



BSI Standards Publication

## Energy performance of buildings – Method for calculation of system energy requirements and system efficiencies

---

Part 6-3: Explanation and justification of 15316-3, Module M3-6, M4-6, M8-6

## National foreword

This Published Document is the UK implementation of CEN/TR 15316-6-3:2017.

The UK participation in its preparation was entrusted to Technical Committee RHE/24, Central heating installations.

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.

© The British Standards Institution 2017  
Published by BSI Standards Limited 2017

ISBN 978 0 580 95254 8

ICS 91.120.10; 91.140.65; 91.140.10; 91.140.30

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

This Published Document was published under the authority of the Standards Policy and Strategy Committee on 31 August 2017.

### Amendments/corrigenda issued since publication

Date	Text affected
------	---------------

---

TECHNICAL REPORT

**CEN/TR 15316-6-3**

RAPPORT TECHNIQUE

TECHNISCHER BERICHT

April 2017

ICS 91.120.10; 91.140.10; 91.140.30; 91.140.65

English Version

**Energy performance of buildings - Method for calculation  
of system energy requirements and system efficiencies  
Part 6-3: Explanation and justification of 15316-3, Module  
M3-6, M4-6, M8-6**

Performance énergétique des bâtiments - Méthode de  
calcul des besoins énergétiques et des rendements des  
systèmes - Partie 6-2 : Explication et justification de  
l'EN 15316-2, Module M3-5, M4-5

Heizungsanlagen und Wasserbasierte Kühlanlagen in  
Gebäuden - Verfahren zur Berechnung der  
Energieanforderungen und Nutzungsgrade der  
Anlagen - Teil 6-3: Begleitende TR zur EN 15316-3  
(Wärmeverteilungssysteme für die Raumheizung  
(Trinkwasser, Heizen und Kühlen))

This Technical Report was approved by CEN on 27 February 2017. It has been drawn up by the Technical Committee CEN/TC 228.

CEN members are the national standards bodies of 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 United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

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

**Contents**

Page

European foreword.....	4
Introduction .....	5
1 Scope .....	6
2 Normative references.....	6
3 Terms and definitions .....	6
4 Symbols and abbreviations .....	6
4.1 Symbols.....	6
4.2 Subscripts.....	7
5 Information on the methods .....	7
6 Method description .....	8
6.1 Thermal loss calculation and auxiliary energy in distribution systems .....	8
6.1.1 Basic principles.....	8
6.1.2 Ribbon heater in DHW distribution systems .....	12
6.1.3 Auxiliary energy calculation .....	12
6.1.4 Recoverable and recovered auxiliary energy.....	16
6.1.5 Calculation of linear thermal resistance .....	17
6.1.6 Time steps.....	18
6.1.7 Assumptions.....	18
6.1.8 Data input .....	18
6.1.9 Simplified input .....	18
7 Input correlations to the length of pipes in zones (buildings) .....	19
7.1 Introduction .....	19
7.2 Network for space heating and space cooling systems .....	19
7.2.1 Sections.....	19
7.2.2 Input data to the correlation .....	20
7.2.3 Correlations.....	20
7.2.4 Boundary conditions.....	21
7.3 Network for domestic hot water systems.....	21
7.3.1 Sections.....	21
7.3.2 Input data to the correlation.....	22
7.3.3 Correlations.....	22
7.3.4 Boundary conditions.....	23
8 Input correlations to linear thermal transmittance of pipes in zones (buildings) .....	23
8.1 Introduction.....	23
8.2 Network for space heating, space cooling and domestic hot water systems.....	24
8.2.1 Sections.....	24
8.2.2 Correlations.....	24
9 Input correlations to constants for distribution pumps.....	25
9.1 Introduction .....	25
9.2 Constants for the calculation of the expenditure energy factor of distribution pumps.....	25
10 Input correlations to additional resistances and resistance ratio .....	26
10.1 Introduction .....	26
10.2 Network for space heating, space cooling and domestic hot water systems.....	26

10.2.1	Correlations for pressure loss per length.....	26
10.2.2	Correlations for resistance ratio.....	26
10.2.3	Correlations additional resistances.....	27
10.2.4	Input correlations factor for recoverable auxiliary energy.....	27
11	Worked out examples - Calculation details.....	27
12	Application range .....	27
12.1	Energy performance.....	27
12.1.1	Thermal expenditure energy factor.....	27
12.1.2	Primary energy related expenditure energy factor.....	28
12.2	Energy certificate.....	28
12.3	Inspection.....	28
12.4	Building or system complexity .....	28
13	Regulation use .....	28
14	Quality issues .....	28
Annex A	(informative) Calculation example.....	29
Annex B	(informative) Data catalogue example.....	39
Bibliography	.....	40

## European foreword

This document (CEN/TR 15316-6-3:2017) has been prepared by Technical Committee CEN/TC 228 “Heating systems and water based cooling systems in buildings”, the secretariat of which is held by DIN.

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

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.

Currently in preview, click buy full vers.

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

Each EPB-standards 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.

## 1 Scope

This Technical Report refers to standard EN 15316-3, modules Space Distribution Systems Module M3-6 heating / M4-6 cooling / M8-6 domestic hot water

It contains information to support the correct understanding, use and national adaptation of standard EN 15316-3.

## 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 15316-3, *Energy performance of buildings - Method for calculation of system energy requirements and system efficiencies - Part 3: Space distribution systems (DHW, heating and cooling), Modules M3-6, M4-6, M8-6*

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

EN ISO 52000-1:2017, *Energy performance of buildings - Overarching EPB assessment - Part 1: General framework and procedures (ISO 52000-1:2017)*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 7345:1995, EN ISO 52000-1:2017 and the following apply.

### 3.1

#### tapping profile

depending on the definition in M8-3

### 3.2

#### setback

operation Mode for pumps at the end of scheduled usage time

### 3.3

#### boost

operation Mode for pumps before the begin of scheduled usage time

## 4 Symbols and abbreviations

### 4.1 Symbols

For the purposes of this Technical Report, the symbols given in EN ISO 52000-1:2017, in EN 15316-3 (the accompanying EPB standard) and the specific symbols listed in Table 1 apply.

**Table 1 — Specific symbols and units**

Symbol	Name of quantity	Unit
$n_{\text{Tap}}$	Tapping profile	1/h