

**SLOVENSKI STANDARD**  
**SIST-TP CEN ISO/TR 52019-2:2017**  
**01-september-2017**

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**Energetska učinkovitost stavb - Higrotermalno obnašanje sestavnih delov stavb in elementov stavb - 2. del: Obrazložitev in utemeljitev (ISO/TR 52019-2:2017)**

Energy performance of buildings - Hygrothermal performance of building components and building elements - Part 2: Explanation and justification (ISO/TR 52019-2:2017)

**iTeh STANDARD PREVIEW**

Performance énergétique des bâtiments - Performances hygrothermiques des composants et parois de bâtiments - Partie 2: Explication et justification (ISO/TR 52019-2:2017)

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**Ta slovenski standard je istoveten z: CEN ISO/TR 52019-2:2017**

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**ICS:**

27.015	Energijska učinkovitost. Ohranjanje energije na splošno	Energy efficiency. Energy conservation in general
91.120.10	Toplotna izolacija stavb	Thermal insulation of buildings

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TECHNICAL REPORT

CEN ISO/TR 52019-2

RAPPORT TECHNIQUE

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July 2017

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English Version

Energy performance of buildings - Hygrothermal  
performance of building components and building  
elements - Part 2: Explanation and justification (ISO/TR  
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Performance énergétique des bâtiments -  
Performances hygrothermiques des composants et  
parois de bâtiments - Partie 2: Explication et  
justification (ISO/TR 52019-2:2017)

This Technical Report was approved by CEN on 24 February 2017. It has been drawn up by the Technical Committee CEN/TC 89.

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

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## European foreword

This document (CEN ISO/TR 52019-2:2017) has been prepared by Technical Committee ISO/TC 163 "Thermal performance and energy use in the built environment" in collaboration with Technical Committee CEN/TC 89 "Thermal performance of buildings and building components" the secretariat of which is held by SIS.

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.

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

This document is part of the set of standards and accompanying technical reports on the energy performance of buildings and has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association (Mandate M/480, see reference [EF3] below).

Directive 2010/31/EU recasting the Directive 2002/91/EC on energy performance of buildings (EPBD, [EF4]) promotes the improvement of the energy performance of buildings within the European Union, taking into account all types of energy uses (heating, lighting, cooling, air conditioning, ventilation) and outdoor climatic and local conditions, as well as indoor climate requirements and cost effectiveness (Article 1).

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The directive requires Member States to adopt measures and tools to achieve the prudent and rational use of energy resources. In order to achieve those goals, the EPBD requires increasing energy efficiency and the enhanced use of renewable energies in both new and existing buildings. One tool for this is the application by Member States of minimum requirements on the energy performance of new buildings and for existing buildings that are subject to major renovation, as well as for minimum performance requirements for the building envelope if energy-relevant parts are replaced or retrofitted. Other tools are energy certification of buildings, inspection of boilers and air-conditioning systems.

The use of European standards increases the accessibility, transparency and objectivity of the energy performance assessment in the Member States facilitating the comparison of best practices and supporting the internal market for construction products. The use of EPB standards for calculating energy performance, as well as for energy performance certification and the inspection of heating systems and boilers, ventilation and air-conditioning systems will reduce costs compared to developing different standards at national level.

The first mandate to CEN to develop a set of CEN EPBD standards (M/343, [EF1]), to support the first edition of the EPBD ([EF2]) resulted in the successful publication of all EPBD related CEN standards in 2007-2008.

Mandate M/480 was issued to review the mandate M/343 as the recast of the EPBD raised the need to revisit the standards and reformulate and add standards so that they become on the one hand unambiguous and compatible, and on the other hand a clear and explicit overview of the choices, boundary conditions and input data that need to be defined at national or regional level. Such national or regional choices remain necessary, due to differences in climate, culture and building tradition, policy and legal frameworks. Consequently, the set of CEN EPBD standards published in 2007-2008 had to be improved and expanded on the basis of the recast of the EPBD.

The EPB standards are flexible enough to allow for necessary national and regional differentiation and facilitate Member States implementation and the setting of requirements by the Member States.

**CEN ISO/TR 52019-2:2017 (E)**

Further target groups are users of the voluntary common European Union certification scheme for the energy performance of non-residential buildings (EPBD article 11.9) and any other regional (e.g. pan European) parties wanting to motivate their assumptions by classifying the building energy performance for a dedicated building stock.

**References:**

[EF1] EPBD, Directive 2002/91/EC of the European Parliament and of the Council of 16 December 2002 on the energy performance of buildings

[EF2] EPBD Mandate M/343, Mandate to CEN, CENELEC and ETSI for the elaboration and adoption of standards for a methodology calculating the integrated energy performance of buildings and estimating the environmental impact, in accordance with the terms set forth in Directive 2002/91/EC , 30 January 2004

[EF3] Mandate M/480, Mandate to CEN, CENELEC and ETSI for the elaboration and adoption of standards for a methodology calculating the integrated energy performance of buildings and promoting the energy efficiency of buildings, in accordance with the terms set in the recast of the Directive on the energy performance of buildings (2010/31/EU), 14 December 2010

[EF4] EPBD, Recast of the Directive on the energy performance of buildings (2010/31/EU). 14 December 2010

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The text of ISO/TR 52019-2:2017 has been approved by CEN as CEN ISO/TR 52019-2:2017 without any modification.

