failure rate

EN 62717:2017/A2:2019 (E)

Ecodesign requirement of Regulation (EU) No 1194/2012 [2012 OJ L342]	Clause(s) / subclause(s) of this EN	Remarks / Notes
Annex III, Table 5	Z1.5.1	Starting time
Annex III, Table 5	Z1.5.1	Warm-up time to 95% ϕ
Annex I	Annex A	Chromaticity coordinates
Annex III, Table 5	Z1.5.2	Colour rendering index (CRI)
Annex III, Article 3.1.1	Z1.2	Correlated colour temperature (CCT)
Annex III, Table 5	9.1	Colour consistency
Annex III, Table 5	Z1.5.3	Power factor (Only for LED modules operating on direct mains, LEDi Modules, Type 1)
Article 3	Z1.6	Product information requirements

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EN 62717:2017/A2:2019 (E)

Annex ZZC

(informative)

Relationship between this European Standard and the energy labelling requirements of Commission Delegated Regulation (EU) No 874/2012 aimed to be covered

This European Standard has been prepared under a Commission's standardisation request M/495 to provide one voluntary means of conforming to the energy labelling requirements of Commission Delegated Regulation (EU) No 874/2012 of 12 July 2012 supplementing Directive 2010/30/EU of the European Parliament and of the Council with regard to energy labelling of electrical lamps and luminaires [2012 OJ L258].

Once this standard is cited in the Official Journal of the European Union under that Commission Regulation, compliance with the clauses of this standard given in Table ZZC.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding energy labelling requirements of that Regulation and associated EFTA regulations.

Table ZZC.1 – Correspondence between this European Standard and Commission Regulation (EU) No 874/2012 of 12 July 2012 supplementing Directive 2010/30/EU of the European Parliament and of the Council with regard to energy labelling of electrical lamps and luminaires [2012 OJ L258] and Commission's standardisation request M/495

Energy labelling requirement of Regulation (EU) No 874/2012 [2012 OJ L258]	Clause(s) / subclause(s) of this EN	Remarks / Notes
Article 1	Annex A	Applicable parameter according to Article 1 luminous flux
Annex VII	7.1	LED module power
Annex VII	8.1	Luminous flux (non-directional only)
Annex VII	Z1.3	Useful luminous flux (directional only)
Annex VII	Z1.1	Beam angle

WARNING 1: Presumption of conformity stays valid only as long as a reference to this European Standard is maintained in the list published in the Official Journal of the European Union. Users of this standard should consult frequently the latest list published in the Official Journal of the European Union.

WARNING 2: Other Union legislation may be applicable to the products falling within the scope of this standard.

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FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 62717 has been prepared by subcommittee 34A: Lamps, of IEC technical committee 34: Lamps and related equipment.

This edition includes the following significant technical changes with respect to IEC PAS 62717.

- all terms and definitions are aligned with IEC 62504 and relevant documents of CIE. For example, general terms like “rated value” are shifted to IEC 62504.
- a statement on the applicability on a population is included.
- the normative references are completed and cleaned from standards that are not in use.
- with regard to EMC, references to harmonic currents are given.

- the change, which has an effect on most parts of the standard, is the split of failure mechanisms into abrupt failures and luminous flux depreciation. Consequently, new terms and definitions, new requirements for lumen maintenance and a complete new structure and contents of [Annex C](#) are introduced.
- transition from t_{pmax} to t_{prated} is made, with the background that there is not one t_{pmax} , but a choice of $t_p(rated)$ values, in combination with lifetime.
- places where to mark (product, packaging, data sheets) are changed, and as a consequence of the split of failure mechanisms, new parameters are listed. Further, changes in the endurance test (ramping speed of temperature) are reflected in marking.
- the concept of displacement factor instead of power factor is introduced. This led to new definitions, requirements and [Annexes E](#) and [F](#).
- the requirements on luminous efficacy are changed.
- the requirements, associated with the family concept are reviewed.
- statistics, based on confidence intervals are removed. This concerns requirements and limits for LED module power and luminous flux and deletion of [Annex E](#).
- new requirements for lumen maintenance are introduced.
- as part of the endurance test, the maximum light decrease after accelerated operation life test is now fixed.
- with regard to the discussion on type test and sample size, the number of pieces in a test sample is drastically reduced, see [Table 7](#).
- [Annex A](#) on measuring methods is completely restructured and reviewed, for example for ambient temperature and for shortening of stabilisation time when conducting subsequent light output measurements.
- for electrical characteristics, the ageing time may be chosen as 500 h.
- for photometric data file formats, reference is given to IEC 62722-1.
- mistakes in the photometric code ([Annex D](#)) are corrected.
- [Annex G](#) on optimised test duration is removed; instead, an INF sheet shall be published.
- from the luminaire standard, a new [Annex H](#) on “Test equipment for temperature measurement” is taken over.
- finally, the Bibliography is updated.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

In this standard, the following print types are used:

- requirements: roman type.
- *test specifications: italic type.*
- notes: smaller roman type.

