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**Energy performance of buildings —  
Indicators for partial EPB  
requirements related to thermal  
energy balance and fabric features —**

**Part 1:  
Overview of options**

*Performance énergétique des bâtiments — Indicateurs pour  
des exigences PEB partielles liées aux caractéristiques du bilan  
énergétique thermique et du bâti —*

*Partie 1: Aperçu des options*

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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](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).

ISO 52018-1 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 52018 series can be found on the ISO website.

## 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 52018-2)<sup>[Z]</sup> 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 indoor 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, for example, appliances, technical building systems and indoor environment.

The overall and partial EPB indicators, i.e. the quantitative output of EPB assessments, can be used for different purposes.

- a) Requirements: To set public or private requirements regarding the energy performance of buildings.
- b) Decisions: To facilitate decisions or actions in the private or public domain.
- c) Information and communication: For building designers, owners, operators, users, policymakers and citizens (as sellers or renters, as prospective buyers or tenants).

ISO 52003-1 and ISO 52003-2 discuss in a general manner the post-processing of the outputs of the EPB standards. They describe the concepts of EPB features and EPB indicators and deal with the principles of requirements, ratings and certificates. They also briefly deal in a more practical manner with the overall EPB requirements.

This document deals on a practical level with the requirements related to the fabric and related to the thermal balance of the building. Thermal balance aspects concern both the heating and cooling needs and the free floating temperatures, especially with respect to overheating or too cold indoor temperatures.

Most of the EPB features falling within this scope are succinctly enumerated and for each of them, many possible indicators are listed. [Annex A](#) provides standardized tables to report the choices that are made by regulators. [Annex B](#) gives motivated default choices.

As ISO 52003-1, this document does not provide any EPB assessment method (calculation, measurement of inspection). Instead, they refer to other EPB and non-EPB standards for the determination of EPB indicators.

ISO/TR 52018-2 is the technical report corresponding to this document. It provides extensive background information to help with making well-considered choices. For best understanding, the reader is advised to read this document and ISO/TR 52018-2 in parallel, clause by clause.

EPB indicators that can possibly be used for setting requirements to technical building systems are in principle covered in the corresponding EPB documents (which are until now mostly CEN standards).

[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](#).

**Table 1 — Position of this document (*in casu* M2–4) 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	ISO 52018-1	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									
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.

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# Energy performance of buildings — Indicators for partial EPB requirements related to thermal energy balance and fabric features —

## Part 1: Overview of options

### 1 Scope

The set of EPB assessment standards produces a great number of overall and partial EPB indicators as outputs, which can be used for different purposes. This document deals with the use as requirement of partial EPB indicators related to the fabric and related to the thermal balance of the building. Thermal balance aspects concern both the heating and cooling needs and the free floating temperatures, especially with respect to overheating or too cold indoor temperatures. This document can support both private parties and public regulators (and all stakeholders involved in the regulatory process) with the “post-processing” of these outputs.

This document provides standardized tables for reporting, in a structured and transparent manner, the choices that are to be made with respect to the partial EPB requirements covered by this document. The tables are non-restrictive, thus allowing for full regulatory flexibility.

NOTE [Table 1](#) in the Introduction 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.

### 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.

NOTE 1 In addition, [Annex C](#) contains specific parallel routes in referencing standards, in order to take into account existing national and/or regional regulations and/or legal environments while maintaining global relevance.

NOTE 2 Default references to EPB standards other than ISO 52000-1 are identified by the EPB module code number and given in [Annex A](#) (normative template) and [Annex B](#) (informative default choice).

EXAMPLE 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).

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

ISO 9050, *Glass in building — Determination of light transmittance, solar direct transmittance, total solar energy transmittance, ultraviolet transmittance and related glazing factors*

ISO 9972:2015, *Thermal performance of buildings — Determination of air permeability of buildings — Fan pressurization method*

ISO 10291, *Glass in building — Determination of steady-state U values (thermal transmittance) of multiple glazing — Guarded hot plate method*

ISO 10292, *Glass in building — Calculation of steady-state U values (thermal transmittance) of multiple glazing*

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ISO 10293, *Glass in building — Determination of steady-state U values (thermal transmittance) of multiple glazing — Heat flow meter method*

ISO 13788, *Hygrothermal performance of building components and building elements — Internal surface temperature to avoid critical surface humidity and interstitial condensation — Calculation methods*

ISO 15099, *Thermal performance of windows, doors and shading devices — Detailed calculations*

ISO 18292, *Energy performance of fenestration systems for residential buildings — Calculation procedure*

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

EN 410, *Glass in building — Determination of luminous and solar characteristics of glazing*

EN 673, *Glass in building — Determination of thermal transmittance (U value) — Calculation method*

EN 674, *Glass in building — Determination of thermal transmittance (U value) — Guarded hot plate method*

EN 675, *Glass in building — Determination of thermal transmittance (U value) — Heat flow meter method*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 7345 and ISO 52000-1 and the following 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>

#### 3.1 Building

##### 3.1.1

##### **assessed object**

building, part of a building or portfolio of buildings that is the object of the energy performance assessment

Note 1 to entry: The assessed object comprises all spaces and technical systems which may contribute to or influence the energy performance assessment.

Note 2 to entry: The assessed object may include one or several building units, if these are not individually object of the energy performance assessment.

Note 3 to entry: A distinction may be made between, for example, a designed building, new building after construction, existing building in the use phase and existing building after major renovation.

[SOURCE: ISO 52000-1:2017, 3.1.1]

##### 3.1.2

##### **building**

construction as a whole, including its envelope and all technical building systems, where energy may be used to condition the indoor environment, to provide domestic hot water and illumination and other services related to the use of the building

Note 1 to entry: The term refers to the physical building as a whole or to all parts thereof that at least include the spaces and technical building systems that are relevant for the energy performance assessment.

Note 2 to entry: Parts of a building can be physically detached, but are on the same building site. For example, a canteen or a guard house or one or more classrooms of a school in a detached part of a building or an essential space in a dwelling (e.g. bedroom).

[SOURCE: ISO 52000-1:2017, 3.1.2]

### 3.1.3

#### **building category**

##### **unit category**

classification of buildings and/or building units related to their main use or their special status, for the purpose of enabling differentiation of the energy performance assessment procedures and/or energy performance requirements

**EXAMPLE** Buildings officially protected as part of a designated environment or because of their special architectural or historical merit, buildings used as places of worship and for religious activities, residential buildings, (a) single-family houses of different types;(b) apartment blocks;(c) offices;(d) educational buildings;(e) hospitals;(f) hotels and restaurants;(g) sports facilities;(h) wholesale and retail trade services buildings;(i) data centres; (j) other types of energy-consuming buildings.

Note 1 to entry: Building regulations often make a distinction between building categories.

Note 2 to entry: The building category, for instance, may determine if energy performance assessment is mandatory (e.g., not for religious or historic buildings) and which are the minimum energy performance requirements (e.g., for new buildings); in some countries measured energy performance of a building is prescribed for specific categories of buildings (e.g., apartment buildings, large public buildings), etc. Another type of categorization is the distinction between new and existing and renovated buildings.

Note 3 to entry: Many buildings or building units of a given (use) category contain spaces of different (use) categories; for instance an office building may contain a restaurant; see 3.1.12 definition of space category.

Note 4 to entry: The allocation of a building category may also have a strong impact on other parts of the building regulations, for instance on safety (e.g., emergency exits, strength of floor) or indoor environmental quality (e.g., minimum ventilation rates).

[SOURCE: ISO 52000-1:2017, 3.1.3]

### 3.1.4

#### **building element**

integral component of the technical building systems or of the fabric of a building

[SOURCE: ISO 52000-1:2017, 3.1.4]

### 3.1.5

#### **building fabric**

all physical elements of a building, excluding technical building systems

**EXAMPLE** Roofs, walls, floors, doors, gates and internal partitions.

Note 1 to entry: It includes elements both in the inside and outside of the thermal envelope, including the thermal envelope itself.

Note 2 to entry: The fabric determines the thermal transmission, the thermal envelope airtightness and (nearly all of) the thermal mass of the building (apart from the thermal mass of furniture and technical building systems). The fabric also makes the building wind and water tight. The building fabric is sometimes described as the building as such, i.e. the building without any technical building system.

[SOURCE: ISO 52000-1:2017, 3.1.5]

### 3.1.6

#### **building portfolio**

set of buildings and common technical building systems whose energy performance is determined taking into account their mutual interactions

Note 1 to entry: An example of common equipment is an energy generation system (PV panels, wind turbine, cogen unit, boiler etc.) serving the building portfolio.

[SOURCE: ISO 52000-1:2017, 3.1.6]

### 3.1.7

#### **building thermal zone** **thermal zone**

internal environment with assumed sufficiently uniform thermal conditions to enable a thermal balance calculation according to the procedures in the standard under EPB module M2-2

Note 1 to entry: The EPB standard under module M2-2 is ISO 52016-1<sup>[4]</sup>.

[SOURCE: ISO 52000-1:2017, 3.1.7]

### 3.1.8

#### **building unit**

section, floor or apartment within a building which is designed or altered to be used separately from the rest of the building

EXAMPLE A shop in a shopping mall, an apartment in an apartment building or a rentable office space in an office building.

Note 1 to entry: The building unit can be the assessed object.

[SOURCE: ISO 52000-1:2017, 3.1.8]

### 3.1.9

#### **conditioned space**

room or enclosure that is covered by one or more of the EPB services

### 3.1.10

#### **reference floor area**

floor area used as a reference size

Note 1 to entry: See definition of reference size.

