ICS 91.120.10, 91.140.30 SLOVENSKÁ TECHNICKÁ NORMA December 2017

STN	**Energetická hospodárnosť budov Vetranie budov Časť 9: Metódy výpočtu potreby energie pre chladiace systémy (Moduly M4-1, M4-4, M4-9) Všeobecne**	**STN EN 16798-9 12 7015**

Energy performance of buildings - Ventilation for buildings - Part 9: Calculation methods for energy requirements of cooling systems (Modules M4-1, M4-4, M4-9) - General

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

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English Version

Energy performance of buildings - Ventilation for buildings - Part 9: Calculation methods for energy requirements of cooling systems (Modules M4-1, M4-4, M4-9) - General

Performance énergétique des bâtiments - Ventilation des bâtiments - Partie 9 : Module M4-1,M4-4, M4-9 - Méthodes de calcul des exigences énergétique des systèmes de refroidissement - Généralités

Energieeffizienz von Gebäuden - Lüftung von Gebäuden - Teil 9: Modul M4-1;4-4, M4-9 - Berechnungsverfahren für den Energiebedarf der Kühlsysteme - Allgemeines

This European Standard was approved by CEN on 27 February 2017.

CEN 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 CEN member.

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 foreword

This document (EN 16798-9:2017) has been prepared by Technical Committee CEN/TC 156 “Ventilation for buildings”, the secretariat of which is held by BSI.

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 EPDB”.

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 December 2017, and conflicting national standards shall be withdrawn at the latest by December 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 15243:2007.

EN 15243:2007 was produced to meet the requirements of Directive 2002/91/EC 16 December 2002 on energy performance of buildings referred to as “EPBD”.

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

For the convenience of Standards users CEN/TC 156, together with responsible Working Group Conveners, 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 – 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)
N/A	CEN/TR 16798–2	Energy performance of buildings – Ventilation for buildings - Part 2: Interpretation of the requirements in EN 16798-1 - 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)
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)
N/A	CEN/TR 16798–4	Energy performance of buildings – Ventilation for buildings - Part 4: Interpretation of the requirements in EN 16798- 3 - For non-residential buildings – Performance requirements for ventilation and room-conditioning systems(Modules M5-1, M5-4)

EPBD EN Number	Recast EPBD EN Number	Title
EN 15241	EN 16798–5–1	Energy performance of buildings — Ventilation for buildings – Part 5-1: Calculation methods for energy requirements of ventilation and air conditioning systems (Modules M5-6, M5-8, M6-5, M6-8, M7-5, M7-8) — Method 1: Distribution and generation
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
N/A	CEN/TR 16798–6	Energy performance of buildings - Ventilation for buildings – Part 6: Interpretation of the requirements in EN 16798-5 -1 and EN 16798-5-2 – Calculation methods for energy requirements of ventilation and air conditioning systems (Modules M5-6, M5-8, M 6-5, M6-8 , M7-5, M7-8)
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)
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 – (Modules M5-5)
EN 15243	EN 16798–9	Energy performance of buildings – Ventilation for buildings - Part 9: Calculation methods for energy requirements of cooling systems (Modules M4-1, M4-4, M4-9) - General
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 16798–13	Energy performance of buildings – Ventilation for buildings - Part 13: - Calculation of cooling systems (Module M4-8) – Generation
N/A	CEN/TR 16798–14	Energy performance of buildings – Ventilation for buildings - Part 14: Interpretation of the requirements in EN 16798-13 – Calculation of cooling systems (Module M4-8) – Generation
N/A	EN 16798–15	Energy performance of buildings – Ventilation for buildings – Part 15: Calculation of cooling systems (Module M4-7) – 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 M4-8) – Storage
EN 15239, and EN 15240	EN 16798–17	Energy performance of buildings – Ventilation for buildings - Part 17: 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 – Ventilation for buildings – Part 18: Interpretation of the requirements in EN 16798-17 – Guidelines for inspection of ventilation and air-conditioning systems (Module M4-11, M5-11, M6-11, M7-11)

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 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 “EPB set of 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. engineers, regulators, programmers).

