

Energy performance of buildings - Ventilation for buildings - Part 15: Calculation of cooling systems (Module M4-7) - Storage

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

See Eesti standard EVS-EN 16798-15:2017 sisaldab Euroopa standardi EN 16798-15:2017 ingliskeelset teksti.	This Estonian standard EVS-EN 16798-15:2017 consists of the English text of the European standard EN 16798-15:2017.
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ICS 91.120.10; 91.140.30

English Version

**Energy performance of buildings - Ventilation for buildings  
- Part 15: Calculation of cooling systems (Module M4-7) -  
Storage**

Performance énergétique des bâtiments - Ventilation  
des bâtiments - Partie 15 : Calcul des systèmes de  
refroidissement (Module M4-7) - Stockage

Energieeffizienz von Gebäuden - Teil 15: Modul M4-7 -  
Berechnungsmethoden für den Energiebedarf von  
Kälteanlagen - Speicherung

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

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**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

<b>Contents</b>	<b>Page</b>
<b>European foreword</b> .....	<b>4</b>
<b>Introduction</b> .....	<b>7</b>
<b>1 Scope</b> .....	<b>9</b>
<b>2 Normative references</b> .....	<b>11</b>
<b>3 Terms and definitions</b> .....	<b>11</b>
<b>4 Symbols and subscripts</b> .....	<b>11</b>
<b>4.1 Symbols</b> .....	<b>11</b>
<b>4.2 Subscripts</b> .....	<b>11</b>
<b>5 Brief description of the method</b> .....	<b>12</b>
<b>5.1 Output of the method</b> .....	<b>12</b>
<b>5.2 Extension of the method</b> .....	<b>12</b>
<b>5.3 Flowchart of the calculation procedure</b> .....	<b>12</b>
<b>5.4 Technologies covered by the standard</b> .....	<b>13</b>
<b>5.5 Description of cooling systems</b> .....	<b>13</b>
<b>6 Calculation method</b> .....	<b>13</b>
<b>6.1 Output data</b> .....	<b>13</b>
<b>6.2 Calculation time interval and calculation period</b> .....	<b>14</b>
<b>6.3 Calculation period</b> .....	<b>14</b>
<b>6.4 Input data</b> .....	<b>15</b>
<b>6.4.1 Source of data</b> .....	<b>15</b>
<b>6.4.2 Product data</b> .....	<b>15</b>
<b>6.4.3 System design data</b> .....	<b>16</b>
<b>6.4.4 Operating conditions</b> .....	<b>18</b>
<b>6.4.5 Constants and physical data</b> .....	<b>18</b>
<b>6.4.6 Input data from Annex A (Annex B)</b> .....	<b>19</b>
<b>6.5 Calculation procedure, hourly method</b> .....	<b>19</b>
<b>6.5.1 Applicable time intervals</b> .....	<b>19</b>
<b>6.5.2 Operating conditions calculation</b> .....	<b>19</b>
<b>6.5.3 Energy calculation</b> .....	<b>19</b>
<b>6.6 Calculation procedure, monthly method</b> .....	<b>26</b>
<b>6.6.1 Applicable time step</b> .....	<b>26</b>
<b>6.6.2 Operating conditions calculation</b> .....	<b>26</b>
<b>6.6.3 Energy calculation</b> .....	<b>26</b>
<b>6.6.4 Simplification of formulae for the energy delivered to the storage, monthly method</b> .....	<b>26</b>
<b>7 Quality control</b> .....	<b>28</b>
<b>8 Compliance check</b> .....	<b>28</b>
<b>Annex A (normative) Input and method selection data sheet — Template</b> .....	<b>29</b>
<b>A.1 General</b> .....	<b>29</b>
<b>A.2 References</b> .....	<b>30</b>
<b>A.3 Hourly, monthly and annual method</b> .....	<b>30</b>
<b>A.3.1 Storage type</b> .....	<b>30</b>
<b>A.3.2 Product storage technical data</b> .....	<b>30</b>