[SOURCE: ISO 52000-1:2017, 3.1.12]

### 3.1.11

#### **reference size**

relevant metric to normalize the overall or partial energy performance and energy performance requirements to the size of the building or part of a building and for the comparison against benchmarks

[SOURCE: ISO 52000-1:2017, 3.1.13]

### 3.1.12

#### **space category**

classification of building spaces related to a specific set of use conditions

EXAMPLE Office space, restaurant space, entrance hall, toilet, living space, assembly hall, shop, residential bed room, indoor car park, heated indoor stair case, unheated indoor stair case, etc.

Note 1 to entry: The space category is relevant for the calculation of the energy performance assessment and for defining the reference size.

[SOURCE: ISO 52000-1:2017, 3.1.14]

### 3.1.13

#### **thermally conditioned space**

heated and/or cooled space

[SOURCE: ISO 52000-1:2017, 3.1.16]

**3.1.14****thermal envelope area**

total area of all elements of a building that enclose thermally conditioned spaces through which thermal energy is transferred, directly or indirectly, to or from the external environment

Note 1 to entry: The thermal envelope area depends on whether internal, overall internal or external dimensions are being used.

Note 2 to entry: The thermal envelope area does not include the area to adjacent buildings; see ISO 13789.

Note 3 to entry: The thermal envelope area may play a role in the ways to express the overall and partial energy performance and energy performance requirements and comparison against benchmarks.

[SOURCE: ISO 13789:2017, 3.9, modified — Notes 2 and 3 to entry have been added.]

**3.1.15****thermally unconditioned space**

room or enclosure that is not part of a thermally conditioned space

[SOURCE: ISO 52000-1:2017, 3.1.17]

**3.1.16****useful floor area**

<for EPB assessment> area of the floor of a building needed as parameter to quantify specific conditions of use that are expressed per unit of floor area and for the application of the simplifications and the zoning and (re-)allocation rules

[SOURCE: ISO 52000-1:2017, 3.1.18]

**3.2 Indoor and outdoor conditions****3.2.1****condition of use**

requirement and/or restriction for the use of a building space category, related to the services for the energy performance assessment and/or the boundary conditions

EXAMPLE Heating set point, cooling set point, minimum amount of ventilation related to air quality, net domestic hot water needs (e.g. per m<sup>2</sup> floor area or per person), lighting levels, internal heat gains, etc., including the distribution over time (operation). Where relevant, the numbers are based on the number of occupants per m<sup>2</sup> per type of building space.

[SOURCE: ISO 52000-1:2017, 3.2.1]

**3.2.9****solar irradiance**

power density of radiation incident on a surface, i.e. the quotient of the radiant flux incident on the surface and the area of that surface, or the rate at which radiant energy is incident on a surface, per unit area of that surface

[SOURCE: ISO 52000-1: 2017, 3.2.6]

**3.2.10****solar irradiation**

incident solar heat per area over a given period

Note 1 to entry: Incident energy per unit area of a surface, found by integration of solar irradiance over a specified time interval, often an hour or a day (see ISO 9488).

[SOURCE: ISO 52000-1:2017, 3.2.7]

### 3.3 Technical building systems

#### 3.3.1

##### **building service**

service provided by the technical building systems and by appliances to provide the indoor environment conditions, domestic hot water, illumination levels and other services related to the use of the building

[SOURCE: ISO 52000-1:2017, 3.3.3]

#### 3.3.2

##### **building service area service area**

part of a building consisting of one or more elementary spaces served by a specific technical building system or sub-system

EXAMPLE Building service area for a specific heating system circuit, for a specific cooling system circuit, for a specific domestic hot water distribution system, for a specific ventilation system, for a specific air conditioning system, for a specific lighting (artificial light or daylight) configuration.

[SOURCE: ISO 52000-1:2017, 3.3.4]

#### 3.3.3

##### **other building service**

service supplied by energy-consuming appliances

[SOURCE: ISO 52000-1:2017, 3.2.5]

#### 3.3.4

##### **recoverable system thermal loss**

part of a system thermal loss which can be recovered to lower either the energy need for heating or cooling or the energy use of the heating or cooling system

Note 1 to entry: This depends on the calculation approach chosen to calculate the recovered gains and losses (detailed or simplified approach; see ISO 52000-1:2017, 11.3).

Note 2 to entry: In this document, if not directly taken into account as a reduction to the system losses, the recoverable system thermal losses are calculated as part of the internal heat gains. It may be decided at national level to report the recoverable system thermal losses separately from the other internal heat gains.

[SOURCE: ISO 52000-1:2017, 3.3.9, modified — Note 2 to entry has been added.]

#### 3.3.5

##### **recovered system thermal loss**

part of a recoverable system thermal loss which has been recovered to lower either the energy need for heating or cooling or the energy use of the heating or cooling system

Note 1 to entry: This depends on the calculation approach chosen to calculate the recovered gains and losses (detailed or simplified approach; see ISO 52000-1:2017, 11.3).

[SOURCE: ISO 52000-1:2017, 3.3.10]

#### 3.3.6

##### **system thermal loss**

thermal loss from a technical building system for heating, cooling, domestic hot water, humidification, dehumidification or ventilation that does not contribute to the useful output of the system

Note 1 to entry: A system loss can become an internal heat gain for the building if it is recoverable.

Note 2 to entry: Thermal energy recovered directly in the sub-system is not considered as a system thermal loss but as heat recovery and directly treated in the related system standard under EPB module M3 to M8.

Note 3 to entry: Heat dissipated by the lighting system or by other services (e.g. appliances of computer equipment) is not part of the system thermal losses, but part of the internal heat gains.

[SOURCE: ISO 52000-1:2017, 3.3.11]

### 3.3.7

#### **technical building system**

technical equipment for heating, cooling, ventilation, humidification, dehumidification, domestic hot water, lighting, building automation and control and electricity production

Note 1 to entry: A technical building system can refer to one or to several building services (e.g. heating, heating and domestic hot water).

Note 2 to entry: A technical building system is composed of different sub-systems.

Note 3 to entry: Electricity production can include cogeneration, wind power and photovoltaic systems.

[SOURCE: ISO 52000-1:2017, 3.3.13]

## 3.4 Energy

### 3.4.1

#### **energy need for heating or cooling**

<sensible>heat to be delivered to or extracted from a thermally conditioned space to maintain the intended space temperature conditions during a given period of time

[SOURCE: ISO 52000-1:2017, 3.4.13, modified — the domain 'sensible' has been added.]

### 3.4.2

#### **energy need for humidification or dehumidification**

latent heat in the water vapour to be delivered to or extracted from a thermally conditioned space by a technical building system to maintain a specified minimum or maximum humidity within the space

[SOURCE: ISO 52000-1:2017, 3.4.14]

## 3.5 Energy performance

### 3.5.1

#### **energy performance**

#### **overall energy performance**

<of an assessed object> calculated or measured amount of (weighted) energy needed to meet the energy demand associated with a typical use of the assessed object, which includes energy used for specific services (EPB services)

Note 1 to entry: See definition of EPB services and definition of assessed object.

Note 2 to entry: Also called overall energy performance, to distinct from partial energy performance.

[SOURCE: ISO 52000-1:2017, 3.5.7]

### 3.5.2

#### **energy performance indicator**

#### **EPB indicator**

calculated or measured numerical quantity that characterizes an energy feature of an assessed object

Note 1 to entry: EPB indicators are used for the energy performance rating, the energy performance requirements and/or for the certificate. An EPB indicator can for example be expressed in energy performance per unit of floor area or energy performance divided by the energy performance of a specific benchmark or another reference value.

Note 2 to entry: This covers both overall energy performance and partial energy performance.

[SOURCE: ISO 52000-1:2017, 3.5.10]

### 3.5.3

#### **energy performance requirement**

minimum level of the (partial or overall) energy performance that is to be achieved to obtain a right or an advantage: e.g. right to build, lower interest rate, quality label

[SOURCE: ISO 52000-1:2017, 3.5.11]

### 3.5.4

#### **EPB service**

building service included in the assessment of the energy performance

Note 1 to entry: See definition of building service. Which services are included is a national or regional choice, specified in [Annex A](#)/Annex B of ISO 52000-1.

Note 2 to entry: Energy used for heating, cooling, ventilation, humidification, dehumidification, domestic hot water and lighting.

[SOURCE: ISO 52000-1:2017, 3.5.13]

### 3.5.5

#### **EPB standard**

standard that complies with the requirements given in ISO 52000-1, CEN/TS 16628<sup>[8]</sup> and CEN/TS 16629<sup>[9]</sup>

Note 1 to entry: These three basic EPB documents were developed under a mandate given to CEN by the European Commission and the European Free Trade Association (Mandate M/480) and support essential requirements of EU Directive 2010/31/EU on the energy performance of buildings (EPBD). Several EPB standards and related documents are developed or revised under the same mandate.

[SOURCE: ISO 52000-1:2017, 3.5.14]

### 3.5.6

#### **reference value**

standard legal or calculated value against which an energy indicator is compared

Note 1 to entry: This can be a fixed value for specific types of buildings or for specific energy features, or a variable value (formula or notional reference building) taking into account one or more data from the actual building.

[SOURCE: ISO 52000-1:2017, 3.5.20]

## 3.6 Building heat transfer, heat gains and recoverable system thermal losses

### 3.6.1

#### **heat gain**

heat generated within, or entering into, the thermally conditioned space from heat sources other than energy intentionally utilized for heating, cooling or domestic hot water preparation

Note 1 to entry: Internal heat gains and solar heat gains. Sinks that extract heat from the building, are examples of heat gains, with a negative sign.

Note 2 to entry: For summer conditions, heat gains with a positive sign constitute extra heat load on the space.

