HOONETE ENERGIATÕHUSUS. HOONETE VENTILATSIOON. OSA 1: SISEKESKKONNA LÄHTEANDMED HOONETE ENERGIATÕHUSUSE PROJEKTEERIMISEKS JA HINDAMISEKS, LÄHTUDES SISEÕHU KVALITEEDIST, SOOJUSLIKUST KESKKONNAST, VALGUSTUSEST JA AKUSTIKAST. MOODUL M1-6

Energy performance of buildings - Ventilation for buildings - Part 1: Indoor environmental input parameters for design and assessment of energy performance of buildings addressing indoor air quality, thermal environment, lighting and acoustics - Module M1-6

EESTI STANDARDIKESKUS
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NATIONAL FOREWORD

See Eesti standard EVS-EN 16798-1:2019 sisaldab Euroopa standardi EN 16798-1:2019 ingliskeelset teksti.	This Estonian standard EVS-EN 16798-1:2019 consists of the English text of the European standard EN 16798-1:2019.
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 01.05.2019.	Date of Availability of the European standard is 01.05.2019.
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.

ICS 91.120.10, 91.140.01

EUROPEAN STANDARD

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Supersedes EN 15251:2007

English Version

Energy performance of buildings - Ventilation for buildings - Part 1: Indoor environmental input parameters for design and assessment of energy performance of buildings addressing indoor air quality, thermal environment, lighting and acoustics - Module M1-6

Performance énergétique des bâtiments - Ventilation des bâtiments - Partie 1 : Données d'entrées d'ambiance intérieure pour la conception et l'évaluation de la performance énergétique des bâtiments couvrant la qualité de l'air intérieur, l'ambiance thermique, l'éclairage et l'acoustique (Module M1-6)

Energetische Bewertung von Gebäuden - Teil 1: Eingangsparameter für das Innenraumklima zur Auslegung und Bewertung der Energieeffizienz von Gebäuden bezüglich Raumluftqualität, Temperatur, Licht und Akustik - Module M1-6

This European Standard was approved by CEN on 23 December 2018.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (EN 16798-1:2019) has been prepared by Technical Committee CEN/TC 156 "Ventilation for buildings", the secretariat of which is held by BSI.

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 November 2019, and conflicting national standards shall be withdrawn at the latest by November 2019.

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 15251:2007.

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

Regarding the most significant technical changes that were made in this new edition, see the Introduction.

Concerning the various parts of EN 16798, see below.

This standard has been produced to meet the requirements of Directive 2010/31/EU (19 May 2010) on the energy performance of buildings (recast), referred to as "recast EPbd".

EN 15251:2007 was produced to meet the requirements of Directive 2002/91/EC (16 December 2002) on energy performance of buildings referred to as "EPBD".

For the convenience of Standards users CEN/TC 156, together with responsible Working Group Convenors, have prepared a simple table below relating, where appropriate, the relationship between the 'EPBD' and 'recast EPBD' standard numbers prepared by Technical Committee CEN/TC 156 "Ventilation for buildings".

EPBD EN Number	Recast EPBD EN Number	Title
EN 15251	EN 16798–1	*Energy performance of buildings — Part 1: Indoor environmental input parameters for design and assessment of energy performance of buildings addressing indoor air quality, thermal environment, lighting and acoustics — Module M1-6* (revision of EN 15251)
N/A	CEN/TR 16798–2	*Energy performance of buildings — Part 2: Indoor environmental input parameters for design and assessment of energy performance of buildings addressing indoor air quality, thermal environment, lighting and acoustics — Module M1–6 — Technical report — Interpretation of the requirements in EN 16798–1*

