
Energijske lastnosti stavb - Prezračevanje stavb - 6. del: Razlaga in utemeljitev EN 16798-5-1 in EN 16798-5-2 - Metode za izračun potrebne energije za sisteme prezračevanja in klimatizacije - Moduli M5-6, M5-8, M6-5, M6-8, M7-5, M7-8

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, M6-5, M6-8, M7-5, M7-8)

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Energieeffizienz von Gebäuden - Lüftung von Gebäuden - Teil 6: Interpretation der Anforderungen der EN 16798-5-1 und EN 16798-5-2 - Berechnungsmethoden für den Energiebedarf von Lüftungs- und Klimaanlage (Module M5-6, M5-8, M6-5, M6-8, M7-5, M7-8)

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Performance énergétique des bâtiments - Ventilation des bâtiments - Partie 6 :
Interprétation des exigences de l'EN 16798-5-1 et de l'EN 16798-5-2 - Méthodes de calcul des besoins énergétiques des systèmes de ventilation et de conditionnement d'air (Modules M5-6, M5-8, M6-5, M6-8, M7-5, M7-8)

Ta slovenski standard je istoveten z: CEN/TR 16798-6:2017

ICS:

91.140.30	Prezračevalni in klimatski sistemi	Ventilation and air-conditioning systems
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SIST-TP CEN/TR 16798-6:2018 **en**

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Performance énergétique des bâtiments - Ventilation
 des bâtiments - Partie 6 : Interprétation des exigences
 de l'EN 16798-5-1 et de l'EN 16798-5-2 - Méthodes de
 calcul des besoins énergétiques des systèmes de
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Energieeffizienz von Gebäuden - Lüftung von
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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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European foreword

This document (CEN/TR 16798-6:2017) 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.

The necessary editorial revisions were made to comply with the requirements for each EPB technical report.

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 EPBD".

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".

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EPBD EN Number	Recast EPBD EN Number	(standards.iteh.ai) Title
EN 15251	EN 16798-1	SIST-TP CEN/TR 16798-6:2018 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

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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)

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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 16628:2014, *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 16629:2014, *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 52000-1:2017 [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

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— 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 the calculation of the energy performance of ventilation systems. It relates to the European standards EN 16798-5-1 and EN 16798-5-2, which form 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 standards in the set of EPB standards is defined in the Introduction to the standards.

Accompanying spreadsheet(s)

Concerning the accompanied standards EN 16798-5-1 and EN 16798-5-2, the following spreadsheets were produced:

- on EN 16798-5-1; and
- on EN 16798-5-2.

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

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1 Scope

This Technical Report refers to standards EN 16798-5-1 and EN 16798-5-2.

It contains information to support the correct understanding and use of these standards.

This Technical Report does not contain any normative provision.

2 Normative references

Not applicable.

NOTE More information on the use of EPB module numbers for normative references between EPB standards is given in CEN ISO/TR 52000-2:2017.

3 Terms and definitions

For the purposes of this document, the terms and definitions as mentioned and given in the EN 16798-5-1 and EN 16798-5-2 apply.

More information on some key EPB terms and definitions is given in CEN ISO/TR 52000-2:2017.

4 Symbols, subscripts and abbreviations

4.1 Symbols

For the purposes of this document, the symbols as mentioned and given in EN 16798-5-1 and EN 16798-5-2 apply.

More information on key EPB symbols is given in CEN ISO/TR 52000-2:2017.

NOTE If new symbols are needed, indeed, please refer to the EPB standards template and Annex C of EN ISO 52000-1:2017 for detailed rules.

Additional symbols are given in Table 1.

Table 1 — Symbols and units

Symbol	Quantity	Unit
u	damper position	—
γ	concentration	various

4.2 Subscripts

For the purposes of this document, the subscripts as mentioned and given in EN 16798-5-1 and EN 16798-5-2 apply.

More information on key EPB subscripts is given in CEN ISO/TR 52000-2:2017.

NOTE If new subscripts are needed, indeed, please refer to the EPB standards template and Annex C of EN ISO 52000-1:2017 for detailed rules.

Additional subscripts are given in Table 2.

Table 2 — Subscripts

Subscript	Term
Bal	balanced
D	damper
F	fan
Fld	full load
Gas	going to the gas
R	resistance
SP	setpoint

4.3 Abbreviations

For the purposes of this document, the abbreviations as mentioned and given in EN 16798-5-1 and EN 16798-5-2 apply.

