SLOVENSKI STANDARD
SIST EN 15193-1:2017

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Nadomešča:
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Energetska učinkovitost stavb - Energijske zahteve za razsvetljavo - 1. del: Specifikacije, Modul M9

Energy performance of buildings - Energy requirements for lighting - Part 1: Specifications, Module M9

Energetische Bewertung von Gebäuden - Energetische Anforderungen an die Beleuchtung - Teil 1: Spezifikationen, Modul M9

Performance énergétique des bâtiments - Exigences énergétiques pour l'éclairage - Partie 1 : Spécifications, module M9

Ta slovenski standard je istoveten z: **EN 15193-1:2017**

ICS:

27.015	Energijska učinkovitost. Ohranjanje energije na splošno	Energy efficiency. Energy conservation in general
91.120.10	Toplotna izolacija stavb	Thermal insulation of buildings
91.160.10	Notranja razsvetljava	Interior lighting

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

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English Version

Energy performance of buildings - Energy requirements for lighting - Part 1: Specifications, Module M9

Performance énergétique des bâtiments - Exigences énergétiques pour l'éclairage - Partie 1 : Spécifications, module M9

Energetische Bewertung von Gebäuden - Energetische Anforderungen an die Beleuchtung - Teil 1: Spezifikationen, Modul M9

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European foreword

This document (EN 15193-1:2017) has been prepared by Technical Committee CEN/TC 169 “Light and lighting”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2017, and conflicting national standards shall be withdrawn at the latest by October 2017.

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

This document supersedes EN 15193:2007.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

EN 15193 consists of the following parts, under the general title “Energy performance of buildings — Energy requirements for lighting”.

Part 1: Specifications, Module M9

Part 2: (Technical Report) Explanation and justification of EN 15193-1, Module M9

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This Standard is part of a series of standards aiming at international harmonization of the methodology for the assessment of the energy performance of buildings, called “set of EPB standards”.

All EPB standards follow specific rules to ensure overall consistency, unambiguity and transparency.

All EPB standards provide a certain flexibility with regard to the methods, the required input data and references to other EPB standards, by the introduction of a normative template in Annex A and Annex B with informative default choices.

For the correct use of this standard a normative template is given in Annex A to specify these choices. Informative default choices are provided in Annex B.

The main target groups of this standard are all the users of the set of EPB standards (e.g. architects, engineers, regulators).

Use by or for regulators: In case the standard is used in the context of national or regional legal requirements, mandatory choices may be given at national or regional level for such specific applications. These choices (either the informative default choices from Annex B or choices adapted to national / regional needs, but in any case following the template of this Annex A) can be made available as national annex or as separate (e.g. legal) document (national data sheet).

NOTE So in this case:

— the regulators will specify the choices;

— the individual user will apply the standard to assess the energy performance of a building, and thereby use the choices made by the regulators.

Topics addressed in this standard can be subject to public regulation. Public regulation on the same topics can override the default values in Annex B. Public regulation on the same topics can even, for certain applications, override the use of this standard. Legal requirements and choices are in general not published in standards but in legal documents. In order to avoid double publications and difficult updating of double documents, a national annex may refer to the legal texts where national choices have been made by public authorities. Different national annexes or national data sheets are possible, for different applications.

It is expected, if the default values, choices and references to other EPB standards in Annex B are not followed due to national regulations, policy or traditions, that:

— national or regional authorities prepare data sheets containing the choices and national or regional values, according to the model in Annex A. In this case the national annex (e.g. NA) refers to this text;

— or, by default, the national standards body will consider the possibility to add or include a national annex in agreement with the template of Annex A, in accordance to the legal documents that give national or regional values and choices.

Further target groups are parties wanting to motivate their assumptions by classifying the building energy performance for a dedicated building stock.

More information is provided in the Technical Report accompanying this standard (CEN/TR 15193-2 [5]).

CEN/TC 169 deals with light and lighting and the subjects covered by committee are:

— Lighting criteria for indoor and outdoor activities;

— Photometry of lighting systems;

— Lighting terminology;

— Energy efficiency of lighting systems.

This standard specifies three methods for evaluating the energy performance of lighting systems.