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# TECHNICAL REPORT

# ISO/TR 52019-2

First edition  
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## Energy performance of buildings — Hygrothermal performance of building components and building elements —

### Part 2: Explanation and justification

*Performance énergétique des bâtiments — Performances  
hygrothermiques des composants et parois de bâtiments —*

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## ISO/TR 52019-2:2017(E)

### Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html). ([standards.iteh.ai](http://standards.iteh.ai))

ISO/TR 52019-2 was prepared by ISO Technical Committee ISO/TC 163, *Thermal performance and energy use in the built environment*, Subcommittee SC 2, *Calculation methods*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 89, *Thermal performance of buildings and building components*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

A list of all parts in the ISO 52019 series can be found on the ISO website.

## 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*<sup>[8]</sup>;
- 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*<sup>[9]</sup>.

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, ISO 52000-1<sup>[5]</sup>.

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<sup>[9]</sup>):

- 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<sup>[5]</sup> that laid the foundation for the preparation of the set of EPB standards.

## ISO/TR 52019-2:2017(E)

### This document

This technical report accompanies the suite of EPB standards on thermal transmission properties of building elements. It relates to ISO 6946, ISO 10211, ISO 13370, ISO 13786, ISO 13789 and ISO 14683, 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 introductions to ISO 6946, ISO 10211, ISO 13370, ISO 13786 and ISO 14683.

### Accompanying spreadsheets

Concerning ISO 6946, ISO 10211, ISO 13370, ISO 13786 and ISO 14683, spreadsheets were produced for:

- ISO 6946;
- ISO 13370;
- ISO 13789.

These spreadsheets are available at [www.epb.center](http://www.epb.center).

In this document, examples of each of these calculation sheets are included in [Annex M](#).

No accompanying calculation spreadsheets were prepared on:

- ISO 10211: this document does not provide a calculation procedure; it provides test cases and performance criteria for calculation procedures.
- ISO 13786: this document provides complex matrix calculation procedures. Instead of a spreadsheet, [Annex I](#) contains examples of calculation results obtained by a computer program.
- ISO 14683: this document does not provide a calculation procedure; it provides choices between procedures provided elsewhere and default tabulated values. Instead, [Annex L](#) contains examples of the use of default values.

The first series of standards on thermal and hygrothermal properties of building components and elements were prepared by ISO Technical Committee TC 163 in the 1980s, as a result of growing global concern on future fuel shortages and inadequate health and comfort levels in buildings. During the following decades these first standards were revised and new standards were added, to cope with new developments and additional needs. From the 1990s on, these standards were developed in close collaboration with CEN.

# Energy performance of buildings — Hygrothermal performance of building components and building elements —

## Part 2: Explanation and justification

### 1 Scope

This document contains information to support the correct understanding and use of ISO 6946, ISO 10211, ISO 13370, ISO 13786, ISO 13789 and ISO 14683.

This document does not contain any normative provision.

### 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 6946:2017, *Building components and building elements — Thermal resistance and thermal transmittance — Calculation methods*

ISO 7345, *Thermal insulation — Physical quantities and definitions*

ISO 10211, *Thermal bridges in building construction — Heat flows and surface temperatures — Detailed calculations*

ISO 13370:2017, *Thermal performance of buildings — Heat transfer via the ground — Calculation methods*

ISO 13786, *Thermal performance of building components — Dynamic thermal characteristics — Calculation methods*

ISO 13789, *Thermal performance of buildings — Transmission and ventilation heat transfer coefficients — Calculation method*

ISO 14683, *Thermal bridges in building construction — Linear thermal transmittance — Simplified methods and default values*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 6946, ISO 7345, ISO 10211, ISO 13370, ISO 13786, ISO 13789 and ISO 14683 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

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### 4 Symbols and subscripts

For the purposes of this document, the symbols and subscripts given in ISO 6946, ISO 7345, ISO 10211, ISO 13370, ISO 13786, ISO 13789 and ISO 14683 apply.

### 5 Description of the methods

#### 5.1 Outputs

The main outputs of ISO 6946, ISO 7345, ISO 10211, ISO 13370, ISO 13786, ISO 13789 and ISO 14683 are:

- thermal transmission properties of building elements (thermal resistance, thermal transmittance or dynamic thermal characteristics of a wall, floor or roof);
- heat transfer coefficient for the whole building (or part of a building).

#### 5.2 General description

Together with ISO 10456, ISO 10077-1, ISO 10077-2 and ISO 12631, these documents (ISO 6946, ISO 7345, ISO 10211, ISO 13370, ISO 13786, ISO 13789 and ISO 14683) provide the methodology to obtain heat transfer coefficients for a building starting from the properties of materials used for its construction and the size and geometry of the building.

