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Third edition
2017-06

Thermal bridges in building construction — Linear thermal transmittance — Simplified methods and default values

*Ponts thermiques dans les bâtiments — Coefficient linéique de
transmission thermique — Méthodes simplifiées et valeurs par défaut*



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ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

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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).

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).

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.

ISO 14683 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).

This third edition cancels and replaces the second edition (ISO 14683:2007), which has been technically revised.

The changes in the third edition are mostly editorial. The document has been re-drafted according to CEN/TS 16629:2014.

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Introduction

This document is part of a series aimed at the international harmonization of the methodology for assessing the energy performance of buildings. Throughout, this series is referred to as a “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 document, a normative template is given in [Annex A](#) to specify these choices. Informative default choices are provided in [Annex B](#).

The main target groups for this document are architects, engineers and regulators.

Use by or for regulators: In case the document 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 [Annex A](#)) can be made available as national annex or as separate (e.g. legal) document (national data sheet).

NOTE 1 So in this case:

- the regulators will specify the choices;
- the individual user will apply the document to assess the energy performance of a building, and thereby use the choices made by the regulators.

Topics addressed in this document can be subject to public regulation. Public regulation on the same topics can override the default values in [Annex B](#). Public regulation on the same topics can even, for certain applications, override the use of this document. 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 a national annex (e.g. NA) is recommended, containing a reference to these data sheets;
- 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 (ISO/TR 52019-2) accompanying this document.

The subset of EPB standards prepared under the responsibility of ISO/TC 163/SC 2 cover *inter alia*:

- calculation procedures on the overall energy use and energy performance of buildings;
- calculation procedures on the internal temperature in buildings (e.g. in case of no space heating or cooling);
- indicators for partial EPB requirements related to thermal energy balance and fabric features;

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- calculation methods covering the performance and thermal, hygrothermal, solar and visual characteristics of specific parts of the building and specific building elements and components, such as opaque envelope elements, ground floor, windows and facades.

ISO/TC 163/SC 2 cooperates with other technical committees for the details on appliances, technical building systems, indoor environment, etc.

This document provides the means (in part) to assess the contribution that building products and services make to energy conservation and to the overall energy performance of buildings.

This document deals with methods for assessing thermal bridges, which give rise to changes in heat flow rates and surface temperatures compared with those of the unbridged structure. These heat flow rates and temperatures can be precisely determined by numerical calculation in accordance with ISO 10211. However, for linear thermal bridges, it is often convenient to use simplified methods or tabulated values to obtain an estimate of their linear thermal transmittance.

The effect of repeating thermal bridges which are part of an otherwise uniform building element, such as wall ties penetrating a thermal insulation layer or mortar joints in lightweight blockwork, needs to be included in the calculation of the thermal transmittance of the building element concerned, in accordance with ISO 6946.

Although not covered by this document, thermal bridges can also give rise to low internal surface temperatures, with an associated risk of surface condensation or mould growth.

[Table 1](#) shows the relative position of this document within the set of EPB standards in the context of the modular structure as set out in ISO 52000-1.

NOTE 2 In 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 3 The modules represent EPB standards, although one EPB standard could cover more than one module and one module could 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](#).

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Table 1 — Position of this document (*in casu* M2–5) within the modular structure of the set of EPB standards

| Sub module | Overarching | | Building (as such) | | Technical building systems | | | | | | | | | | |
|------------|---|----|---|-----------|---|---------|---------|-------------|----------------|------------------|--------------------|----------|---------------------------------|--------------|--|
| | Descriptions | | Descriptions | | Descriptions | Heating | Cooling | Ventilation | Humidification | Dehumidification | Domestic hot water | Lighting | Building automation and control | PV, wind, .. | |
| sub1 | | 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 | ISO 14683 | 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 | | | | | | | | | | |
| 8 | Building zoning | | Solar heat gains | | Generation and control | | | | | | | | | | |
| 9 | Calculated energy performance | | Building dynamics (thermal mass) | | Load dispatching and operating conditions | | | | | | | | | | |

^a The shaded modules are not applicable.

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Table 1 (continued)

| Overarching | | Building (as such) | | Technical building systems | | | | | | | | | | |
|-------------|---------------------------------|--------------------|-----------------------------|----------------------------|-----------------------------|---------|---------|-------------|----------------|------------------|--------------------|----------|---------------------------------|--------------|
| Sub module | Descriptions | | Descriptions | | Descriptions | Heating | Cooling | Ventilation | Humidification | Dehumidification | Domestic hot water | Lighting | Building automation and control | PV, wind, .. |
| sub1 | | M1 | | M2 | | M3 | M4 | M5 | M6 | M7 | M8 | M9 | M10 | M11 |
| 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 | | | | | | | | | | | | | |

^a The shaded modules are not applicable.