More information on key EPB abbreviations is given in CEN ISO/TR 52000-2:2017.

NOTE If new abbreviations are needed, indeed, please refer to the EPB standards template and Annex C of EN ISO 52000-1:2017 for detailed rules.

Additional abbreviations are given in Table 3.

Table 3 — Abbreviations

Abbreviation	Term
<i>C</i>	Central controller
<i>CR</i>	Zone based controller
<i>R</i>	Resistance
VOC	Volatile oxide components

5 Brief description of the methods and routing

5.1 Output of the methods

The accompanied EPB standards, EN 16798-5-1 and EN 16798-5-2, cover two different methods for the calculation of the energy performance of ventilation and/or air conditioning systems.

Because the scope and the applicability range of the two methods are different, it was decided to divide the description in two separate documents.

5.2 General description of the methods

5.2.1 Method 1

The method covers the calculation of:

- the volume flow rates provided to the ventilation zones served by the system, based on the required values;
- the supply air temperature and moisture content, based on the required values;
- the ventilation generation input (electric energy required by fans);

- the humidification generation input;
- heating (including humidification in case of reheat with adiabatic humidification) and cooling input to the air handling unit (to be transferred to the connected heating and cooling distribution systems calculation);
- the recoverable heat or cold losses from ventilation/air conditioning system for heating or cooling;
- the ventilation auxiliary energy (electric energy for drives of, e.g. rotary or pumped circuit heat recovery devices, control devices, actuators, etc.);
- the electric energy required for humidification (only for specific humidifier types); and
- the humidification auxiliary energy.

The time interval of the output can be:

- a) hourly, or
- b) bin,

according to the application of the standard and interval of the input.

5.2.2 Method 2

The method covers the calculation of:

- the volume flow rates provided to a single ventilation zone (no multi ventilation zones modelling) served by the system, based on the required values;
- the supply air temperature, based on the required values;
- the ventilation generation input (electric energy required by fans);
- heating and cooling input to the air handling unit (to be transferred to the connected heating and cooling distribution systems calculation);
- the recoverable heat or cold losses from ventilation/air conditioning system for heating or cooling; and
- the ventilation auxiliary energy (electric energy for drives, control devices, actuators, ...).

The time interval of the output can be:

- a) monthly,
- b) yearly, or
- c) bin,

according to the application of the standard and time interval of the input.

5.3 Selection criteria between the methods

The criteria for the selection are:

- the technologies covered by the methods; and
- the calculation interval.

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Method 1 is applicable for full air conditioning systems, including heating, cooling, humidification, dehumidification, covering different control options such as constant and variable air volume flow rates, different fan controls, different heat recovery types with different frost protection technologies, constant and variable recirculation air, and adiabatic cooling. It is mainly dedicated to larger customized air handling units and distribution networks. It can only be applied to hourly calculation intervals and – with the respective technique provided – with bins.

Method 2 is applicable for ventilation systems with heating and cooling, including heat recovery and recirculation. It does, however, not cover humidification and dehumidification. On the other hand, it covers the use of extract air heat as a source of heat for domestic hot water production and includes the heat generation by heat pumps. It is dedicated to packaged systems including heat generation and/or DHW production, as they are mainly used in residential buildings. But the application is by intention not restricted though the building use type. The method can be applied to monthly and yearly calculation intervals and bins.

5.4 Application and implementation of the methods**5.4.1 Method 1**

The method contains a lot of options, the choice of which needs to be made, in order to consider:

- different air treatment stages, which may or may not be present in the system to be represented (e.g. recirculation, heat recovery, heating, cooling, humidification, dehumidification, adiabatic cooling);
- different types of components for certain treatment stages (e.g. heat recovery types, humidifier types); and
- different control options.

In the implementation of the method in the accompanying spreadsheet [3], a "system configuration" sheet was added. It allows making the relevant choices, which influence the calculation procedure, as shown in Figure 1.

The layout of the choices refers to the scheme shown above, which originates from Figure 1 in EN 16798-5-1:2017.

Some choices of the presence of principal treatment stages are controlled by the presence of the respective energy supply at the data input interface (heating, cooling), or by the presence of the respective set points at the respective data input interface (humidification, dehumidification). This means, no special keywords and identifiers are present in the standard for the choice of these options.