EN 13779	EN 16798–3	*Energy performance of buildings - Ventilation for buildings - Part 3: For non-residential buildings - Performance requirements for ventilation and room-conditioning systems (Modules M5-1, M5-4)* (revision of EN 13779)
N/A	CEN/TR 16798–4	*Energy performance of buildings — Part 4: Ventilation for non-residential buildings — Performance requirements for ventilation and room-conditioning systems — Technical report — Interpretation of the requirements in EN 16798–3*
EN 15241	EN 16798–5–1	*Energy performance of buildings — Modules M5-6, M5-8, M6-5, M6-8, M7-5, M7-8 — Ventilation for buildings - Calculation methods for energy requirements of ventilation and air conditioning systems — Part 5-1: Distribution and generation — method 1* (revision of EN 15241)
EN 15241	EN 16798–5–2	*Energy performance of buildings - Ventilation for buildings - Part 5-2: Calculation methods for energy requirements of ventilation systems (Modules M5-6, M5-8, M6-5, M6-8, M7-5, M7-8) - Method 2: Distribution and generation* (revision of EN 15241)
N/A	CEN/TR 16798–6	*Energy performance of buildings — Part 6: Ventilation for buildings — Modules M5-6, M5-8, M6-5, M6-8, M7-5, M7-8 — Calculation methods for energy requirements of ventilation and air conditioning systems — Technical report — Interpretation of the requirements in EN 16798-5-1 and EN 16798-5-2*
EN 15242	EN 16798–7	*Energy performance of buildings - Ventilation for buildings - Part 7: Calculation methods for the determination of air flow rates in buildings including infiltration (Modules M5-5)* (revision of EN 15242)
N/A	CEN/TR 16798–8	*Energy performance of buildings - Ventilation for buildings - Part 8: Interpretation of the requirements in EN 16798-7 - Calculation methods for the determination of air flow rates in buildings including infiltration - (Module M5-5)*
EN 15243	EN 16798–9	*Energy performance of buildings — Part 9: Ventilation for buildings - Module M4-1, M4-4, M4-9 — Calculation methods for energy requirements — Calculation methods for energy requirements of cooling systems — General* (revision of EN 15243)

N/A	CEN/TR 16798–10	*Energy performance of buildings - Ventilation for buildings - Part 10: Interpretation of the requirements in EN 16798-9 - Calculation methods for energy requirements of cooling systems (Module M4-1,M4-4, M4-9) - General*
N/A	EN 16798–11	*Energy performance of buildings — Part 11: Module M4-3 — Calculation of the design cooling load*
N/A	EN 16798–13	*Energy performance of buildings — Part 13: Module M4-8 — Calculation of cooling systems — Generation*
N/A	CEN/TR 16798–14	*Energy performance of buildings — Part 14 : Module M4-8 — Calculation of cooling systems — Generation — Technical report — Interpretation of the requirements in EN 16798-13*
N/A	EN 16798–15	*Energy performance of buildings — Part 15: Module M4-7 — Calculation of cooling systems — Storage*
N/A	CEN/TR 16798–16	*Energy performance of buildings - Ventilation for buildings - Part 16: Interpretation of the requirements in EN 16798-15 - Calculation of cooling systems (Module M4-7) - Storage*
EN 15239 and EN 15240	EN 16798–17	*Energy performance of buildings — Part 17: Ventilation for buildings — Guidelines for inspection of ventilation and air conditioning systems, Module M4-11, M5-11, M6-11, M7-11*
N/A	CEN/TR 16798–18	*Energy performance of buildings — Part 18: Ventilation for buildings — Module M4-11, M5-11, M6-11, M7-11 — Guidelines for inspection of ventilation and air conditioning systems in EN 16798–17*

According to the CEN-CENELEC Internal Regulations, the national standards organisations 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 European 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 of this standard. 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 16798-2 [7], under preparation).

The first edition of this standard was published in 2007 as EN 15251. The major change consisted in splitting up the standard in a normative Part 1 and a Technical Report as Part 2. Part 1 includes an Annex B with tables with default values and an Annex A with similar empty tables to be used for national values. Further technical changes are the introduction of a category IV, inclusion of daylight factor and occupant schedules.

Energy consumption of buildings depends significantly on the criteria used for the indoor environment (heating, cooling, ventilation and lighting) and building (including systems) design and operation. Indoor environment also affects health, productivity and comfort of the occupants. Recent studies have shown that costs of poor indoor environment for the employer, the building owner and for society, as a whole are often considerable higher than the cost of the energy used in the same building. It has also been shown that good indoor environmental quality can improve overall work and learning performance and reduce absenteeism. In addition uncomfortable occupants are likely to take actions to make themselves comfortable which may have energy implications. There is therefore a need for specifying criteria for the indoor environment for design and energy calculations for buildings and building service systems.

The present standard is a revision of EN 15251:2007. This standard specifies different types and categories of criteria, which may have a significant influence on the energy demand. For the thermal environment criteria for the heating season (cold/winter) and cooling season (warm/summer) are listed. The criteria in EN 15251 were, however, mainly for dimensioning of building, heating, cooling and ventilation systems. They may not be used directly for energy calculations and year-round evaluation of the indoor thermal environment. Studies have shown that occupant expectations in natural ventilated buildings may differ from conditioned buildings, which will be part of this standard.

The present standard specifies how design criteria can be established and used for dimensioning of systems. It defines how to establish and define the main parameters to be used as input for building energy calculation and short and long term evaluation of the indoor environment. The present standard gives default criteria for design and energy calculations in an informative Annex B. A similar normative Annex A is included for specifying national criteria. The national Annex A may specify different criteria for design compared to criteria for energy calculation. The national annex may also specify different criteria for different building types (offices, schools, etc.).