<b>A.3.3</b>	<b>System design data</b> .....	<b>31</b>
<b>A.3.3.1</b>	<b>Qualitative process design data choices</b> .....	<b>31</b>
<b>A.3.3.2</b>	<b>Quantitative process design data choices</b> .....	<b>31</b>
<b>A.3.3.3</b>	<b>Storage control options</b> .....	<b>31</b>
<b>A.4</b>	<b>Additional information for monthly method</b> .....	<b>31</b>
<b>Annex B (informative)</b>	<b>Input and method selection data sheet — Default choices</b> .....	<b>32</b>
<b>B.1</b>	<b>General</b> .....	<b>32</b>
<b>B.2</b>	<b>References</b> .....	<b>33</b>
<b>B.3</b>	<b>Hourly, bin, monthly and annual method</b> .....	<b>33</b>
<b>B.3.1</b>	<b>Storage type</b> .....	<b>33</b>
<b>B.3.2</b>	<b>Product storage technical data</b> .....	<b>33</b>
<b>B.3.3</b>	<b>System design data</b> .....	<b>34</b>
<b>B.3.3.1</b>	<b>Qualitative process design data choices</b> .....	<b>34</b>
<b>B.3.3.2</b>	<b>Quantitative process design data choices</b> .....	<b>34</b>
<b>B.3.3.3</b>	<b>Process control options</b> .....	<b>35</b>
<b>B.4</b>	<b>Additional information for monthly and annual method</b> .....	<b>35</b>
	<b>Bibliography</b> .....	<b>36</b>

## European foreword

This document (EN 16798-15:2017) 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 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 [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 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”.

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)

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)

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 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. 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 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 16798-16 [4]).

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

- energy performance calculation for ventilation, air conditioning and cooling systems;
- inspection of ventilation and air conditioning systems;
- installation and commissioning of ventilation and air conditioning systems.

This standard gives the methods applicable to calculate the energy performance of the cooling storage systems.

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## 1 Scope

This European Standard specifies a calculation method for the energy performance of storage systems used for ventilation systems. It takes into account the energy performance of storage systems using water from phase change material (PCM) to store cooling energy. This standard presents a general method applicable to the different technologies of water-based storage systems or PCM related controls systems. It does not cover the cooling emission, distribution and generation that are covered by EN 15316-2, EN 15316-3 and EN 16798-13 respectively.

The standard covers typically hourly time steps but can be adapted to different time steps accordingly with the scenarios used for energy use and energy delivered or to bin method.

A simplified method is provided for monthly or annual time step.

This standard does not cover:

- the cooling emission, distribution and generation systems; or
- sizing or inspection of such storage systems.

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 52000-1:2017.

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 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 M4–7) 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, ..
sub 1	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								a	
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									
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		EN 16798-15							
8	Building zoning	Solar Heat Gains	Generation and control									
9	Calculated Energy Performance	Building Dynamics (thermal mass)	Load dispatching and operating conditions									
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											

<sup>a</sup> 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 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 52000-1:2017 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).

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

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 52000-1:2017 and the following apply.

NOTE The terms of EN ISO 52000-1:2017 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 52000-1:2017, CEN/TS 16628 and CEN/TS 16629

### 3.2

#### Phase Change Material

##### PCM

substance capable of storing and releasing thermal energy in the form of latent heat (enthalpy) over a specific temperature range during which the material changes phase (from solid to liquid, or from liquid to solid), thus buffering external temperature changes

## 4 Symbols and subscripts

### 4.1 Symbols

For the purposes of this document, the symbols given in Clause 4 and Annex C of EN ISO 52000-1:2017 apply.

### 4.2 Subscripts

For the purposes of this document, the subscripts given in Clause 4 and Annex C of EN ISO 52000-1:2017, EN 12792, and the specific subscripts listed in Table 2 apply.

**Table 2 —Subscripts**

Subscript	Term
Sld	Solid
Stb	Standby
lqd	Liquid
tot	total
med	Medium