ICS 29.140.99 SLOVENSKÁ TECHNICKÁ NORMA December 2017

STN	**Moduly LED na všeobecné osvetlenie** **Prevádzkové požiadavky**	**STN** **EN 62717** 36 0585

LED modules for general lighting - Performance requirements

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 11/17

Obsahuje: EN 62717:2017, IEC 62717:2014, IEC 62717:2014/AMD1:2015

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 62717

June 2017

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)

This European Standard was approved by CENELEC on 2017-02-20. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Ref. No. EN 62717:2017 E

EN 62717:2017 (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- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2020-02-20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.

EN 62717:2017 (E)

Endorsement notice

The text of the International Standard IEC 62717:2014 and IEC62717:2014/A1:2015 was approved by CENELEC as a European Standard with agreed common modifications.

COMMON MODIFICATIONS

CONTENTS **Add** the following annexes:

Annex ZA (normative)	Normative references to international publications with their corresponding European publications
Annex ZZA (informative)	Relationship between this European Standard and the requirements of Commission Regulation (EC) No 244/2009
Annex ZZB (informative)	Relationship between this European Standard and the requirements of Commission Regulation (EU) No 1194/2012
Annex ZZC (informative)	Relationship between this European Standard and the requirements of Commission Regulation (EU) No 874/2012

1.0.Z1 **Add** the following clause before Clause 2

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

3.1 **Change** in Note 1 to entry “given in A.2” into “given in Annex A”.

3.Z1 After 3.21 **add** new definitions 3.Z1 up to 3.Z4:

3.Z1
directional LED module
LED module having at least 80 % luminous flux within a solid angle of π sr

Note 1 to entry: A solid angle of π sr corresponds to a cone with angle of 120°.

3.Z2
beam angle
angle between two imaginary lines in a plane through the optical beam axis, such that these lines pass through the centre of the front face of the lamp and through points at which the luminous intensity is 50 % of the centre beam intensity

[SOURCE: EN 61341:2011, 2.4]

3.Z3
partial luminous flux (of a light source, within a specified cone angle)
luminous flux emitted from a light source within a specified cone angle α, determined from the luminous intensity distribution $I(\theta, \varphi)$ of the source:

$$\Phi_\alpha = \int_{\varphi=0}^{2\pi} \int_{\theta=0}^{\alpha/2} I(\theta,\varphi) \sin\theta \, \mathrm{d}\theta \, \mathrm{d}\varphi \qquad (2)$$

Note 1 to entry: Partial luminous flux is expressed in lumen (lm).

Note 2 to entry: $(\theta, \varphi)=(0,0)$ is the direction of the cone axis.

Note 3 to entry: The cone angle α is the full angle (diameter) of the cone.

[SOURCE: EN 13032-4:2016, 3.41, modified, – Notes 4 and 5 removed]

3.Z4
useful luminous flux,
Φ_{use}
partial luminous flux of a LED module falling within the cone used for calculating the LED module's energy efficiency according Annex III, point 1.1 of regulation (EU) No 1194/2012

Note 1 to entry: Useful luminous flux is expressed in lumen (lm).

Note 2 to entry: The regulation specifies 90° or 120° cones according to the product characteristics.

Note 3 to entry: Useful luminous flux is similar to partial luminous flux. It is determined with the cone axis coincident with the observed optical beam axis of the light source, the axis about which the luminous intensity is substantially symmetrical.

8.2.1 **Add** a new paragraph after the first:

Measurements shall be conducted according to Annex A.

8.2.2 **Change** "clause A.1" into "Annex A".

8.2.3 **Remove** last sentence of the first paragraph of this subclause.

8.2.4 **Remove** last sentence of this subclause.

8.2.5 **Remove** last sentence of this subclause.

8.3 **Change** "A.3.2" into "Annex A".

9.1 Add the following note after first paragraph:

NOTE EN 60081 Annex D defines preferred chromaticity co-ordinates for fluorescent lamps and the corresponding MacAdam ellipses.

10.3.2.2.2 In the last paragraph **change** "A.1" into "Annex A".

10.3.2.3 In Note 2 **change** "A.1" into "Annex A".

10.3.3 In the second paragraph **change** "A.1" into "Annex A".

10.3.4 In the first paragraph after the compliance text **change** "A.1" into "Annex A".

11 **Add** to the end of Clause 11 Verification, the following:

For market surveillance verification purposes, the minimum sampling size n shall be 20 LED modules of the same model from the same manufacturer, where possible obtained in equal proportion from four randomly selected sources.