[SOURCE: ISO 52000-1:2017, 3.6.5]

### 3.6.2

#### **heat transfer coefficient**

heat flow rate divided by the temperature difference between two environments, specifically used for heat transfer coefficient by transmission or ventilation

Note 1 to entry: In contrast with a heat gain, the driving force for heat transfer is the difference between the temperature in the considered space and the temperature of the environment at the other side (in the case of transmission) or the supply air temperature (in the case of ventilation).

[SOURCE: ISO 52016-1:2017, 3.6.9]

### 3.6.3

#### **internal heat gain**

heat provided within the building by occupants (sensible metabolic heat) and by appliances such as lighting, domestic appliances, office equipment, etc., other than energy intentionally provided for heating, cooling or hot water preparation

Note 1 to entry: This includes recoverable system thermal losses, if the detailed approach for the calculation of the recovered system losses is chosen, see 11.3 of ISO 52000-1.

Note 2 to entry: In this document, if not directly taken into account as a reduction to the system thermal losses, the recoverable system thermal losses are included as part of the internal heat gains. It may be decided at national level to report the recoverable system thermal losses separately.

Note 3 to entry: Included are heat from (warm) or to (cold) process sources that are not controlled for the purpose of heating or cooling or domestic hot-water preparation. The heat extracted from the building, from the indoor environment to cold sources (sinks), is included as gain with a negative sign.

[SOURCE: ISO 52000-1:2017, 3.6.7, modified — Notes 2 and 3 to entry have been added.]

### 3.6.4

#### **solar heat gain**

heat provided by solar radiation entering, directly or indirectly (after absorption in building elements), into the building through windows, opaque walls and roofs, or passive solar devices such as sunspaces, transparent insulation and solar walls

Note 1 to entry: Active solar devices such as solar collectors are considered as part of the technical building system.

[SOURCE: ISO 52000-1:2017, 3.6.10]

### 3.6.5

#### **transmission heat transfer coefficient**

heat flow rate due to thermal transmission through the fabric of a building, divided by the difference between the environment temperatures on either side of the construction

Note 1 to entry: By convention, the sign is positive if the heat flow is going out of the space considered (heat loss).

[SOURCE: ISO 52016-1:2017, 3.6.13]

### 3.6.6

#### **useful heat gains**

part of internal and solar heat gains that contribute to reducing the energy need for heating

[SOURCE: ISO 52000-1:2017, 3.6.11]

### 3.6.7

#### **ventilation heat transfer coefficient**

heat flow rate due to air entering an enclosed space, either by infiltration or ventilation, divided by the difference between the internal air temperature and the supply air temperature

Note 1 to entry: The sign of the coefficient is always positive. By convention, the sign of the heat flow is positive if the supply air temperature is lower than the internal air temperature (heat loss).

[SOURCE: ISO 52016-1:2017, 3.6.16]

## 4 Symbols and subscripts

### 4.1 Symbols

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

Symbol	Quantity	Unit
<i>A</i>	area	m <sup>2</sup>
<i>E</i>	energy balance value	W/(m <sup>2</sup> ·K)
<i>F, f</i>	factor, fraction	—
<i>f</i>	shape factor	—
<i>g</i>	total solar energy transmittance	—
<i>H</i>	heat transfer coefficient	W/K
<i>l</i>	length	m
<i>n</i>	air change rate	—
<i>P</i>	energy performance of windows	kWh/m <sup>2</sup>
<i>Q</i>	quantity of heat	kW·h
<i>q</i>	air flow per (thermal envelope or useful floor) area	(m <sup>3</sup> /h)/m <sup>2</sup>
<i>R</i>	thermal resistance	m <sup>2</sup> ·K/W
<i>U</i>	thermal transmittance	W/(m <sup>2</sup> ·K)
<i>X</i>	point thermal transmittance	W/K
<i>Ψ</i>	linear thermal transmittance	W/(m·K)

### 4.2 Subscripts

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

Subscript	Term
an	annual
C	cooling
c	component or element
co	cost optimal
E	energy
env, E	envelope
F	floor
H	heating
max	maximal
mn	mean
nd	need
npss	non parallel solar shading
op	opaque
pr	pressure
R	resistance
ref	reference
s	surface
si	surface internal

Subscript	Term
tb	thermal bridge
tp	transparent
tr	transmission (heat transfer)
u	unconditioned
use	useful
w	window

## 5 Description of this document

### 5.1 General

This document focuses on the setting of requirements by public authorities and is worded in this perspective. But much of the content is readily applicable (as such or after, easy, adaptation) by private actors (e.g. building specifiers) for their own specific purposes (e.g. setting additional or stricter requirements than the public ones).

It is the responsibility of the competent authorities (regulators) to take all of the various decisions related to the public EPB requirements.

NOTE 1 In the European context, it is stipulated in the EPBD that setting public requirements is a national or regional (i.e. non-EU) prerogative. The basic principles of the EPB standards have been drawn up accordingly (see CEN/TS 16628:2014, 7.2[8]).

This document only enumerates a number of possible partial EPB features (and the corresponding indicators) that can be considered for setting EPB requirements related to the thermal energy balance and to the fabric. Although many features and indicators are mentioned, including those mostly used and a number of potential other ones, the enumeration can by nature never be exhaustive. This document also does not deal with other EPB features, such as those related to the overall EPB (see the relevant standard under EPB module M1-4) or to technical building systems (see corresponding standards under EPB modules M3-4 to M8-4).

NOTE 2 See also ISO/TR 52003-2, the technical report accompanying the EPB standard under EPB module M1-4.

Thermal energy balance calculations result in the heating and/or the cooling need, and/or the winter and/or summer free floating temperatures<sup>1)</sup>. They are based on the heat transfer by transmission, by hygienic ventilation and by in/exfiltration, and on the internal and solar gains.

ISO/TR 52018-2[7], which is fully informative, provides extensive further orientation and insight with a view of helping all persons involved to make judicious choices. It constitutes an essential complement to this document. It discusses in much more detail many aspects of each of the different options, such as the possible motivations, possible indicators, practical points of attention, comparable economic strictness of the requirements, new construction and renovation issues, exceptions, etc. ISO/TR 52018-2 should be read in parallel, chapter by chapter, with this document.

Both documents should be seen in the broader context of ISO 52003-1[3] and ISO/TR 52003-2[6], which discuss, among several other things, some general principles on establishing EPB requirements. Taken together, the main purpose of these four documents is to provide information to public authorities and to all stakeholders involved to help them make good use of the output of the EPB assessment methods (i.e. productive “post-processing” of the EPB assessment results), while leaving them full freedom to make their own choices. Establishing appropriate EPB requirements is one of the main applications (besides certificates) of the various outcomes of the EPB assessment.

NOTE 3 ISO/TR 52003-2[6] provides a graphical presentation of the relation between the EPB assessment standards and the post-processing (as well as the relation with the product standards).

1) In the case of a monthly time interval, it concerns the time-integrated value.

In the relevant standard under EPB module M1-4, a number of general reflections with respect to the establishment of regulatory EPB requirements are formulated. Three choices that need to be made by the regulator are

- the mix of EPB features and corresponding indicators for which requirements are set,
- how to express each of the (overall and partial) EPB requirements, and
- the actual strictness of each of the requirements.

This document and ISO/TR 52018-2 mainly deal with the first point, but to some extent also provide insight concerning the second point.

The third point is pre-eminently a policy decision. It is not discussed here. The actual numeric (constant or variable) value of any requirement also strongly depends on the assessment methods (options chosen in [Annex A](#) of each EPB standard) and all the numeric boundary conditions and assumptions made (local outdoor climate, indoor set point temperatures, internal gains, etc.).

NOTE 4 When deciding on the actual strictness of EPB requirements, the cost effectiveness can be an important consideration. When this aspect is taken into account, it can strongly influence both the second point (notably the choice between a constant or variable numeric requirement and the practical way how to tailor a variable one) and third point (actual strictness). This topic is explained in a general manner in ISO 52003-1[3] and ISO/TR 52003-2[6].

The mix of partial EPB features for which regulatory requirements are set (first of the three choices above) is further dealt within [Clause 6](#).

### 5.2 Brief overview of this document

[Clauses 6](#) to [17](#) very succinctly mention in a non-exhaustive manner different quantitative indicators that can be considered for various partial EPB features that fall within the scope of this document. Sometimes a very brief motivation for setting a requirement on that specific EPB feature is given at the start of the clause. If applicable, attention is also paid to further specifications that regulators need to set in view of achieving a univocal definition of the indicator and the requirement.

[Annex A](#) provides a standardized format for regulators to report their choices in a uniform and succinct tabular manner. [Annex B](#) illustrates the use of the tables in [Annex A](#) by means of filled out examples, which can be used as “best guess” default choices.

Throughout this document, where indicated in the text, [Table C.1](#) shall be used to identify alternative regional references in line with ISO Global Relevance Policy.

### 5.3 Selection criteria between the possible options

For each of the EPB features mentioned in this document, extensive background information is provided in ISO/TR 52018-2[7] in order to support public authorities or private parties to make a well-considered and balanced choice between the many different options that are possible.

### 5.4 Input and output data

This document is not a calculation standard. Together with ISO/TR 52018-2[7], it provides guidance on the use of the output of other EPB standards to set (regulatory or private) EPB requirements (see graphical presentation of the relations in ISO/TR 52003-2[6]). Unlike most other EPB standards, this document does not provide a readily applicable set of methods and formulae.

When public authorities elaborate the different aspects of their requirements in full and practical detail, they may need to define some calculations of their own, notably when a requirement is not a constant value, but a variable value. In some instances, such tailored variable quantitative requirements may be essential to achieve the goals that are set, for instance an equitable economic strictness for all projects.

NOTE This is further explained in ISO 52003-1[3] and ISO/TR 52003-2[6].