The results provide input for calculation of energy needs for heating and cooling by ISO 52016-1<sup>[7]</sup> when one of the simplified (monthly or hourly) calculation methods is being used in ISO 52016-1. In the case of detailed dynamic simulations, the component (or subcomponent) properties are used directly as inputs for the building simulation.

In applications where individual component properties are needed, these documents provide:

- in the case of minimum component requirements, the  $U$ -value or  $R$ -value of the construction;
- for multi-zone calculations with assumed thermal interaction between the zones, the thermal transmission properties of the separating construction;

[Figure 1](#) illustrates the linkages between these documents.

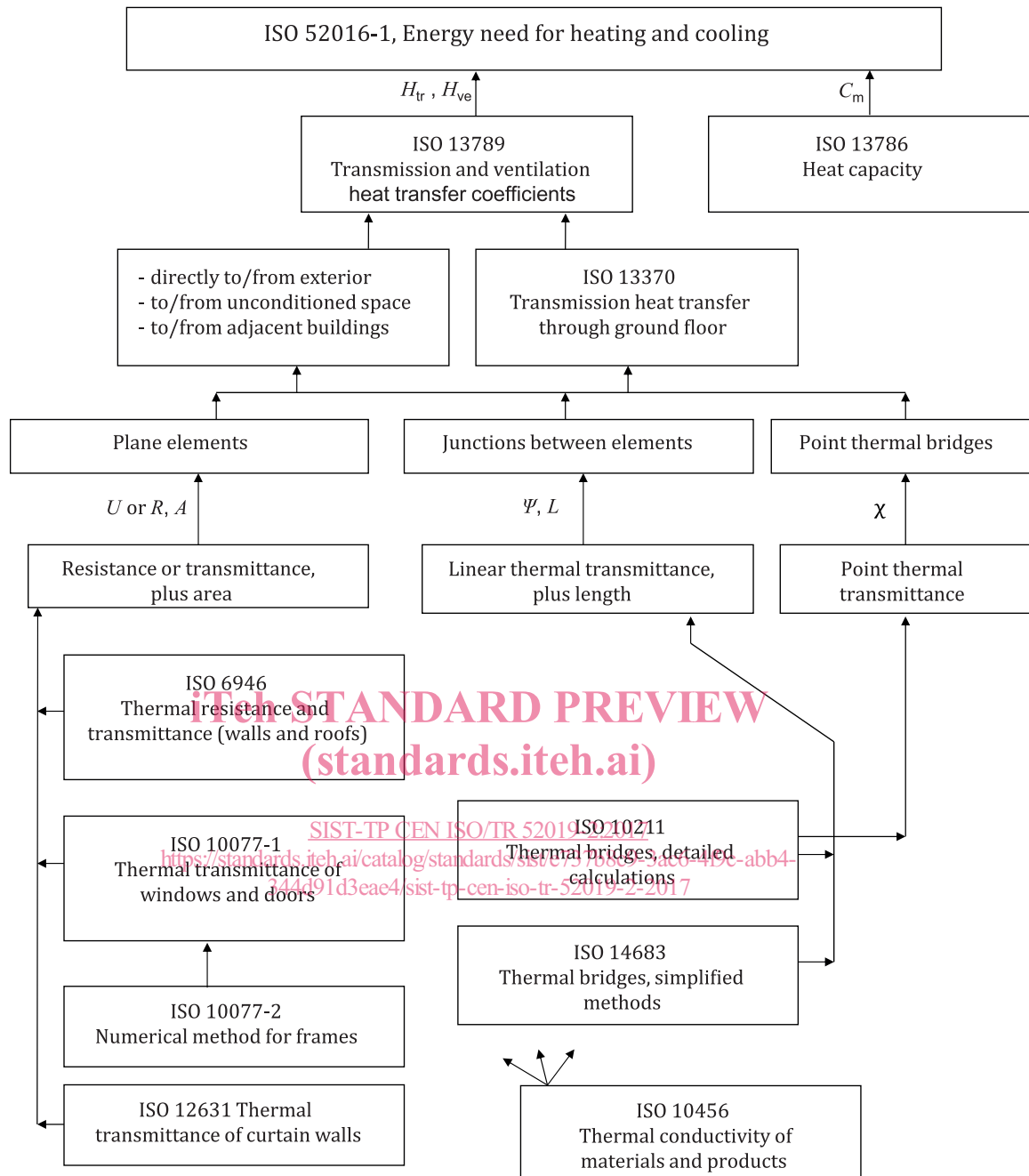


Figure 1 — Linkage between documents

More information can be found in [20] and [21].

## 6 ISO 6946

ISO 6946 provides a calculation method that is valid for most building components (walls and roofs). It is based on calculating the upper limit of thermal resistance of the component (which would apply if the heat flow were unidirectional from warm side to cold side) and the lower limit (in which the plane separating each layer is isothermal). Except for components consisting entirely of homogeneous layers (for which the upper and lower limits are equal) the true thermal resistance of a component is between these two limits. ISO 6946 specifies use of the arithmetic mean of the two limits provided that their ratio does not exceed 1,5.