It is of paramount importance that correct lighting is provided in buildings. The convention and procedures in this standard assumes that the designed and installed lighting scheme conforms to good lighting practices. For new and refurbished installations in the non-residential building sector the design of the lighting system should conform to the requirements in the lighting applications standards EN 12464-1 for indoor workplaces, EN 12193 for sports buildings and EN 1838 for emergency escape lighting. For residential buildings the lighting system should be designed to fulfil the needs of the rooms in the buildings. Guidance on the requirements is provided in the supporting Technical Report CEN/TR 15193-2 [5]).

This standard also assumes that the buildings can have access to daylight to provide all or some of the illumination required in the rooms and that in addition there will be an adequate amount of electric lighting installed to provide the required illumination in the absence of daylight or with a reduced daylight contribution.

This standard defines the methods for estimating or measuring the amount of energy required or used for lighting in buildings. The method of separate metering of the energy used for lighting will also give regular feedback on the effectiveness of the lighting control.

The methodology of energy estimation not only provides values for the Lighting Energy Numeric Indicator (*LENI*) but it will also provide input for the heating and cooling load estimations for the combined total energy performance of building indicator.

Figure 1 gives an overview of the methodology and the flow of the processes involved.

NOTE The dotted line in Figure 1 linking preliminary annual *LENI* to the comprehensive lighting design indicates the requirement to follow-up the budget calculation with a comprehensive calculation during the detailed lighting design process.

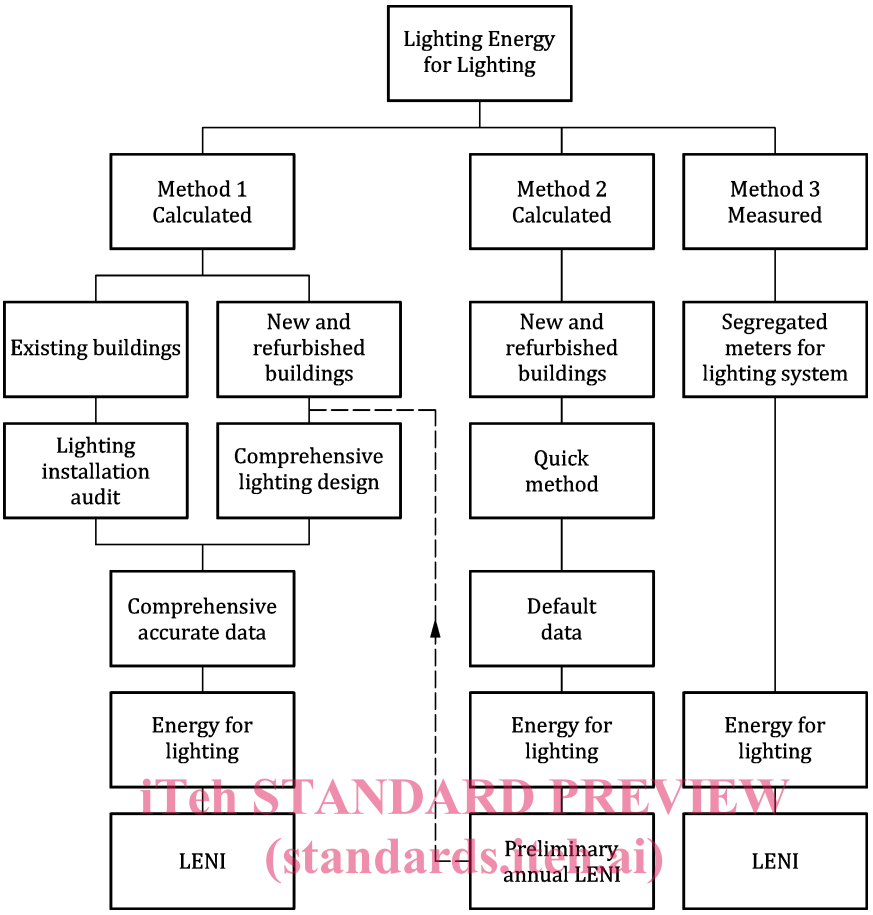

Figure 1 — Flow chart illustrating methods to determine energy for lighting

This standard was developed during the first EPBD mandate and the first edition was published in 2007.

The revision for inclusion in the second mandate package was performed during 2013-2016.

The most important changes are:

— extension of calculation methods,

— inclusion of lighting for residential buildings,

— substantial editorial changes.