When public authorities define such new calculations (which are usually limited in extent) for the purpose of EPB requirements, they shall report in detail each of the input data that is needed for the calculations (e.g. in a formula or for a notional reference building) in a way similar to the manner that is common in the EPB standards (see in principle 6.3 of each of these EPB standards).

Similarly, any new calculated output that is defined in the specific methodologies shall also be listed clearly, in a manner corresponding to the common practice in the EPB standards (see in principle 6.1 of each of these EPB standards). Possible examples of such new output are: a new ratio or the result/symbol of the formula or of the notional reference building approach.

## 6 Mix of EPB features with requirements

As mentioned in 5.1, the first action that shall be taken when setting EPB requirements is to carefully choose the set of EPB features (and corresponding indicators) for which requirements are set.

Generally speaking, it appears advisable to keep the number of EPB features with requirements limited, by selecting only those features that are (judiciously combined) truly useful and serve specific purposes. Obviously, the mix will most likely be different for new construction and renovation.

[Table A.2](#) provides a standardized format to report the chosen mix of EPB requirements that fall within the scope of this document. Example cases are provided in [Table B.2](#).

For each field of application for which a different set of EPB requirements would set (e.g. new residential construction, new non-residential construction, extensive renovations, small renovations, etc.), [Table A.2](#) and the relevant subsequent tables in [Annex A](#) shall be repeated and duly filled out.

## 7 Summer thermal comfort

In order to avoid a high probability of thermal comfort problems in summer, and thus also in order to reduce the risk that in uncooled buildings active cooling is installed at a later date, a specific requirement can be set with respect to overheating.

When doing so, great care should be taken to avoid undesired side effects, such as any discrimination (unless explicitly wanted) between actively cooled and other buildings, for instance through the inadvertent stimulation of active cooling (e.g. because differentiated, overall and/or partial, EPB requirements would be more easily satisfied for cooled buildings). This issue is discussed in somewhat more detail in ISO/TR 52018-2[7].

Many indicators can be considered for setting a summer thermal comfort requirement. Two possible indicators that in principle can be applicable to all building categories are the time (in hours) or the temperature weighted time (in Kelvin hour [K·h]) above a fixed reference temperature, determined on a full year basis under free floating temperature conditions, calculated according to the relevant standard under EPB module M2-2, which also includes a monthly method to determine the temperature weighted time. Logically, the reference temperature will depend on the climate of the country or region (considering human adaptation to the local climate).

[Table A.3](#) provides a standardized format to report, if applicable (see [Table A.2](#)), the numeric indicator used for the requirement on the summer thermal comfort as chosen by the regulator. If applicable (see [Table B.2](#)), example cases are provided in [Table B.3](#).

NOTE 1 It goes without saying that the strictness of the requirement will normally depend on the building category (for instance due to the different internal gain densities and the assumed type of activity, clothing and comfort expectations of the users).

NOTE 2 The topic of adaptive summer comfort (which makes use of a variable reference temperature) is discussed in more detail in ISO/TR 52018-2[7].

## 8 Winter thermal comfort

It is obvious that for regions with a sufficiently warm winter climate, where heating systems are not systematically installed, a reasoning similar to the one for summer comfort (see [Clause 7](#)) applies to winter thermal comfort. Ensuring an acceptable winter thermal comfort without heating system may strongly reduce the chance that a heating system (e.g. in the form of direct electric resistance heating) is brought in afterwards.

The same caution with respect to potential side effects as for summer thermal comfort applies.

Here, the time (in hours) or the temperature weighted time (in Kelvin hour [K·h]) below a reference temperature (determined on a full year basis under free floating conditions) can for instance be used as quantitative indicator for setting a requirement.

[Table A.4](#) provides a standardized format to report, if applicable (see [Table A.2](#)), the numeric indicator used for the requirement on the winter thermal comfort as chosen by the regulator. If applicable (see [Table B.2](#)), example cases are provided in [Table B.4](#).

## 9 Energy need for heating or variants

When a requirement on the heating “need” is set, it is usually with the aim of ensuring a basic energy efficiency of the building, notably of the fabric and the ventilation provisions, independent of the heating system.

If no heating system is present (e.g. in climates with very temperate winters), a (fictitious) heating “need” requirement constitutes a possible alternative to a winter thermal comfort requirement (see [Clause 8](#)).

The total annual energy “need” for heating can be subjected to a requirement. This total heating “need” is the sum of the heat that needs to be emitted in the spaces and, if active preheating of hygienic ventilation air is applicable, of the heat that is needed for this preheating (e.g. in an air handling unit or in a trickle ventilator). The space heating “need” is calculated according to the relevant standard under EPB module M2-2 and the air preheating according to the relevant standards under EPB module M5-8. It shall be specified whether the energy “need” concerns only the sensible heat or whether it also includes the latent heat (on space level and/or for the humidification of the incoming hygienic ventilation air).

Sometimes, a modified heating “need” is considered whereby not the real hygienic ventilation provisions (as are present in the project/building) are taken into account in the heating need calculations, but whereby instead a predefined, fictitious system is used for the calculations. In this manner, the indicator becomes fully independent of the technical building systems, thus only including fabric features as design variables. In order to avoid any confusion, it is then appropriate to use a specific term for this modified quantity, e.g. “the fabric energy efficiency for heating”.

In both instances, particular attention shall be paid to the way that the requirement is expressed, e.g. with a view of achieving a technically and economically comparable strictness for all projects.

NOTE This important issue is not self-evident. A constant maximum value for the heating “need” per useful floor area is usually not at all a requirement of equitable technical and economical strictness. The topic is further discussed and illustrated with a practical example in ISO/TR 52018-2[7]. The issue is also discussed in a more general manner in ISO 52003-1[3] and ISO/TR 52003-2[6].

Commonly used indicators are the total heating “need” as such, the specific heating “need” per useful floor area or a dimensionless ratio of one of them to a tailored reference value.

[Table A.5](#) provides a standardized format to report, if applicable (see [Table A.2](#)), the numeric indicator used for the requirement on the energy “need” for heating as chosen by the regulator. If applicable (see [Table B.2](#)), example cases are provided in [Table B.5](#).

## 10 Energy need for cooling, or variants

The same aspects that apply to the energy “need” for heating (see [Clause 9](#)) are, with the necessary changes being made, also valid for the cooling “need”. They are not repeated or reworded here.

[Table A.6](#) provides a standardized format to report, if applicable (see [Table A.2](#)), the numeric indicator used for the requirement on the energy “need” for cooling as chosen by the regulator. If applicable (see [Table B.2](#)), example cases are provided in [Table B.6](#).

## 11 Combination of “needs”

Sometimes the heating and cooling “needs” are aggregated together into a single indicator (independent or not of the fact whether there is active heating and/or cooling). Hereby, weighting factors are used which may reflect typical overall system efficiencies and primary energy factors. Obviously, the stimulus to pay due attention to winter and summer comfort each apart in unheated and/or uncooled buildings is then largely lost, as both terms can be traded against one another in the combined indicator with single requirement.

An even further step is to include the impact of daylight access on the lighting “needs” into the combined indicator; see the relevant standard under EPB module M9-1. Natural lighting is to a large extent determined by the windows, i.e. by the fabric.

[Table A.7](#) provides a standardized format to report, if applicable (see [Table A.2](#)), the numeric indicator used for the requirement on the combined energy “need” as chosen by the regulator. If applicable (see [Table B.2](#)), example cases are provided in [Table B.7](#).

## 12 Overall thermal insulation of the thermal envelope

Because in heating dominated climates, transmission losses through an uninsulated envelope are ultimately responsible for a large part of the heating consumption; there has, in such climates, been a long-standing and widespread tradition of setting a requirement on the overall thermal insulation of the thermal envelope.

Often, the requirement is expressed in terms of the mean thermal transmittance of the entire thermal envelope,  $U_{mn}$ . Alternatively, the overall heat transfer coefficient,  $H_{tr}$ , can be used. Both quantities shall be determined according to the relevant standard under EPB module M2-5.1. For both quantities, it shall be specified in the relevant standard under EPB module M2-5.1 whether or not thermal bridges are taken into full account, and if so, how this is precisely to be done.

NOTE 1 ISO 13789 is the EPB standard under this module. The properties are calculated in separate EPB standards, but all thermal transmission properties are gathered via ISO 13789 in order to ensure consistency. See ISO/TR 52018-2:2017, 13.2.

A ratio of the mean thermal transmittance to a tailored (i.e. variable) reference value,  $U_{mn}/U_{mn,ref}$ , is also often used. Such ratio is then usually indicated with a separate symbol.

[Table A.8](#) provides a standardized format to report, if applicable (see [Table A.2](#)), the numeric indicator used for the requirement on the overall thermal insulation of the envelope as chosen by the regulator. If applicable (see [Table B.2](#)), example cases are provided in [Table B.8](#).

NOTE 2 As with the heating and cooling “needs”, setting a technically and economically sensible requirement is a particular point of attention, which is further discussed in ISO/TR 52018-2[Z].

## 13 Thermal insulation of individual elements of the thermal envelope

It is very common to impose this type of requirements, either for reducing heat losses and/or for reducing the risk of low internal surface temperatures and their potential attendant problems and drawbacks.

The requirements are usually expressed in terms of one or more of the following quantities:

- a minimum temperature factor,  $f_{R_{si}}$ , as defined in ISO 13788;
- a maximum thermal transmittance,  $U$ ;
- a minimum total thermal resistance of opaque elements,  $R_{tot}$ ;
- a minimum intrinsic component thermal resistance of opaque elements,  $R_{c,op}$ .

NOTE 1 Sometimes a requirement is set on the thermal resistance of the insulation layer by itself (e.g. when adding thermal insulation in the case of renovation).