Z1 **Add** the following new clause Z1 and Z2 after Clause 12:

Z1 Requirements for directional LED modules

Z1.1 Beam angle

The requirements of 8.2.5 apply.

Z1.2 Correlated colour temperature

The correlated colour temperature of a LED module shall be measured in accordance with 7.1, Colorimetric Measurements of EN 13032-4:2015.

Z1.3 Useful luminous flux

The useful luminous flux of a directional LED module shall be measured according Annex A together with the following:

a) useful luminous flux of a directional LED module with a rated beam angle ≥ 90° shall be measured in a 120° cone;

b) otherwise the useful luminous flux of a directional LED module shall be measured in 90° cone.

If no rated beam angle is provided the useful luminous flux shall be measured in a 90° cone.

Z1.4 Energy efficiency requirements

The energy efficiency requirements for a directional LED module is determined by the Energy Efficiency Index, EEI. The energy efficiency index, EEI is calculated as follows and rounded to two decimal places:

$$EEI = P_{cor} / P_{ref} \quad (1)$$

Where:

a) P_{cor} is the measured power of a LED module corrected in accordance with Table Z1.

b) P_{ref} is the reference power obtained from the measured useful luminous flux of the same LED module, Φ_{use} according clause Z1.3.

For LED modules with a measured useful luminous flux, Φ_{use} < 1 300 lumen, the following shall apply $P_{ref} = 0{,}88 \cdot \sqrt{\Phi_{use}} + 0{,}049 \cdot \Phi_{use}$, otherwise $P_{ref} = 0{,}07341 \cdot \Phi_{use}$ applies

Table Z1 – Power correction factors

Scope of the correction	Corrected power (P_{cor})
LED modules operating on direct mains (LEDi Modules, Type 1)	$P_{measured}$ x 1,00
LED modules which require external controlgear (LEDsi and LEDni Modules, Type 2 and Type 3 respectively)	$P_{measured}$ x 1,10

Z1.5 Functionality requirements

Z1.5.1 Starting and warm-up time

Non integrated LED modules (Type 3) are deemed to fulfil the starting and warm-up times requirements according to Commission Regulation (EU) No. 1194/2012.

For Type 1 and Type 2 LED modules the following applies:

The starting time requirements for LED modules that are intended to be switched on and off via a communication protocol (and normally not by switching the mains supply on and off) shall be determined disregarding the time required by the communication protocol.

The test for starting and warm-up times shall be carried out in accordance with FprEN 60969:2016, B.3.

Starting time is determined as the period from the start of the test to when the LED module has fully completed the starting sequence (LED module has started and remains alight).

Warm-up time is the time taken from the start of the test to when the LED module achieves the required percentage of its stable luminous flux.

Z1.5.2 Colour rendering (R_a)

Colour rendering, in particular R_a, of a LED module shall be measured in accordance with 7.1, Colorimetric Measurements of EN 13032-4:2015.

Z1.5.3 Power factor

LED modules operating on direct mains (LEDi Modules, Type 1) shall be in accordance with 7.1 and 7.2, the distortion shall be measured according to EN 61000-3-2 and the power factor λ be calculated according to the relation given in F.1.

NOTE In view of future regulations, EN 62717 defines - the primary metric displacement factor and its associated measurement method and recommended values – instead of the composite power factor metric. Definitions related to power quantities are given in Table 2 of IEC/TR 61000-1-7:2016.

Z1.6 Product information requirements for directional LED modules

Z1.6.1 General

Independent LED modules as defined in EN 62031, shall meet the product information requirements of Z1.6.2, Z1.6.3 and Z1.6.4.

NOTE The information requirements do not apply for LED modules when marketed as part of a luminaire from which they are not intended to be removed by the end-user. Built-in and integrated LED modules are part of the luminaire and are not intended to be removed by the end-user.

Z1.6.2 Information to be displayed on the LED module itself (for independent LED modules)

The useful luminous flux, correlated colour temperature, beam angle shall be displayed on the product itself. If there is room for only one of the three values, the useful luminous flux shall be provided. If there is room for two values, the useful luminous flux and the correlated colour temperature shall be provided.

Z1.6.3 Information to be displayed on the packaging (for independent LED modules)

If the product is placed on the market in a packaging containing information to be visibly displayed to the end-users, prior to their purchase, the information below shall be clearly and prominently indicated on the packaging:

a) Rated useful luminous flux displayed in a font at least twice as large as any display of the rated LED module power;

b) Rated life time of the LED module in hours;

c) Colour temperature, as a value in Kelvins and also expressed graphically or in words;

d) Number of switching cycles;

e) Warm-up and starting time expressed as ‘instant full light’;

f) A warning if the LED module cannot be dimmed or can be dimmed only on specific dimmers; in the latter case a list of compatible dimmers shall be also provided on the manufacturer's website;

g) LED module dimensions in millimetres;

h) Rated beam angle in degrees;

i) If the rated beam angle is ≥ 90°, a warning shall be given that the LED module is not suitable for accent lighting.