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 1 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.

Default references to other EPB standards, identified by the EPB module code number, are given in Table B.1. If alternative references are specified, this should be done in Table NA.1 of a National Annex, which should follow the template given in Table A.1.

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).

NOTE 3 The same module code numbering will be used in other EPB standards. This will facilitate, in a individual country, the making of a consistent set of national annexes for each EPB standard and contribute to the overall consistency and transparency.

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 16798-10 [4], under preparation).

TC 156 deals with ventilation and air conditioning systems in buildings. Subjects covered by TC 156 are:

— energy performance calculation for ventilation, air conditioning and cooling systems;

— inspection of ventilation and air conditioning systems; and

— installation and commissioning of ventilation and air conditioning systems.

This standard gives the method of how to apply and combine the calculation methods given in the different cooling related standards covering sub-system calculations, in order to get a consistent overall calculation of an envisaged cooling system. It also contains information on how to express the energy performance of cooling systems as technical system related energy performance indicators.

This standard replaces EN 15243:2007 [1], which was developed during the first EPBD mandate and was published in 2007. However, due to the revision of the whole EBPD related standards, the majority of the content of EN 15243 are covered elsewhere, or the calculation methods presented cover issues that are now described in more detail in other EPBD standards. Specifically, the following parts are covered in other standards:

— Clause 5: CEN/TR 16798-10;

— Clauses 6 to 8: prEN ISO 52016-1;

— Clause 9: prEN ISO/TR 52016-2;

— Clause 10 and 11: prEN ISO 52016-1;

— Clause 12: prEN ISO/TR 52016-2; and

— Clause 13: prEN ISO 52016-1.

This European Standard specifically replaces EN 15243:2007, Clause 14.

1 Scope

This European Standard covers the energy performance calculation of complete cooling systems. It gives a calculation method that defines how to collect the cooling energy requirements from the thermal zones and from the air handling units connected to a distribution system, and how to aggregate multiple distribution systems to an overall system energy requirement. It incorporates the calculation of the emission and distribution losses and auxiliary energy. The required cooling energy to be extracted by the cooling generation system is calculated, and the cooling energy storage is considered. It gives a method on how to dispatch the cooling energy provided by the cooling generation to different distribution systems, and possible priorities are considered.

This European Standard defines energy performance indicators for cooling systems.

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

NOTE 1 In prCEN 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 might cover more than one module and one module might 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 (in casu M4–1, M4–4, M4–9) within the EPB set of 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		EN 16798–9							
2	Common terms and definitions; symbols, units and subscripts	Building Energy Needs	Needs									
3	Applications	(Free) Indoor Conditions without Systems	Maximum Load and Power									
4	Ways to Express Energy Performance	Ways to Express Energy Performance	Ways to Express Energy Performance		EN 16798-9							
5	Building categories and Building Boundaries	Heat Transfer by Transmission	Emission and control									
6	Building Occupancy and Operating Conditions	Heat Transfer by Infiltration and Ventilation	Distribution and control									
7	Aggregation of Energy Services and Energy Carriers	Internal Heat Gains	Storage and control									
8	Building zoning	Solar Heat Gains	Generation and control									
9	Calculated Energy Performance	Building Dynamics (thermal mass)	Load dispatching and operating conditions		EN 16798–9							

	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
10	Measured Energy Performance	Measured Energy Performance	Measured Energy Performance									
11	Inspection	Inspection	Inspection									
12	Ways to Express Indoor Comfort		BMS									
13	External Environment Conditions											
14	Economic Calculation											

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 12792:2003, *Ventilation for buildings - Symbols, terminology and graphical symbols*

prEN ISO 52000-1:2016, *Energy performance of buildings — Overarching EPB assessment — Part 1: General framework and procedures*

EN ISO 7345:1995, *Thermal insulation - Physical quantities and definitions (ISO 7345:1987)*