The thermal transmittance of glazing shall be obtained from the relevant standard under EPB module M2-5.1 determined in accordance with ISO 10291, ISO 10292 or ISO 10293 (or Subject 1, 2 or 3 in [Table C.1](#)).

Any other thermal transmittance or any resistance shall be determined in accordance with the relevant standard under EPB module M2-5.1.

NOTE 2 ISO 13789[1] is the EPB standard under this module. The properties are calculated in separate EPB standards, but all thermal transmission properties are gathered via ISO 13789 in order to ensure consistency. See ISO/TR 52018-2:2017, 13.2.

For the minimum temperature factor, it shall be clearly specified whether the requirement applies to any arbitrary point of the thermal envelope or not (with then a precise specification to which points it applies and where not).

[Table A.9](#) provides a standardized format to report, if applicable (see [Table A.2](#)), the numeric indicator(s) used for the requirement on the thermal insulation of individual elements of the thermal envelope as chosen by the regulator. If applicable (see [Table B.2](#)), example cases are provided in [Table B.9](#).

## 14 Thermal bridges

Properly evaluating thermal bridges in a quantitative manner is not trivial. M2-5.3 lists different possibilities. Given this difficulty, setting and controlling requirements on thermal bridges in the context of a strict regulation is not self-evident. Therefore, simplified approaches that stimulate good design practice have proven a productive alternative. Such pragmatic approaches are usually integrated in an EPB regulation as part of the calculation of the overall heat transfer coefficient,  $H_{tr}$ ; see [Clause 12](#).

If requirements as such are set, the following are the most commonly used possibilities:

- a minimum temperature factor,  $f_{R_{si}}$ , as defined in ISO 13788;
- a maximum linear thermal transmittance,  $\Psi$ , differentiated per type of junction;
- a maximum point thermal transmittance,  $\chi$ , differentiated per type of three-dimensional thermal bridge;
- the relative importance of thermal bridges compared with the overall heat transfer coefficient:

$$\frac{(\sum \psi \cdot l + \sum \chi)}{H_{tr}} \tag{1}$$

The linear and point thermal transmittances shall be determined in accordance with the options of M2-5.3.

[Table A.10](#) provides a standardized format to report, if applicable (see [Table A.2](#)), the numeric indicator(s) used for the requirement on the thermal bridges that is chosen by the regulator. If applicable (see [Table B.2](#)), example cases are provided in [Table B.10](#).

## 15 Window energy performances

As a complement or as an alternative to a thermal insulation requirement (see [Clause 13](#)), it is possible to set a more integral energy requirement for windows and transparent doors that takes into account not only the transmission heat transfer but also the ventilation (air leakage) heat transfer and the solar gains of the transparent elements. ISO 18292 provides a methodology for both the heating and cooling energy performance (resp.  $P_{E,H,w}$  and  $P_{E,C,w}$ ) of windows in residential buildings.

Since many simplifying assumptions need to be made in the calculation, it is more applicable to renovations. In new buildings, a much more accurate assessment can be made taking into account the real value of the many influencing factors, e.g. the real window area. In new constructions, more integral EPB features are therefore more appropriate to evaluate the full and precise impact of the windows on the specific project, e.g. the energy “need” for heating and/or cooling (see [Clauses 9](#) and [10](#)) and the thermal comfort in summer and/or winter (see [Clauses 6](#) and [8](#)).

When only the glazing is replaced, ISO 14438<sup>[2]</sup> can be used for the heating season. It defines a so-called energy balance value E, taking into account the thermal transmittance and solar gains.

(Mainly) in new construction, building regulations sometimes require minimal transparent areas (possibly weighted with their visual transmittance) in certain types of rooms for the purpose of minimal daylight access and/or visual contact with the outside. The requirement may for instance be expressed as a certain fraction of the floor area.

[Table A.11](#) provides a standardized format to report, if applicable (see [Table A.2](#)), the numeric indicator used for the requirement on the window energy performance as chosen by the regulator. If applicable (see [Table B.2](#)), example cases are provided in [Table B.11](#).

## 16 Airtightness of the thermal envelope

When requirements with respect to the airtightness of the thermal envelope are set in an EPB regulation, one or more of the following options are usually chosen:

- a mandatory airtightness test upon completion (or sufficient advancement) of the works with (see next point) or without actual quantitative requirement;
- a quantitative requirement (with or without mandatory systematic proof of compliance by means of testing; see previous point), for instance expressed in terms of one of the following indicators:
  - a maximum specific leakage rate per thermal envelope area at a reference pressure difference ( $q_{Epr}$ );
  - a maximum air change rate at a reference pressure difference ( $n_{pr}$ );
  - a maximum specific leakage rate per useful floor area at a reference pressure difference ( $q_{Fpr}$ ).

Testing shall be performed in accordance with ISO 9972, which also defines each of the above quantities. The preferred option for a quantitative requirement is the specific leakage rate per thermal envelope area.

In the regulation, full clarity shall be given on at least each of the following points.

- Which method (method 1, 2 or 3) in ISO 9972:2015, 5.2 is to be used? If the regulation prescribes method 3, then all necessary specifications for the preparation of the buildings shall be given.
- What is the precise definition of the reference area or volume, if needed to calculate the indicator? For instance, according to one of the definitions in ISO 9972 or according to another definition. The preferred option is a geometric quantity as already defined in the EPB assessment method, e.g. the thermal envelope area.
- What reference pressure (pr) shall be considered?

- Is it the result of the pressurization, of the depressurization or the mean of both that shall be considered for the evaluation of the requirement? The preferred option is the mean value.

Further considerations with respect of each of these points are formulated in ISO/TR 52018-2[Z], where also the three measurement methods of ISO 9972 are described in a summary manner.

[Table A.12](#) provides a standardized format to report, if applicable (see [Table A.2](#)), the numeric indicator used for the requirement on the thermal envelope air tightness as chosen by the regulator. If applicable (see [Table B.2](#)), example cases are provided in [Table B.12](#).

## 17 Solar control

In general, there is rather a tendency towards a more integral requirement concerning the summer behaviour of a building, notably a requirement on a summer thermal comfort indicator (see [Clause 6](#)) and/or on the energy “need” for cooling (see [Clause 10](#)). Such integral approach allows to give due consideration to all of the many different variables that together determine the summer behaviour of the building.

However, if a requirement is set on solar protection, it can be expressed in terms of the solar factor.

- If no solar protection device is present, the solar factor of the glazing,  $g$ , shall be determined in accordance with ISO 9050 (or Subject 4 in [Table C.1](#)).
- If a solar protection device parallel with the glass pane is present, the solar factor of the combined glazing and the solar protection device,  $g_{\text{tot}}$ , shall be determined in accordance with ISO 15099, M2-8.1 or M2-8.2.
- If a solar protection device not parallel with the glass pane is present, the ratio of the energy entering through the transparent element into the room to the incident solar irradiation can be used as indicator. The ratio can be determined for instance for a typical summer day or for the warmest month of the year, while the device is in its lowest position. In [Table A.13](#), the ratio is indicated with the symbol  $F_{\text{npss}}$ . The radiation can be calculated according to M1-13 (without shading device) and according to M2-2 (with shading device).

Adequate solar control is sometimes imposed as a precondition to install active cooling, both in new and in existing buildings.

[Table A.13](#) provides a standardized format to report, if applicable (see [Table A.2](#)), the numeric indicator(s) used for the requirement on the solar control as chosen by the regulator. If applicable (see [Table B.2](#)), example cases are provided in [Table B.13](#).

## 18 Other requirements

[Table A.14](#) provides a standardized format to report, if applicable (see [Table A.2](#)), for numeric indicator(s) used for other requirements as chosen by the regulator, in as far as they fall within the scope of this document. If applicable (see [Table B.2](#)), example cases are provided in [Table B.14](#).

## 19 Quality control

The main quality control is the reporting (including the documentation of the motivation) conforming to the format of [Annex A](#) of the choices with respect to the partial EPB features and numeric indicators that fall within the scope of this document.

## 20 Compliance check

The aim of this clause is to provide procedures that enable to check if this document is practically applicable and/or has been applied correctly and that the assumptions, in particular the input data, are correct.

In this document, all of the input is gathered through other EPB standards. Relevant procedures for compliance check are provided in those standards.

NOTE This clause on compliance check is a clause required for each EPB standard.

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## Annex A (normative)

### Input and method selection data sheet — Template

#### A.1 General

The template in Annex A of this document shall be used to specify the choices between methods, the required input data and references to other documents.

NOTE 1 Following this template is not enough to guarantee consistency of data.

NOTE 2 Informative default choices are provided in [Annex B](#). Alternative values and choices can be imposed by national/regional regulations. If the default values and choices of [Annex B](#) are not adopted because of the national/regional regulations, policies or national traditions, it is expected that:

- national or regional authorities prepare data sheets containing the national or regional values and choices, in line with the template in Annex A; or
- by default, the national standards body will add or include a national annex (Annex NA) to this document, in line with the template in Annex A, giving national or regional values and choices in accordance with their legal documents.

NOTE 3 The template in Annex A is applicable to different applications (e.g., the design of a new building, certification of a new building, renovation of an existing building and certification of an existing building) and for different types of buildings (e.g., small or simple buildings and large or complex buildings). A distinction in values and choices for different applications or building types could be made:

- by adding columns or rows (one for each application), if the template allows;
- by including more than one version of a table (one for each application), numbered consecutively as a, b, c, ... For example: Table NA.3a, Table NA.3b;
- by developing different national/regional data sheets for the same standard. In case of a national annex to the standard these will be consecutively numbered (Annex NA, Annex NB, Annex NC, ...).

NOTE 4 In the section "Introduction" of a national/regional data sheet information can be added, for example about the applicable national/regional regulations.

