SLOVENSKI STANDARD
SIST-TP CEN/TR 16798-8:2018

01-julij-2018

Energijske lastnosti stavb - Prezračevanje stavb - 8. del: Razlaga in utemeljitev EN 16798-7 - Metode za izračun in določanje količine zraka v stavbah, vključno z infiltracijo - Modul M5-5

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)

Energieeffizienz von Gebäuden - Lüftung von Gebäuden - Teil 8: Interpretation der Anforderungen der EN 16798-7 - Berechnungsmethoden zur Bestimmung der Luftvolumenströme in Gebäuden einschließlich Infiltration (Modul M5-5)

Performance énergétique des bâtiments - Ventilation des bâtiments - Partie 8 : Interprétation des exigences de l’EN 16798-7 - Méthodes de calcul pour la détermination des débits d'air dans les bâtiments y compris les infiltrations (Module M5-5)

Ta slovenski standard je istoveten z: **CEN/TR 16798-8:2017**

ICS:

91.140.30	Prezračevalni in klimatski sistemi	Ventilation and air-conditioning systems

SIST-TP CEN/TR 16798-8:2018 **en**

TECHNICAL REPORT

RAPPORT TECHNIQUE

TECHNISCHER BERICHT

CEN/TR 16798-8

June 2017

ICS 91.120.10; 91.140.30

English Version

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)

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This Technical Report was approved by CEN on 27 February 2017. It has been drawn up by the Technical Committee CEN/TC 156.

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Ref. No. CEN/TR 16798-8:2017 E

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European foreword

This document (CEN/TR 16798-8:2017) has been prepared by Technical Committee CEN/TC 156 "Ventilation for buildings", the secretariat of which is held by BSI.

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

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

This document 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".

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 – 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)

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 M5-6.2, M5-8.2) – 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 (Module 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 – (Module 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
EN 15243	EN 16798-13	Energy performance of buildings – Ventilation for buildings – Part 13: Calculation of cooling systems (Module M4-8) – Generation
EN 15243	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 M4-7) – 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)

Introduction

The set of EPB standards, Technical Reports and supporting tools

In order to facilitate the necessary overall consistency and coherence, in terminology, approach, input/output relations and formats, for the whole set of EPB-standards, the following documents and tools are available:

a) a document with basic principles to be followed in drafting EPB-standards: CEN/TS 16628, *Energy Performance of Buildings — Basic Principles for the set of EPB standards* [1];

b) a document with detailed technical rules to be followed in drafting EPB-standards; CEN/TS 16629, *Energy Performance of Buildings — Detailed Technical Rules for the set of EPB-standards* [2]; and

c) the detailed technical rules are the basis for the following tools:

   1) a common template for each EPB standard, including specific drafting instructions for the relevant clauses,

   2) a common template for each Technical Report that accompanies an EPB standard or a cluster of EPB standards, including specific drafting instructions for the relevant clauses, and

   3) a common template for the spreadsheet that accompanies each EPB standard, to demonstrate the correctness of the EPB calculation procedures.

Each EPB standard follows the basic principles and the detailed technical rules and relates to the overarching EPB-standard, EN ISO 52000-1 [3].

One of the main purposes of the revision of the EPB-standards is to enable that laws and regulations directly refer to the EPB-standards and make compliance with them compulsory. This requires that the set of EPB-standards consists of a systematic, clear, comprehensive and unambiguous set of energy performance procedures. The number of options provided is kept as low as possible, taking into account national and regional differences in climate, culture and building tradition, policy and legal frameworks (subsidiarity principle). For each option, an informative default option is provided (Annex B).

Rationale behind the EPB technical reports

There is a risk that the purpose and limitations of the EPB standards will be misunderstood, unless the background and context to their contents – and the thinking behind them – is explained in some detail to readers of the standards. Consequently, various types of informative contents are recorded and made available for users to properly understand, apply and nationally or regionally implement the EPB standards.

If this explanation would have been attempted in the standards themselves, the result is likely to be confusing and cumbersome, especially if the standards are implemented or referenced in national or regional building codes.

Therefore, each EPB standard is accompanied by an informative Technical Report, like this one, where all informative content is collected, to ensure a clear separation between normative and informative contents (see CEN/TS 16629 [2]):

— to avoid flooding and confusing the actual normative part with informative content;

— to reduce the page count of the actual standard; and

— to facilitate understanding of the set of EPB standards.

This was also one of the main recommendations from the European CENSE project [5] that laid the foundation for the preparation of the set of EPB standards.

This Technical Report

This Technical Report accompanies the suite of EPB standards on thermal transmission properties of building elements. It relates to the international standard EN 16798-7, which forms part of a set of standards related to the evaluation of the energy performance of buildings (EPB).