Z1.6.4 Information to be made publicly available, e.g. on free-access websites (for independent LED modules)

The following information shall be provided:

a) The information as in Z1.6.3

b) Rated power (0,1 W precision);

c) LED module power factor;

d) Lumen maintenance factor at the end of the rated life;

e) Colour rendering;

f) Initial Colour consistency

g) Rated peak intensity in candela (cd);

h) If only intended for use in outdoor or industrial applications;

i) A graphical representation of the spectral power distribution according CIE 63 in the range 180-800 nm.

Z2 Requirements for non-directional LED Modules

Z2.1 Functionality requirements

The requirements of Z1.5 apply.

Annex A **Replace** Annex A by following text:

Annex A
(normative)

Method of measuring LED module characteristics

For general conditions of measurement see EN 13032-4.

For the application of EN 13032-4:2015, independent LED modules shall be regarded as luminaires.

The test voltage, current or power shall be the rated voltage, current or power. In the case of a range, measurements shall be carried out at the input value corresponding to the most adverse effect to the temperature of the LED module.

LED modules do not require any ageing prior to testing. However, the manufacturer may define an ageing period of up to 500 h.

For temperature measurement, equipment as specified in the informative Annex H may be used.

Maintenance (10.2) and supply switching (10.3.3) operation shall be conducted in the temperature interval (t_p rated-5, t_p rated) at a rated maximum ambient temperature specified by the manufacturer, with a tolerance of (+0 K, -5 K). In case there is no rated maximum ambient temperature, the ambient temperature range (20°C to 25°C) shall be used. For the supply switching test, the temperature requirement is applicable only to the ON time. The value of $t_{p\ rated}$ shall not be exceeded. An appropriate heat sink or additional heating may need to be applied to obtain the correct $t_{p\ rated}$ value. For testing purposes, the t_p-point shall be marked easily accessible. Even if the location is different for t_p and t_c, the value of t_c shall not be exceeded.

For directional LED modules the useful luminous flux (Z1.3) is obtained by luminous intensity integration according to EN 13032-4:2015, 6.3 "Partial luminous flux"

For non-directional LED modules (6.4) the total luminous flux shall be measured according to EN 13032-4. Also the partial luminous flux within a solid angle of π sr of the LED module shall be evaluated to check the non-directionality.

NOTE 1 Once the non-directionality is verified for one module, for modules of the same type, only the total luminous flux has to be measured.

Luminous intensity distribution shall be measured in accordance with EN 13032-4 and EN 61341.

NOTE 2 EN 13032-4 refers to EN 61341 for beam angle evaluation.

Chromaticity coordinates of a LED module shall be measured in accordance with 7.1, Colorimetric Measurements of EN 13032-4:2015.

All test results shall be presented as if testing had been executed at the maximum recommended operating temperature ($t_{p\ rated}$) of the LED module. Tests may be performed at different temperatures; for this, the relation between the two temperatures ($t_{p\ rated}$ and a different t_p where this t_p shall be within the range of manufacturer's provided data) has to be established beforehand in an unambiguous manner by data provided by the LED module manufacturer. In case of doubt the reference measurement is performed at $t_{p\ rated}$. Depending on the type of control circuit

the LED module manufacturer is using, the t_p measurement shall be done at the most onerous condition of operation. The value of $t_{p\ rated}$ shall be reported in Clause 4.

The manufacturer shall provide, on request, information on the method used to reproduce the claimed characteristics declared at t_p-point.

Bibliography **Add** the following notes for the standards indicated:

IEC 60598-1	NOTE	Harmonized as EN 60598-1
IEC 62384	NOTE	Harmonized as EN 62384
IEC 62612	NOTE	Harmonized as EN 62612
IEC 62707-1	NOTE	Harmonized as EN 62707-1
IEC 62722-1	NOTE	Harmonized as EN 62722-1
IEC 62722-2-1	NOTE	Harmonized as FprEN 62722-2-1
CISPR 15	NOTE	Harmonized as EN 55015

Add the following documents:

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

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

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

IEC/TR 61000-1-7:2016 Electromagnetic compatibility (EMC). Part 1-7: General. Power factor in single-phase systems under non-sinusoidal conditions