1 Scope

This standard specifies the methodology for evaluating the energy performance of lighting systems for providing general illumination in residential and non-residential buildings and for calculating or measuring the amount of energy required or used for lighting in buildings. The method may be applied to new, existing or refurbished buildings. It also provides a methodology (*LENI*) as the measure of the energy efficiency of the lighting installations in buildings.

This standard does not cover lighting requirements, the design of lighting systems, the planning of lighting installations, the characteristics of lighting equipment (lamps, control gear and luminaires) and systems used for display lighting, desk lighting or luminaires built into furniture. This standard does not provide any procedure for the dynamic simulation of lighting scene setting.

Table 1 shows the relative position of this standard within the set of EPB standards in the context of the modular structure as set out in EN ISO 52000-1.

NOTE In CEN ISO/TR 52000-2 the same table can be found, with, for each module, the numbers of the relevant EPB standards and accompanying technical reports that are published or in preparation.

The modules represent EPB standards, although one EPB standard may cover more than one module and one module may be covered by more than one EPB standard, for instance a simplified and a detailed method respectively. See also Clause 2.

Table 1 — Position of this standard within the modular structure of the set of EPB standards

		Overarching		Building (as such)		Technical Building Systems								
Submodule		**Descriptions**		**Descriptions**		**Descriptions**	**Heating**	**Cooling**	**Ventilation**	**Humidification**	**Dehumidification**	**Domestic hot water**	**Lighting**	**Building automation and control**	**PV, wind, ..**
sub1			**M1**		**M2**		**M3**	**M4**	**M5**	**M6**	**M7**	**M8**	**M9**	**M10**	**M11**
1		General		General		General									
2		Common terms and definitions; symbols, units and subscripts		Building Energy Needs		Needs							EN 15193 –1 [a]		
3		Applications		(Free) Indoor Conditions without Systems		Maximum Load and Power							EN 15193 –1		
4		Ways to Express Energy Performance		Ways to Express Energy Performance		Ways to Express Energy Performance							EN 15193 –1		
5		Building categories and Building Boundaries		Heat Transfer by Transmission		Emission and control							EN 15193 –1		

		Overarching		Building (as such)		Technical Building Systems									
Submodule		Descriptions		Descriptions		Descriptions	Heating	Cooling	Ventilation	Humidification	Dehumidification	Domestic hot water	Lighting	Building automation and control	PV, wind, ..
sub1			M1		M2		M3	M4	M5	M6	M7	M8	M9	M10	M11
6		Building Occupancy and Operating Conditions		Heat Transfer by Infiltration and Ventilation		Distribution and control							EN 15193 –1		
7		Aggregation of Energy Services and Energy Carriers		Internal Heat Gains		Storage and control									
8		Building zoning		Solar Heat Gains		Generation and control							EN 15193 –1		
9		Calculated Energy Performance		Building Dynamics (thermal mass)		Load dispatching and operating conditions									
10		Measured Energy Performance		Measured Energy Performance		Measured Energy Performance							EN 15193 –1		
11		Inspection		Inspection		Inspection							EN 15193 –1		
12		Ways to Express Indoor Comfort				BMS									
13		External Environment Conditions													
14		Economic Calculation													

[a] The shaded modules are not applicable.

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.

EN 1838, *Lighting applications - Emergency lighting*

EN 12193, *Light and lighting - Sports lighting*

EN 12464-1, *Light and lighting - Lighting of work places - Part 1: Indoor work places*

EN 12665, *Light and lighting - Basic terms and criteria for specifying lighting requirements*

EN 50470 (all parts), *Electricity metering equipment (a.c.)*

EN 60598 (all parts), *Luminaires*

EN 62722-1, *Luminaire performance - Part 1: General requirements (IEC 62722-1)*

EN ISO 52000-1:2017, *Energy performance of buildings - Overarching EPB assessment - Part 1: General framework and procedures (ISO 52000-1:2017)*

ISO 10916, *Calculation of the impact of daylight utilization on the net and final energy demand for lighting*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 52000-1 and EN 12665 and the following apply.

3.1
EPB standard
standard that complies with the requirements given in EN ISO 52000-1, CEN/TS 16628 and CEN/TS 16629

Note 1 to entry: CEN/TS 16628 and CEN/TS 16629 contain specific rules to ensure overall consistency, unambiguity, transparency and flexibility, supported by common templates. EN ISO 52000-1, the overarching EPB standard, is indispensable for each EPB standard, because of the modular structure, common terms and definitions, symbols and subscripts and because it provides the general framework for the EPB assessment.