The role and the positioning of the accompanied standard in the set of EPB standards is defined in the Introduction to the standard.

Accompanying spreadsheet(s)

Concerning the accompanied standard EN 16798-7, the following spreadsheets were produced:

— on EN 16798-7.

In this Technical Report, examples of each of these calculation sheets are included.

1 Scope

This Technical Report refers to the standard EN 16798-7.

It contains information to support the correct understanding and use of this standard.

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.

NOTE More information on the use of EPB module numbers for normative references between EPB standards is given in CEN ISO/TR 52000-2.

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 16798-5-2, *Energy performance of buildings — Ventilation for buildings — Part 5-2: 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 2: Distribution and generation*

EN 16798-7:2017, *Energy performance of buildings — Ventilation for buildings — Part 7: Calculation methods for the determination of air flow rates in buildings including infiltration (Module M5-5)*

EN ISO 15927-1:2003, *Hygrothermal performance of buildings — Calculation and presentation of climatic data — Part 1: Monthly means of single meteorological elements (ISO 15927-1:2003)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 16798-7 apply.

NOTE More information on some key EPB terms and definitions is given in CEN ISO/TR 52000-2.

4 Symbols, subscripts and abbreviations

4.1 Symbols

For the purposes of this document, the symbols given in the accompanied EPB standard, EN 16798-7, apply.

More information on key EPB symbols is given in CEN ISO/TR 52000-2.

Additional symbols are given in Table 1.

Table 1 — Symbols and units

Symbol	Quantity	Unit
b_B	width of the building	m
b_{obst}	width of the nearest obstacle	m
$C_{p;end;l}$	wind pressure coefficient of the last flow element of the loop l	—
$C_{p;start;l}$	wind pressure coefficient of the first flow element of the loop l	—
C_{rgh}	roughness coefficient	—
d_{obst}	distance between the nearest obstacle and the building	m
h_B	height of the building	m
$h_{loop\_n,i}$	height of loop node	m
h_{obst}	height of the nearest obstacle (upstream)	m
K_R	terrain factor	—
$N_{loop\_e;l}$	number of flow elements in loop l	—
$N_{loop\_n;l}$	number of nodes in loop l	—
u_{ref}	wind speed at the reference regional location	m/s
z	height at which wind velocity is estimated	m
z_0	roughness height	m
z_{min}	minimum height	m
Δp_{loop_e}	pressure drop through a flow element of the loop	Pa
$\rho_{a;i,i+1}$	air density between pressure node i and pressure note i+1	kg/m³

4.2 Subscripts

For the purposes of this document, the subscripts given in the accompanied EPB standard, EN 16798-7, apply.

More information on key EPB subscripts is given in CEN ISO/TR 52000-2.

Additional subscripts are given in Table 2.

Table 2 —Subscripts

Subscript	Term	Subscript	Term	Subscript	Term
B	Building	loop_n	node of a loop	Pint	At intermediate load
loop_e	element of a loop	obst	obstacle		

4.3 Abbreviations

For the purposes of this document, the abbreviations given in the accompanied EPB standards, EN 16798-5-1 and EN 16798-5-2, apply.

More information on key EPB abbreviations is given in CEN ISO/TR 52000-2.

5 Brief description of the methods

5.1 Output of the method

5.1.1 General

The outputs can be used as the basis for calculations related to the following issues:

— energy use;

— indoor air quality; and

— summer comfort using ventilative cooling.

5.1.2 Energy use outputs

Regarding energy use, EN 16798-7:2017, Table 4 gives the intended destination of the outputs in an overall building energy calculation.

5.1.3 Indoor air quality outputs

Regarding indoor air quality, the calculation method can be adapted depending on the parameters of interest for the user, which may depend on national context. These parameters may include one of the following items:

— overall air change for a given zone;

— fresh air for habitable rooms;

— exhaust air for service rooms;

— transfer air for circulation; and

— threshold limit for pollutant(s) (in this case, the source(s) should be specified).

5.1.4 Summer comfort using ventilative cooling

The ventilation can be used for cooling purposes by increasing the fresh flow rates (compared to hygienic values) when outdoor temperature is lower than indoor temperature.

This can be done using the different kind of ventilation and airing systems.

For mechanical systems, it is important to also consider the fan energy as the results can be inefficient, especially for low indoor outdoor temperatures differences. Risks of overcooling should be also taken into account.

For manually operated windows, it will rely on the occupant behaviour for which some assumptions shall be made at national level. For night ventilation in residential building, outdoor noise should be taken into account.

For windows opening at night, hazards, e.g. security, rain, etc. should be considered.