The committee has decided that the contents of the base publication and its amendment 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.

LED modules for general lighting - Performance requirements

1 Scope

1.1 General

This International Standard specifies the performance requirements for LED modules, together with the test methods and conditions, required to show compliance with this standard. The following types of LED modules are distinguished and schematically shown in [Figure 1](#):

Type 1: integrated 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 part of separate controlgear connected to the mains voltage, and having further control means inside ("semi-integrated") for operation under constant voltage, constant current or constant power.

Type 3: LED modules where the complete controlgear is separate from the module (non-integrated) for operation under constant voltage, constant current or constant power.

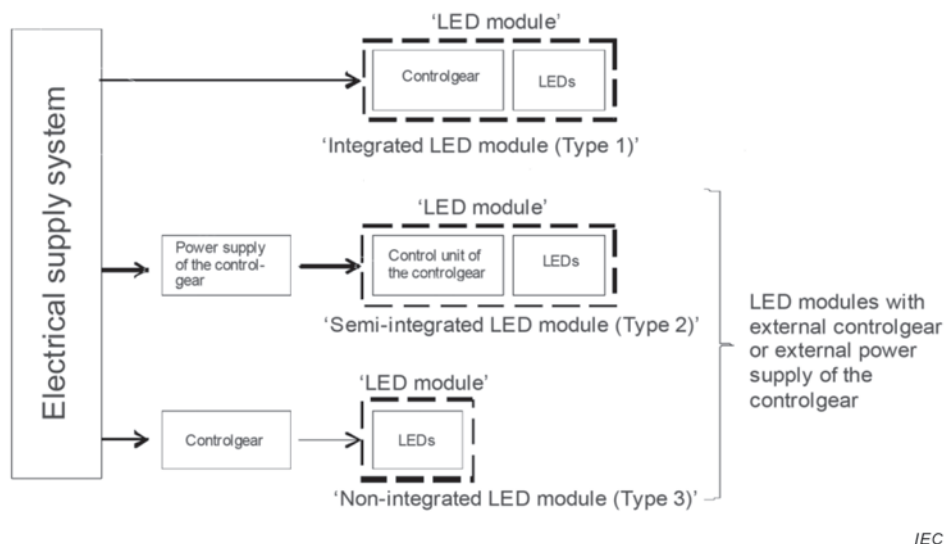


Figure 1 — Types of LED modules

The requirements of this standard relate only to type testing.

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

This standard covers LED modules, based on inorganic LED technology that produces white light.

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 an operational time as stated in [6.1](#), is out of the scope of this standard.

Instead of life time validation this standard 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, represented by the code, 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.

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

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

The separate electronic controlgear for LED modules as mentioned in Type 2 and Type 3 is not part of the testing against the requirements of this standard.

Protection for water and dust ingress, see [B.3](#).

1.2 Statement

It may be expected that integrated LED modules which comply with this standard will start and operate satisfactorily at voltages between 92 % and 106 % of rated supply voltage. LED modules with separate 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 LED module manufacturer and in a luminaire complying with IEC 60598-1.

The requirements for individuals apply for 95 % of the population.

1.0.Z1 Overall statement

Where a Commission Regulation specifies limits for parameters these limits shall be used instead of the limits specified in this standard. 

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 60050-845:1987, *International Electrotechnical Vocabulary — Chapter 845: Lighting*

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

IEC 60068-3-5:2001, *Environmental testing — Part 3-5: Supporting documentation and guidance — Confirmation of the performance of temperature chambers*

IEC 60081, *Double-capped fluorescent lamps — Performance specifications*

IEC 61000-3-2:2005¹⁾, *Electromagnetic compatibility (EMC) — Part 3-2: Limits — Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)*
IEC 61000-3-2:2005/AMD 2:2009

IEC 61000-4-7, *Electromagnetic compatibility (EMC) — Part 4-7: Testing and measurement techniques — General guide on harmonics and interharmonics measurements and instrumentation, for power supply systems and equipment connected thereto*

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*

1) Third edition. This edition has been replaced in 2014 by IEC 61000-3-2:2014, *Electromagnetic compatibility (EMC) — Part 3-2: Limits — Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)*