[SOURCE: EN ISO 52000-1:2017]

3.2
time step
t_s
period in which the energy is evaluated

Note 1 to entry: Measured in hour/month/year.

3.3
standby energy
energy required for charging batteries and/or the energy required for lighting controls during the time the electric lights are switched off

Note 1 to entry: Lighting controls and emergency battery charging circuits are only considered where power is supplied via a luminaire.

3.4
lighting controls
devices connected to the luminaire to vary the light output

Note 1 to entry: In this standard lighting controls are only considered where power is supplied via a luminaire.

3.5
lighting system
set of light sources and/or lamps interacting with luminaires and/or related equipment to provide solutions to satisfy lighting application requirements

Note 1 to entry: The lighting system can be dedicated to

a) the support of (a) specified visual task(s) under specified conditions considering other requirements such as human comfort, safety, the appearance of the surrounding environment and energy consumption;

b) the support of other than human tasks, such as plant growth or breeding of animals.

Note 2 to entry: The lighting system can include physical components, communication protocols, user interfaces, software and networks to provide central control and monitoring functions.

3.6
expenditure factor
expense factor
effort factor
indicator of the energy efficiency of a given lighting system compared to a reference system

4 Symbols and abbreviations

4.1 Symbols and units

For the purposes of this standard, the symbols given in EN ISO 52000-1 and the specific symbols listed in Table 2 apply.

Table 2 — Symbols and units

Symbol	Name of quantity	Unit
A_{Ca}	Area of the raw building carcass opening of the area under consideration	m²
A_D	Partial area which is lit by daylight	m²
a_D	Depth of the daylight area	m
$a_{D,max}$	Maximum depth of the daylight area	m
A_{Dj}	Area receiving daylight	m²
A_{FS}	Glazed area of a dome or strip skylight	m²
$a_{In,At}$	Depth of the courtyard or atrium	m
A_{ND}	The area not lit by daylight	m²
A_{NDj}	Area not receiving daylight	m²
A_{Rb}	Glazed area of a shed rooflight	m²
A_S	Sum of task areas within the room	m²
b_D	Width of the daylight area	m
$b_{In,At}$	Width of the courtyard or atrium	m
C_{we}	Factor for reduction to take account of weekends	-
D	Daylight factor	%

Symbol	Name of quantity	Unit
D_a	External daylight factor	%
$D_{CA,j}$	Daylight factor for raw carcass opening	%
D_{CA}	Daylight factor from carcass opening	%
$\overline{D}_{SA}$	Mean daylight factor with rooflight, shading activated	%
$\overline{D}_{SNA}$	Mean daylight factor with rooflight, shading not activated	%
E_A	Horizontal external illuminance from an overcast sky	lx
E_F	Illuminance on the external surface of the skylight from overcast sky	lx
e_L	Expenditure factor for lighting systems	-
$e_{L,C}$	Partial expenditure factor for constant illuminance control	-
$e_{L,D}$	Partial expenditure factor for daylight dependant lighting control	-
$e_{L,ES}$	Partial expenditure factor for the electric lighting system	-
$e_{L,ES,del}$	Partial expenditure factor for delivery of electric light	-
$e_{L,ES,dis}$	Partial expenditure factor for distribution of electric light	-
$e_{L,ES,gen}$	Partial expenditure factor for generation of electric light	-
$e_{L,O}$	Partial expenditure factor for occupancy dependant lighting control	-
$\overline{E}_m$	Maintained illuminance	lx
E_{SUR}	Maintained illuminance on immediate surround of task area	lx
E_{task}	Maintained illuminance on the task area	lx
F	Dependency Factor	-
F_A	Absence factor	-
f_B	Factor for the efficiency of the operating device	-
F_c	Constant illuminance factor	-
F_{CA}	Factor for reduced power of area	-
F_{cc}	Factor for the efficiency of the constant illuminance control	-
F_D	Daylight dependency factor	-
$F_{D,C}$	Lighting control factor	-
$F_{D,C,nj}$	Daylight responsive control system factor for the area under consideration	-
$F_{D,j,i}$	Factor for monthly partial-load daylight operation	-
$F_{D,mth}$	Monthly daylight dependency factor	-
$F_{D,n,j}$	Daylight dependency factor for the area under consideration	-