The present standard does not require certain criteria to be used. This is up to national regulations or individual project specifications.

1 Scope

This document specifies requirements for indoor environmental parameters for thermal environment, indoor air quality, lighting and acoustics and specifies how to establish these parameters for building system design and energy performance calculations.

This European Standard includes design criteria for the local thermal discomfort factors, draught, radiant temperature asymmetry, vertical air temperature differences and floor surface temperature.

This European Standard is applicable where the criteria for indoor environment are set by human occupancy and where the production or process does not have a major impact on indoor environment.

This European Standard also specifies occupancy schedules to be used in standard energy calculations and how different categories of criteria for the indoor environment can be used.

The criteria in this European Standard can also be used in national calculation methods. This standard sets criteria for the indoor environment based on existing standards and reports listed under normative references or in the bibliography.

This European Standard does not specify design methods, but gives input parameters to the design of building envelope, heating, cooling, ventilation and lighting.

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 1 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.

NOTE 2 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 and Tables A.1 and B.1.

Table 1 — Position of this standard within the EN EPB set of standards according to EN ISO 52000-1

Overarching		Building (as such)		Technical Building Systems										
	Descriptions		Descriptions		Descriptions	Heating	Cooling	Ventilation	Humidification	Dehumidification	Domestic Hot water	Lighting	Building automation and control	PV, wind, ..
sub1	M1	sub1	M2	sub1		M3	M4	M5	M6	M7	M8	M9	M10	M11
1	General	1	General	1	General									
2	Common terms and definitions; symbols, units and subscripts	2	Building Energy Needs	2	Needs									
3	Applications	3	(Free) Indoor Conditions without Systems	3	Maximum Load and Power									

4	Ways to Express Energy Performance	4	Ways to Express Energy Performance	4	Ways to Express Energy Performance										
5	Building Functions and Building Boundaries	5	Heat Transfer by Transmission	5	Emission and control										
6	Building Occupancy and Operating Conditions	6	Heat Transfer by Infiltration and Ventilation	6	Distribution and control										
7	Aggregation of Energy Services and Energy Carriers	7	Internal Heat Gains	7	Storage and control										
8	Building Partitioning	8	Solar Heat Gains	8	Generation and control										
9	Calculated Energy Performance	9	Building Dynamics (thermal mass)	9	Load dispatching and operating conditions										
10	Measured Energy Performance	10	Measured Energy Performance	10	Measured Energy Performance										
11	Inspection	11	Inspection	11	Inspection										
12	Ways to Express Indoor Comfort			12	BMS										
13	Outdoor Environment Conditions														
14	Economic Calculation														

2 Normative references

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.

EN 12464-1:2011, *Light and lighting - Lighting of work places - Part 1: Indoor work places*

EN 12464-2, *Light and lighting - Lighting of work places - Part 2: Outdoor work places*

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

EN 12792, *Ventilation for buildings - Symbols, terminology and graphical symbols*

EN 16516, *Construction products: Assessment of release of dangerous substances - Determination of emissions into indoor air*

EN 16798-3, *Energy performance of buildings - Ventilation for buildings - Part 3: For non-residential buildings - Performance requirements for ventilation and room-conditioning systems (Modules M5-1, M5-4)*

EN ISO 7345:2018, *Thermal performance of buildings and building components - Physical quantities and definitions (ISO 7345:2018)*

EN ISO 13731, *Ergonomics of the thermal environment - Vocabulary and symbols (ISO 13731)*

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

NOTE 1 Default references to EPB standards other than EN ISO 52000-1 are identified by the EPB module code number and given in Annex A (normative template) and Annex B (informative default choice).

NOTE 2 Example of EPB module code number: M5–5, or M5–5.1 (if module M5–5 is subdivided), or M5–5/1 (if reference to a specific clause of the standard covering M5–5.

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 7345:2018, EN ISO 52000-1, EN 12792, EN ISO 13731, the EN 12464 series, EN 12665 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

NOTE The terms of EN ISO 52000-1 that are indispensable for the understanding of the underlying standard are repeated here.

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

3.2
adaptation
<thermal>
physiological, psychological or behavioural adjustment of building occupants to the interior thermal environment in order to avoid or to limit thermal discomfort

Note 1 to entry: In naturally ventilated buildings these are often in response to changes in indoor environment induced by outdoor weather conditions.

3.3
adaptation
<perceived air quality>
sensory adaptation to perceived air quality (odour), which occurs during the first 15 min exposure to bio effluents