NOTE 5 For certain input values to be acquired by the user, a data sheet following the template of Annex A, could contain a reference to national procedures for assessing the needed input data. For instance, reference to a national assessment protocol comprising decision trees, tables and pre-calculations.

The shaded fields in the tables are part of the template and consequently not open for input.

#### Specific information concerning Annex A and [Annex B](#) in this document

Although the tables in Annex A cover most EPB requirements that currently apply in various countries, they are of course not necessarily exhaustive, also in view of possible new developments in the future. Still other variables can possibly be considered for setting regulatory EPB requirements and the tables have been conceived flexibly to allow to report such other choices.

[Table A.1/B.1](#) provides a table to specify the modular references.

[Table A.2/B.2](#) provides a table for regulators to report in a uniform manner the chosen mix of partial EPB features for which regulatory requirements are set, in as far as they fall within the scope of this document. Extra features can be added at the bottom of the table. The table shall be seen in conjunction

with all other overall and partial EPB requirements (which are beyond the scope of this document, e.g. concerning technical building systems); see also the relevant standard under EPB module M1-4.

[Tables A.3/B.3](#) to [A.14/B.14](#) provide tables to report in a uniform manner, for each of the partial EPB features selected for setting requirements, as reported in [Table A.2/B.2](#), the numeric indicator that is chosen to express the quantitative requirement. An X-mark shall be set in the second column corresponding to the row of the chosen indicator. Still other numeric indicators can be added at the bottom of each of the tables. For partial EPB features that are not subjected to a requirement, the corresponding table will of course remain empty. If requirements are set for extra EPB features, as reported in additional rows in [Table A.2/B.2](#), then the format of generic [Table A.14/B.14](#) shall be used for reporting the corresponding indicators that are used.

Due to their open-endedness, all the reporting tables allow full freedom of choice by the regulators.

Typically, different choices will be made according to the type of work, notably for new constructions (or equivalent) on the one hand and works on existing buildings on the other hand. Furthermore, there may be differentiations according to other criteria, such as between residential and non-residential buildings. Each different application area will thus have its own set of tables if different choices are made (see Note 3 above). The application domain of every set shall be clearly specified.

## A.2 References

The references, identified by the module code number, are given in [Table A.1](#).

**Table A.1 — References**

Reference	Reference document	
	Number	Title
M1-4		
M1-6		
M1-13		
M2-2		
M2-5.1		
M2-5.2		
M2-5.3		
M2-8.1		
M2-8.2		
M5-8		
M9-1		

## A.3 Mix of partial energy performance requirements

### A.3.1 General

See [Clause 6](#).

The table based on the template in [Table A.2](#) shall be filled out as follows.

- The first column lists the partial EPB features that can be considered for setting requirements. The motivation for the mix that is chosen shall be reported below the table. If needed, still other partial EPB features can be added at the bottom of the table. By means of a numbered reference, a precise description of each additional EPB feature will then be given below the table. If possible, the description of the extra feature shall be taken from an EPB standard. Also, for each extra partial EPB feature, the motivation shall be described in a clear manner.

- In the second column, an X-mark is placed at each of the features that is chosen to set a requirement.
- In the third column, for each exception, a numbered reference is made to a full, detailed and clear explanation below the table, including the motivation for the exception. For some types of (detailed) requirements (e.g. on element level, such as thermal insulation), it may be easier to explain the exceptions in conjunction with the detailed description of the actual requirements. In these instances, it suffices to give here the general synthesis, the motivation and a precise reference to the regulatory texts where the requirements and exceptions are described.

**A.3.2 Application: ...**

This subclause may be repeated for different applications.

**Table A.2 — Choices with respect to the partial EPB requirements related to thermal energy balance and fabric features (see Clause 6)**

Application: ...			
Partial energy performance feature	Requirement?	Exceptions*?	Details in
Summer thermal comfort			<a href="#">Table A.3/B.3</a>
Winter thermal comfort			<a href="#">Table A.4/B.4</a>
Energy “need” for heating: give further specifications (a)*			<a href="#">Table A.5/B.5</a>
Energy “need” for cooling: give further specifications (b)*			<a href="#">Table A.6/B.6</a>
Combined energy “need” for heating and cooling (and possibly still other quantities): define precisely*			<a href="#">Table A.7/B.7</a>
Overall thermal insulation of the envelope			<a href="#">Table A.8/B.8</a>
Thermal insulation of individual elements of the thermal envelope			<a href="#">Table A.9/B.9</a>
Thermal bridges			<a href="#">Table A.10/B.10</a>
Window energy performance			<a href="#">Table A.11/B.11</a>
Airtightness of the thermal envelope: mandatory measurement: give further specifications*			<a href="#">Table A.12/B.12</a>
Airtightness of the thermal envelope: quantitative requirement: give further specifications*			<a href="#">Table A.12/B.12</a>
Solar control			<a href="#">Table A.13/B.13</a>
<free text> Other requirement 1; define*)			<a href="#">Table A.14/B.14</a>
<free text> Other requirement 2; define*)			<a href="#">Table A.14/B.14</a>
...			<a href="#">Table A.14/B.14</a>
* The columns or cells that are marked with an asterisk (i.e. any cell involving a specific national/regional element) shall be marked with a numbered reference. A clear explanation and motivation shall be given for each of these new elements below the table.			

Table A.2 (continued)

Application: ....			
Partial energy performance feature	Requirement?	Exceptions*?	Details in
<b>Explanation:</b>			
(a) If applicable, specify for the energy “need” for heating:			
— with the real or with a predefined fictitious ventilation system;			
— including/excluding the amount of heat needed for active preheating of the incoming hygienic ventilation air (if present);			
— including/excluding the latent heat need (i.e. the sensible heat need only or not);			
— still other aspects.			
(b) If applicable, specify for the energy “need” for cooling:			
— with the real or with a predefined fictitious ventilation system;			
— including/excluding the amount of cold needed for active precooling of the incoming hygienic ventilation air (if present);			
— including/excluding the latent cold need (i.e. the sensible cold need only or not);			
— still other aspects.			
<b>Specifications according to each of the numbered references:</b>			
(1): ... <free text>			
(2): ... <free text>			
...			
<free text>			
<b>Motivation for the chosen requirement mix:</b>			
... <complete: free text>			

**A.3.3 Application: ...**

This subclause may be repeated for different applications.

**A.4 Partial energy performance requirements**

**A.4.1 Application: ...**

This subclause may be repeated for different applications.

Table A.3 is only applicable if a requirement is set in Table A.2/B.2 for this EPB feature.

**Table A.3 — Numeric indicator used for the requirement on the summer thermal comfort (see Clause 7)**

Application: ...	
Numeric indicator	Choice
Time above a fixed reference temperate [h]	
Temperature weighted time above a fixed reference temperature [K·h]	
<free text> Other indicator; define*)	
...	

**Table A.3 (continued)**

Application: ...	
Numeric indicator	Choice
* If another indicator is used, it shall be clearly described below. And precise reference shall be made to its definition and its assessment method:	
<b>Description in case of other indicator:</b>	
<free text>	

Table A.4 is only applicable if a requirement is set in Table A.2/B.2 for this EPB feature.

**Table A.4 — Numeric indicator used for the requirement on the winter thermal comfort (see Clause 8)**

Application: ...	
Numeric indicator	Choice
Time below a fixed reference temperate [h]	
Temperature weighted time below a fixed reference temperature [K·h]	
<free text> Other indicator; define*)	
...	
* If another indicator is used, it shall be clearly described below. And precise reference shall be made to its definition and its assessment method:	
<b>Description in case of other indicator:</b>	
<free text>	

Table A.5 is only applicable if a requirement is set in Table A.2/B.2 for this EPB feature.

**Table A.5 — Numeric indicator used for the requirement on the energy “need” for heating (see Clause 9)**

Application: ...	
Numeric indicator	Choice
Total “need” [kWh]	
“Need” per useful floor area [kWh/m <sup>2</sup> ]	
Ratio; define*)	
<free text> Other indicator; define*)	
...	
* If a ratio or another indicator is used, it shall be clearly described below. And precise reference shall be made to its definition and its assessment method	
<b>Description in case of ratio or other indicator:</b>	
<free text>	

Table A.6 is only applicable if a requirement is set in Table A.2/B.2 for this EPB feature.

**Table A.6 — Numeric indicator used for the requirement on the energy “need” for cooling (see Clause 10)**

Application: ...	
Numeric indicator	Choice
Total “need” [kWh]	
“Need” per useful floor area [kWh/m <sup>2</sup> ]	
Ratio; define*)	

Table A.6 (continued)

Application: ...	
Numeric indicator	Choice
<free text> Other indicator; define*)	
...	
* If a ratio or another indicator is used, it shall be clearly described below. And precise reference shall be made to its definition and its assessment method:	
<b>Description in case of ratio or other indicator:</b>	
<free text>	

Table A.7 is only applicable if a requirement is set in Table A.2/B.2 for this EPB feature.

Table A.7 — Numeric indicator used for the requirement on the combined energy “need” for heating and cooling (and possibly still other quantities) (see Clause 11)

Application: ...	
Numeric indicator	Choice
Total “need” [kWh]	
“Need” per useful floor area [kWh/m <sup>2</sup> ]	
Ratio; define*)	
<free text> Other indicator; define*)	
...	
* If a ratio or another indicator is used, it shall be clearly described below. And precise reference shall be made to its definition and its assessment method:	
<b>Description in case of ratio or other indicator:</b>	
<free text>	

Table A.8 is only applicable if a requirement is set in Table A.2/B.2 for this EPB feature.