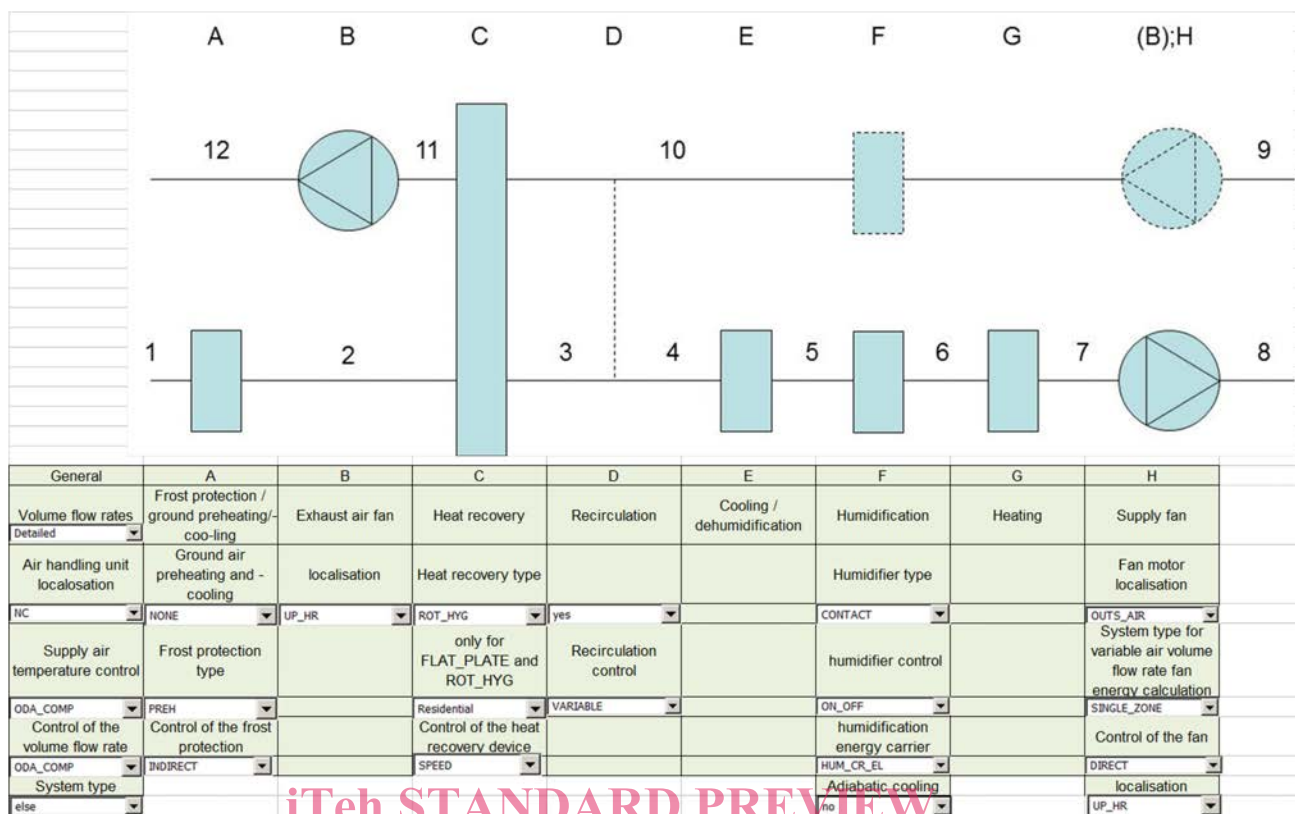


Figure 1 — System configuration table from the spreadsheet

5.4.2 Method 2

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The method contains a lot of options, the choice of which needs to be made in order to consider different air treatment stages, which may or may not be present in the system to be represented (e.g. recirculation, heat recovery, heating, cooling).

In the implementation of the method in the accompanying spreadsheet, all relevant choices, which influence the calculation procedure, have their input in the “Input_series” sheet and “Method_input” sheet.

6 Calculation method 1 (EN 16798-5-1)

6.1 Output data

No further explanations.

6.2 Calculation time interval and calculation period

The method described in Clause 6 is mainly suitable for an hourly calculation interval. For the application to bins, see 6.4.1.

6.3 Input data

6.3.1 Source of data

This method covers a large variety of technologies and design options. Accordingly, the amount of required input data and option choices is also large.