- - - - -

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
-	-	Light and lighting – Measurement and presentation of photometric data of lamps and luminaires – Part 1: Measurement and file format	EN 13032-1 A1	2004 2012
-	-	Light and lighting – Measurement and presentation of photometric data – Part 4: LED lamps, modules and luminaires	EN 13032-4	2015
IEC 60050(845)	-	International Electrotechnical Vocabulary – Lighting	-	-
IEC 60068-2-14	-	Environmental testing – Part 2-14: Tests – Test N: Change of temperature	EN 60068-2-14	-
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 specification	EN 60081	-
IEC 60969	201X	Self-ballasted compact fluorescent lamps for general lighting services - Performance requirements	FprEN 60969	2016 (mod)
IEC 61000-3-2 A1 A2	2005 2008 2009	Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current <= 16 A per phase)	EN 61000-3-2 A1 A2	2006 2009 2009
IEC 61000-4-7	-	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	-
IEC/TR 61341	-	Method of measurement of centre beam intensity and beam angle(s) of reflector lamps	EN 61341	-
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	-
IEC 62031 A1 A2	2008 2012 2014	LED modules for general lighting – Safety specifications	EN 62031 A1 A2	2008 2013 2015
IEC 62504	-	General lighting – Light emitting diode (LED) products and related equipment – Terms and definitions	EN 62504	-

Publication	Year	Title	EN/HD	Year
CIE 13.3	1995	Method of Measuring and Specifying Colour Rendering Properties of Light Source	-	-
CIE 177	2007	Colour rendering of white LED light sources	-	-

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 (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

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 (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

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

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Edition 1.0 2014-12

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

LED modules for general lighting – Performance requirements

Modules de LED pour éclairage général – Exigences de performance

IEC 62717:2014-12(en-fr)

IEC 62717

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INTERNATIONAL STANDARD

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colour inside

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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LED MODULES FOR GENERAL LIGHTING – PERFORMANCE REQUIREMENTS

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 first edition cancels and replaces IEC PAS 62717 published in 2011. This edition constitutes a technical revision.

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.

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

FDIS	Report on voting
34A/1796/FDIS	34A/1817/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.

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 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.

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 first edition of a performance standard (precursor: IEC PAS 62717) 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 performance standard publication (which also started with a Publicly Available Specification) for luminaires in general (IEC 62722-1) and for LED-luminaires (IEC 62722-2-1). Changes in the LED module standard will have an impact on the luminaire standards and vice versa, due to the behaviour of LED. Therefore, in the development of the present standard, a close collaboration between 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.

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 separate controlgear.

LED MODULES FOR GENERAL LIGHTING – PERFORMANCE REQUIREMENTS

1 Scope

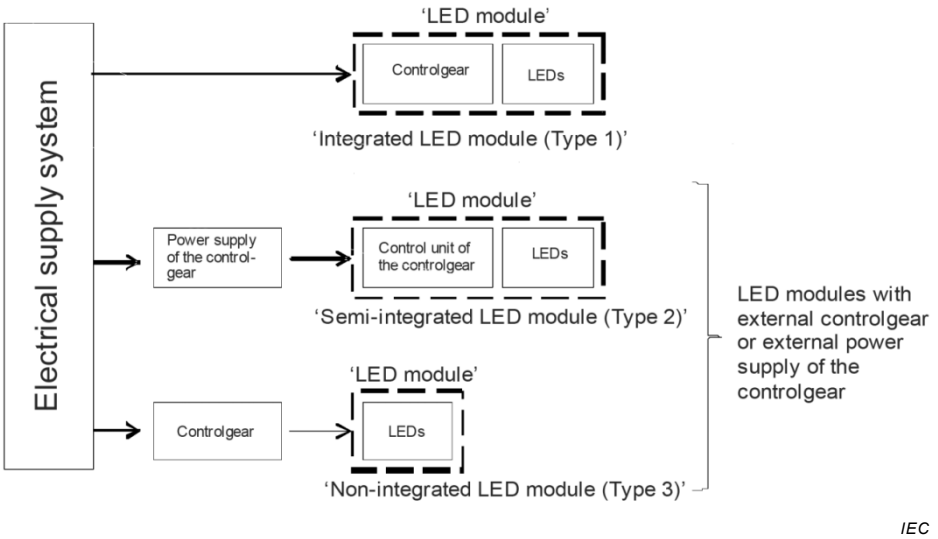
1.1 General

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.



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 LEDs.

A LED module with separate 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 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 manufacturers 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.

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 61000-3-2:2005[1], *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 1:2008
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*

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

IEC 62504, *General lighting – Light emitting diode (LED) products and related equipment – Terms and definitions*

CIE 13.3:1995, *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*

[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).*