Table A.8 — Numeric indicator used for the requirement on the overall thermal insulation of the thermal envelope (see Clause 12)

Application: ...	
Numeric indicator	Choice
Overall transmission heat transfer coefficient $H_{tr}$ [W/K]	
Mean thermal transmittance $U_{mn}$ [W/(m <sup>2</sup> ·K)]	
Ratio; define*)	
<free text> Other indicator; define*)	
...	
* If a ratio or another indicator is used, it shall be clearly described below. And precise reference shall be made to its definition and its assessment method:	
<b>Description in case of a ratio or other indicator:</b>	
<free text>	

Table A.9 is only applicable if a requirement is set in Table A.2/B.2 for this EPB feature.

**Table A.9 — Numeric indicator used for the requirement on the thermal insulation of individual elements of the thermal envelope (see Clause 13)**

Application: ...	
Numeric indicator	Choice
Minimum temperature factor $f_{Rsi}$ [-]	
Thermal transmittance $U$ [W/(m <sup>2</sup> ·K)]	
Total thermal resistance $R_{tot}$ [m <sup>2</sup> K/W]	
Intrinsic element thermal resistance $R_{C;op}$ [m <sup>2</sup> K/W]	
<free text> Other indicator; define*)	
...	
* If another indicator is used, it shall be clearly described below. And precise reference shall be made to its definition and its assessment method:	
<b>Description in case of other indicator:</b>	
<free text>	

Table A.10 is only applicable if a requirement is set in Table A.2/B.2 for this EPB feature.

**Table A.10 — Numeric indicator used for the requirement on the thermal bridges (see Clause 14)**

Application: ...	
Numeric indicator	Choice
Minimum temperature factor $f_{Rsi}$ [-]	
Linear thermal transmittance $\Psi$ [W/(m·K)], possibly differentiated per type of junction	
Point thermal transmittance $\chi$ [W/K], possibly differentiated per type of three dimensional thermal bridge	
Relative importance of thermal bridges compared to the overall heat transfer coefficient [-] ( $\Sigma\Psi l + \Sigma\chi$ )/ $H_{tr}$	
<free text> Other indicator; define*)	
...	
* If another indicator is used, it shall be clearly described below. And precise reference shall be made to its definition and its assessment method:	
<b>Description in case of other indicator:</b>	
<free text>	

Table A.11 is only applicable if a requirement is set in Table A.2/B.2 for this EPB feature.

**Table A.11 — Numeric indicator used for the requirement on the window energy performance (see Clause 15)**

Application: ...	
Numeric indicator	Choice
Heating energy performance $P_{E;H;w}$ [kWh/m <sup>2</sup> ]	
Cooling energy performance $P_{E;C;w}$ [kWh/m <sup>2</sup> ]	
Combination of heating and cooling energy performance $P_{E;H^+C;w}$ [kWh/m <sup>2</sup> ]	
For glazing only: energy balance value $E$ [W/(m <sup>2</sup> ·K)]	
Minimal window area in certain types of rooms: specify*	
<free text> Other indicator; define*)	
...	

Table A.11 (continued)

Application: ...	
Numeric indicator	Choice
* If another indicator is used, it shall be clearly described below. And precise reference shall be made to its definition and its assessment method:	
<b>Description in case of other indicator:</b>	
<free text>	

Table A.12 is only applicable if a requirement is set in Table A.2/B.2 for this EPB feature.

**Table A.12 — Numeric indicator used for the requirement on the thermal envelope air tightness (see Clause 16)**

Application: ...	
Numeric indicator	Choice
Specific leakage rate per thermal envelope area $q_{Epr}$ [m <sup>3</sup> /h/m <sup>2</sup> ]	
Air change rate $n_{pr}$ [h <sup>-1</sup> ]	
Specific leakage rate per useful floor area $q_{Fpr}$ [m <sup>3</sup> /h/m <sup>2</sup> ]	
<free text> Other indicator; define*)	
...	
Specify for the chosen method of the air tightness measurement:	
— the precise definition of the reference area or volume for the indicator used;	
— the reference pressure, $p_r$ ;	
— result of pressurization, depressurization or mean;	
— others, if needed.	
<b>Specification (if method 1, 2 or 3):</b>	
<free text>	
* If another indicator is used, it shall be clearly described below. And precise reference shall be made to its definition and its assessment method:	
<b>Description in case of other indicator:</b>	
<free text>	

Table A.13 is only applicable if a requirement is set in Table A.2/B.2 for this EPB feature.

**Table A.13 — Numeric indicator used for the requirement on the solar control (see Clause 17)**

Application: ...	
Numeric indicator	Choice
Solar factor $g$ or $g_{tot}$ or $F_{npss}$ [-]	
<free text> Other indicator; define*)	
...	
* If another indicator is used, it shall be clearly described below. And precise reference shall be made to its definition and its assessment method:	
<b>Description in case of other indicator:</b>	
<free text>	

If requirements on other EPB features within the scope of this document are set, as reported in Table A.2/B.2, the indicators that are used are reported in Table A.14.

Table A.14 — Numeric indicator used for other requirements (see [Table A.2/B.2](#))

Application: ...	
EPB feature	Numeric indicator
<free text> Other requirement 1; define*)	<free text>
<free text> Other requirement 2; define*)	...
...	
* All EPB features and their corresponding indicator shall be clearly described and precise reference shall be made to their definition and their assessment method. The numbers (1), (2), ... refer to the numbers of other requirements in <a href="#">Table A.2/B.2</a> .	
<b>Specification:</b>	
Other requirement 1: ... <free text>	
Other requirement 2: ...	
<free text>	

**A.4.2 Application: ...**

This subclause may be repeated for different applications.

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## Annex B (informative)

### Input and method selection data sheet — Default choices

#### B.1 General

The template in [Annex A](#) of this document shall be used to specify the choices between methods, the required input data and references to other documents.

NOTE 1 Following this template is not enough to guarantee consistency of data.

NOTE 2 Informative default choices are provided in Annex B. Alternative values and choices can be imposed by national/regional regulations. If the default values and choices of Annex B are not adopted because of the national/regional regulations, policies or national traditions, it is expected that:

- national or regional authorities prepare data sheets containing the national or regional values and choices, in line with the template in [Annex A](#); or
- by default, the national standards body will add or include a national annex (Annex NA) to this document, in line with the template in [Annex A](#), giving national or regional values and choices in accordance with their legal documents.

NOTE 3 The template in [Annex A](#) is applicable to different applications (e.g., the design of a new building, certification of a new building, renovation of an existing building and certification of an existing building) and for different types of buildings (e.g., small or simple buildings and large or complex buildings). A distinction in values and choices for different applications or building types could be made:

- by adding columns or rows (one for each application), if the template allows;
- by including more than one version of a table (one for each application), numbered consecutively as a, b, c, ... For example: Table NA.3a, Table NA.3b;
- by developing different national/regional data sheets for the same standard. In case of a national annex to the standard these will be consecutively numbered (Annex NA, Annex NB, Annex NC, ...).

NOTE 4 In the section “Introduction” of a national/regional data sheet information can be added, for example about the applicable national/regional regulations.

NOTE 5 For certain input values to be acquired by the user, a data sheet following the template of [Annex A](#), could contain a reference to national procedures for assessing the needed input data. For instance, reference to a national assessment protocol comprising decision trees, tables and pre-calculations.

The shaded fields in the tables are part of the template and consequently not open for input.

#### Specific information concerning [Annex A](#) and Annex B in this document

Although the tables in this annex cover most EPB requirements that currently apply in various countries, they are of course not necessarily exhaustive, also in view of possible new developments in the future. Still, other variables can possibly be considered for setting regulatory EPB requirements and the tables have been conceived flexibly to allow to report such other choices.

[Table A.1/B.1](#) provides a table to specify the modular references.

[Table A.2/B.2](#) provides a table for regulators to report in a uniform manner the chosen mix of partial EPB features for which regulatory requirements are set, in as far as they fall within the scope of this document. Extra features can be added at the bottom of the table. The table shall be seen in conjunction

with all other overall and partial EPB requirements (which are beyond the scope of this document, e.g. concerning technical building systems); see also the relevant standard under EPB module M1-4.

Tables A.3/B.3 to A.14/B.14 provide tables to report in a uniform manner, for each of the partial EPB features selected for setting requirements, as reported in Table A.2/B.2, the numeric indicator that is chosen to express the quantitative requirement. An X-mark shall be set in the second column corresponding to the row of the chosen indicator. Still, other numeric indicators can be added at the bottom of each of the tables. For partial EPB features that are not subjected to a requirement, the corresponding table will of course remain empty. If requirements are set for extra EPB features, as reported in additional rows in Table A.2/B.2, then the format of generic Table A.14/B.14 shall be used for reporting the corresponding indicators that are used.

Due to their open-endedness, all the reporting tables allow full freedom of choice by the regulators.

Typically, different choices will be made according to the type of work, notably for new constructions (or equivalent) on the one hand and works on existing buildings on the other hand. Furthermore, there may be differentiations according to other criteria, such as between residential and non-residential buildings. Each different application area will thus have its own set of tables if different choices are made (see Note 3 above). The application domain of every set shall be clearly specified.

**Specific information concerning this annex**

This annex provides in B.3 an example of the reporting of regulatory choices. The choices made can be considered “best guess” default choices, but each public authority should make a judicious choice of its own, based on such factors as the pursued policy objectives, the local climate, the local building styles and construction traditions, the technological state of advancement of the entire professional construction sector, etc. The example tables are elementary. Especially for (small and large) extensions and (simple and thorough) renovations, a great variety of differentiated requirements can be set, depending on the exact nature of the works.

**B.2 References**

The references, identified by the EPB module code number, are given in Table B.1.

