

ÜLDVALGUSTUSE LEEDMOODULID. TOIMIVUS JA  
NÕUDED

LED modules for general lighting - Performance  
requirements

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

See Eesti standard EVS-EN 62717:2017 sisaldab Euroopa standardi EN 62717:2017 ingliskeelset teksti.	This Estonian standard EVS-EN 62717:2017 consists of the English text of the European standard EN 62717:2017.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 16.06.2017.	Date of Availability of the European standard is 16.06.2017.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile [standardiosakond@evs.ee](mailto:standardiosakond@evs.ee).

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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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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

## 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 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  $\pi$  sr

Note 1 to entry: A solid angle of  $\pi$  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  $\alpha$ , determined from the luminous intensity distribution  $I(\theta, \varphi)$  of the source:

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

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  $\alpha$  is the full angle (diameter) of the cone.

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

### 3.24

#### useful luminous flux,

$\Phi_{\text{use}}$

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  $\geq 90^\circ$  shall be measured in a  $120^\circ$  cone;
- b) otherwise the useful luminous flux of a directional LED module shall be measured in  $90^\circ$  cone.

If no rated beam angle is provided the useful luminous flux shall be measured in a  $90^\circ$  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,  $\Phi_{use}$  according clause Z1.3.

For LED modules with a measured useful luminous flux,  $\Phi_{use} < 1\,300$  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)	$P_{measured} \times 1,00$
LED modules which require external controlgear (LEDsi and LEDni Modules, Type 2 and Type 3 respectively)	$P_{measured} \times 1,10$

## **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  $\lambda$  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  $\geq 90^\circ$ , 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 ( $t_{p \text{ rated}} - 5$ ,  $t_{p \text{ rated}}$ ) 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  $t_{p \text{ rated}}$  shall not be exceeded. An appropriate heat sink or additional heating may need to be applied to obtain the correct  $t_{p \text{ rated}}$  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  $\pi$  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 ( $t_{p \text{ rated}}$ ) of the LED module. Tests may be performed at different temperatures; for this, the relation between the two temperatures ( $t_{p \text{ rated}}$  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  $t_{p \text{ rated}}$ . 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  $t_{p \text{ rated}}$  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

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## 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.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
-	-	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	-

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
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.