



BSI Standards Publication

Energy performance of buildings

Part 13: Module M4-8 - Calculation of cooling systems - Generation

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National foreword

This British Standard is the UK implementation of EN 16798-13:2017. Together with BS EN 16798-9:2017 and PD CEN/TR 16798-14:2017, it supersedes BS EN 15243:2007, which is withdrawn.

BSI, as a member of CEN, is obliged to publish EN 16798-13:2017 as a British Standard. However, attention is drawn to the fact that during the development of this European Standard, the UK committee voted against its approval as a European Standard.

The technical reasoning behind the UK committee's response relates to:

- a) The apparent imposition of specific requirements on National authorities
- b) The lack of guidance in EN 16798-13:2017 on accuracy and justification for the use of Methods 1 and 2 relative to existing simpler alternatives.

Users may wish to consider these issues when specifying products.

The UK participation in its preparation was entrusted to Technical Committee RHE/2, Ventilation for buildings, heating and hot water services.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Compliance with a British Standard cannot confer immunity from legal obligations.

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Energy performance of buildings - Part 13: Module M4-8 - Calculation of cooling systems - Generation

Performance énergétique des bâtiments - Partie 13:
Module M4-8 - Calcul des systèmes de refroidissement
- Génération

Energieeffizienz von Gebäuden - Teil 13: M4-8 Modul -
Berechnung der Kühlsysteme - Erzeugung

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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| Contents | | Page |
|------------------------|--|------|
| European foreword..... | | 4 |
| Introduction | | 7 |
| 1 | Scope | 9 |
| 2 | Normative references | 11 |
| 3 | Terms and definitions | 11 |
| 4 | Symbols and subscripts | 11 |
| 4.1 | Symbols..... | 11 |
| 4.2 | Subscripts..... | 12 |
| 5 | Brief description of the methods..... | 12 |
| 5.1 | Output of the method..... | 12 |
| 5.2 | General description of the methods | 14 |
| 5.3 | Selection criteria between the methods | 14 |
| 6 | Calculation method, method 1..... | 14 |
| 6.1 | Output data..... | 14 |
| 6.2 | Calculation intervals | 16 |
| 6.3 | Input data..... | 16 |
| 6.3.1 | Source of data, general..... | 16 |
| 6.3.2 | Product data..... | 16 |
| 6.3.3 | Configuration and system design data | 20 |
| 6.3.4 | Operating conditions | 21 |
| 6.3.5 | Constants and physical data..... | 22 |
| 6.3.6 | Input data from Annex A (Annex B) | 22 |
| 6.4 | Calculation procedure, method 1 | 22 |
| 6.4.1 | Applicable time intervals | 22 |
| 6.4.2 | Operating conditions calculation | 22 |
| 6.4.3 | Calculation..... | 27 |
| 7 | Calculation method, method 2..... | 30 |
| 7.1 | Output data..... | 30 |
| 7.2 | Calculation intervals | 31 |
| 7.3 | Input data..... | 32 |
| 7.3.1 | Product data..... | 32 |
| 7.3.2 | System design data | 35 |
| 7.3.3 | Operating conditions | 36 |
| 7.4 | Calculation procedure, method 2 | 36 |
| 7.4.1 | Applicable time interval | 36 |
| 7.4.2 | Operating conditions calculation | 36 |
| 7.4.3 | Calculation..... | 42 |
| 8 | Quality control | 44 |
| 9 | Compliance check..... | 44 |

This is a preview of "BS EN 16798-13:2017". [Click here to purchase the full version from the ANSI store.](#)

| | |
|--|-----------|
| Annex A (normative) Input and method selection data sheet — Template | 45 |
| A.1 General | 45 |
| A.2 References..... | 46 |
| A.3 Input data method 1 | 46 |
| A.3.1 Product description data | 46 |
| A.3.2 Product technical data tables..... | 46 |
| A.3.3 System design data..... | 47 |
| A.4 Input data method 2 | 48 |
| A.4.1 Product description data | 48 |
| A.4.2 Product technical data..... | 48 |
| A.4.3 System design data..... | 48 |
| Annex B (informative) Input and method selection data sheet — Default choices | 55 |
| B.1 General | 55 |
| B.2 References..... | 56 |
| B.3 Input data method 1 | 56 |
| B.3.1 Product description data | 56 |
| B.3.2 Product technical data tables..... | 56 |
| B.3.3 System design data..... | 57 |
| B.4 Input data method 2 | 58 |
| B.4.1 Product description data | 58 |
| B.4.2 Product technical data..... | 58 |
| B.4.3 System design data..... | 59 |
| Bibliography | 67 |

This is a preview of "BS EN 16798-13:2017". [Click here to purchase the full version from the ANSI store.](#)

European foreword

This document (EN 16798-13:2017) 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, together with parts 9 and 11 of the series, supersedes EN 15243:2007, which 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.

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) |

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| 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 |

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| 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.

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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 “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 and 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 16798-14 [2], under preparation).

EPB standards deal with energy performance calculation and other related aspects (like system sizing) to provide the building services considered in the EPBD.

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

- cooling load calculation;
- 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 specifies a method to calculate the cooling generation of compression, absorption and other types of refrigeration systems. This standard extends EN 15243:2007, which was developed during the first EPBD mandate.

The extension for inclusion in the second mandate package was performed by CEN/TC 156 WG 21.

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1 Scope

This European Standard covers the calculation of the operational parameters and the energy consumption of cooling generation systems. The cooling generation consists of:

- cooling generators like compression and absorption chillers;
- other (generic) generator types such as ground or surface water or direct use of ground heat from boreholes; and
- different types of heat rejection (dry, wet, hybrid with outdoor air, other sink types).

The methods cover:

- the possibility of heat recovery of heat to be rejected for the use of heating and/or domestic hot water production, through the use of an interface to the M3-1 standard; and
- a multi generator calculation.

The document does not cover the cooling emission, distribution and storage systems, which are covered by the Module M4-5, M4-6 and M4-7 standards, respectively. It is directly connected to the general part of the cooling systems, the M4-1 standard.

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.