**Table B.1 — References**

Reference	Reference document	
	Number	Title
M1-4	ISO 52003-1	<i>Energy performance of buildings — Indicators, requirements, ratings and certificates — Part 1: General aspects and application to the overall energy performance</i>
M1-6	ISO 17772-1	<i>Energy performance of buildings — Indoor environmental quality — Part 1: Indoor environmental input parameters for the design and assessment of energy performance of buildings</i>
	EN 16798-1 (under preparation)	<i>Energy performance of buildings - Ventilation of 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)</i>
M1-13	ISO 52010-1	<i>Energy performance of buildings — External climatic conditions — Part 1: Conversion of climatic data for energy calculations</i>
M2-2	ISO 52016-1	<i>Energy performance of buildings — Energy needs for heating and cooling, internal temperatures and sensible and latent heat loads — Part 1: Calculation procedures</i>
M2-5.1	ISO 13789	<i>Thermal performance of buildings — Transmission and ventilation heat transfer coefficients — Calculation method</i>
M2-5.2	ISO 10211	<i>Thermal bridges in building construction — Heat flows and surface temperatures — Detailed calculations</i>

Table B.1 (continued)

Reference	Reference document	
	Number	Title
M2-5.3	ISO 14683	<i>Thermal bridges in building construction — Linear thermal transmittance — Simplified methods and default values</i>
M2-8.1	ISO 52022-1	<i>Energy performance of buildings — Thermal, solar and daylight properties of building components and elements — Part 1: Simplified calculation method of the solar and daylight characteristics for solar protection devices combined with glazing</i>
M2-8.2	ISO 52022-3	<i>Energy performance of buildings — Thermal, solar and daylight properties of building components and elements — Part 3: Detailed calculation method of the solar and daylight characteristics for solar protection devices combined with glazing</i>
M5-8	EN 16798-5-1	<i>Energy performance of buildings — Modules M5-6, M5-8, M6-5, M6-8, M7-5, M7-8 — Ventilation for buildings — Calculation methods for energy requirements of ventilation and air conditioning systems — Part 5-1: Distribution and generation (revision of EN 15241) — Method 1</i>
	EN 16798-5-2	<i>Energy performance of buildings — Modules M5-6.2, M5-8.2 — Ventilation for buildings — Calculation methods for energy requirements of ventilation systems — Part 5-2: Distribution and generation — Method 2</i>
M9-1	EN 15193-1	<i>Energy performance of buildings — Module M9 — Energy requirements for lighting — Part 1: Specifications</i>

### B.3 Mix of partial energy performance requirements

#### B.3.1 General

See [Clause 6](#).

The table based on the template of [Table A.2](#) shall be filled out as follows.

- The first column lists the partial EPB features that can be considered for setting requirements. The motivation for the mix that is chosen shall be reported below the table. If needed, still other partial EPB features can be added at the bottom of the table. By means of a numbered reference, a precise description of each additional EPB feature will then be given below the table. If possible, the description of the extra feature shall be taken from an EPB standard. Also, for each extra partial EPB feature, the motivation shall be described in a clear manner.
- In the second column, an X-mark is placed at each of the features that is chosen to set a requirement.
- In the third column, for each exception, a numbered reference is made to a full, detailed and clear explanation below the table, including the motivation for the exception. For some types of (detailed) requirements (e.g. on element level, such as thermal insulation), it may be easier to explain the exceptions in conjunction with the detailed description of the actual requirements. In these instances, it suffices to give here the general synthesis, the motivation and a precise reference to the regulatory texts where the requirements and exceptions are described.

#### B.3.2 Application: new buildings

Four different requirement mixes are distinguished depending on typical conditioning habits (i.e. commonly heated and/or cooled or not). The mix that is most appropriate for a certain building category (e.g. dwelling or office) obviously varies strongly with the local climate, typical internal gains, etc. It is clear that for a given geographical location, different building categories can best be served by different requirement mixes. For instance, in moderate summer climates, mix A may be best for dwellings, but for offices, mix D may be most appropriate.

**Table B.2a — Choices with respect to the mix of partial EPB requirements related to thermal energy balance and fabric features (see Clause 6)**

Application: New constructions						
Partial EPB feature	Requirement?				Exceptions*?	Details in
	Mix A	Mix B	Mix C	Mix D		
Summer thermal comfort	X	X	—	—	—	<a href="#">Table A.3/B.3</a>
Winter thermal comfort	—	X	X	—	—	<a href="#">Table A.4/B.4</a>
Energy “need” for heating: give further specifications*	X (1)	—	—	X (1)	—	<a href="#">Table A.5/B.5</a>
Energy “need” for cooling: give further specifications*	—	—	X (2)	X (2)	—	<a href="#">Table A.6/B.6</a>
Combined energy “need” for heating and cooling (and possibly still other quantities): define precisely*	—	—	—	—	—	<a href="#">Table A.7/B.7</a>
Overall thermal insulation of the envelope	—	—	—	—	—	<a href="#">Table A.8/B.8</a>
Thermal insulation of individual elements of the thermal envelope	X	X	X	X	X (3)	<a href="#">Table A.9/B.9</a>
Thermal bridges	—	—	—	—	—	<a href="#">Table A.10/B.10</a>
Window energy performance	—	—	—	—	—	<a href="#">Table A.11/B.11</a>
Airtightness of the thermal envelope: mandatory measurement: give further specifications*	X (4)	X (4)	X (4)	X (4)	—	<a href="#">Table A.12/B.12</a>
Airtightness of the thermal envelope: quantitative requirement: give further specifications*	—	—	—	—	—	<a href="#">Table A.12/B.12</a>
Solar control	—	—	—	—	—	<a href="#">Table A.13/B.13</a>
<free text> (Other requirement 1): define*)	—	—	—	—	—	<a href="#">Table A.14/B.14</a>
<free text> (Other requirement 2): define*)	—	—	—	—	—	<a href="#">Table A.14/B.14</a>
...	—	—	—	—	—	<a href="#">Table A.14/B.14</a>
* The columns or cells that are marked with an asterisk (i.e. any cell involving a specific national/regional element) shall be marked with a numbered reference. A clear explanation and motivation shall be given for each of these new elements below the table.						
<b>Explanation:</b>						
(a) If applicable, specify for the energy “need” for heating:						
— with the real or with a predefined fictitious ventilation system;						
— including/excluding the amount of heat needed for active preheating of the incoming hygienic ventilation air (if present);						
— including/excluding the latent heat need (i.e. the sensible heat need only or not);						
— still other aspects.						

Table B.2a (continued)

Application: New constructions						
Partial EPB feature	Requirement?				Exceptions*?	Details in
	Mix A	Mix B	Mix C	Mix D		
(b) If applicable, specify for the energy “need” for cooling: <ul style="list-style-type: none"> <li>— with the real or with a predefined fictitious ventilation system;</li> <li>— including/excluding the amount of cold needed for active precooling of the incoming hygienic ventilation air (if present);</li> <li>— including/excluding the latent cold need (i.e. the sensible cold need only or not);</li> <li>— still other aspects.</li> </ul>						
<b>Specifications according to each of the numbered references:</b>						
The following types of requirement mixes are distinguished. <ul style="list-style-type: none"> <li>— Type Mix A: building categories that do NOT generally have active space cooling (in the region where the regulation applies). For example, dwellings in cold climates.</li> <li>— Type Mix B: building categories that generally have NEITHER active space cooling NOR active space heating (in the region where the regulation applies). For example, many building categories in regions with a mild winter and mild summer climate.</li> <li>— Type Mix C: building categories that do NOT generally have active space heating (in the region where the regulation applies). For example, most building categories in tropical climates.</li> <li>— Type Mix D: building categories that commonly have BOTH active space cooling and active space heating (in the region where the regulation applies). For example, office buildings in moderate climates.</li> </ul> Numbered references: <ol style="list-style-type: none"> <li>(1) The energy need for heating is determined with the real ventilation system and includes, if applicable, the amount of heat needed for active preheating of the incoming hygienic ventilation air. Any latent heat need (on space level or for the incoming hygienic ventilation air) is not included in the heating need.</li> <li>(2) The energy need for cooling is determined with the real ventilation system and includes, if applicable, the amount of cold needed for active precooling of the incoming hygienic ventilation air. Any latent cold need (on space level or for the incoming hygienic ventilation air) is not included in the cooling need.</li> <li>(3) Exception is allowed for 1 % of the envelope area that is subject to the requirements. (Note that this exception with respect to the <math>U_{max}</math> values does not imply that these thermal envelope elements may be neglected in the further EPB assessments. All thermal envelope elements shall still be taken into account in all further EPB assessments.) Designers also should heed the possible impact on indoor environment of any lesser insulated elements (notably the possible consequences of low internal surface temperatures).</li> <li>(4) The air tightness measurement shall be performed according to ISO 9972 and its method 3, with specifications consistent with the treatment of infiltration/exfiltration in the EPB assessment method, e.g. open combustion devices shall be sealed if the air flow through them is already separately taken into account in the EPB assessment method. The final result shall be reported as the mean of the pressurization and depressurization regression curves at the reference pressure needed for the EPB assessments.</li> </ol>						
<b>Motivation for the chosen requirement mix:</b>						
(in bottom-up order): <ul style="list-style-type: none"> <li>— The mandatory measurement of the airtightness of the thermal envelope (upon sufficient completion of the works) creates a strong regulatory stimulus that due attention be paid to this aspect by all actors in the construction process (designers and contractors alike). The stimulus is all the stronger if the result of the measurement is properly valued in the EPB assessment methods. Not setting an actual, quantitative requirement avoids a too strict or too lax requirement for a given project. (It may be difficult to determine in a general manner in a regulation a differentiated, cost-optimal requirement, which depends upon the construction type, the state of know-how and the experience of the specific project team, etc.). It also avoids much contentious public discussion on the actual strictness of the requirement.</li> </ul>						