| STN | **Energetická hospodárnosť budov**<br>**Výpočet potreby tepla na vykurovanie a**<br>**chladenie, vnútorné teploty a citeľná a latentná**<br>**tepelná záťaž**<br>**Časť 3: Výpočtové metódy zohľadňujúce**<br>**adaptívne konštrukcie obvodového plášťa**<br>**budovy (ISO 52016-3: 2022)** | **STN**<br>**EN ISO 52016-3**<br><br><br>73 0704 |
|---|---|---|

Energy performance of buildings - Energy needs for heating and cooling, internal temperatures and sensible and latent heat loads - Part 3: Calculation procedures regarding adaptive building envelope elements (ISO 52016-3:2023)

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 03/24

Rozpracovaná prekladom.

Obsahuje: EN ISO 52016-3:2023, ISO 52016-3:2023

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# EUROPEAN STANDARD

# NORME EUROPÉENNE

# EUROPÄISCHE NORM

# EN ISO 52016-3

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# Energy performance of buildings - Energy needs for heating and cooling, internal temperatures and sensible and latent heat loads - Part 3: Calculation procedures regarding adaptive building envelope elements (ISO 52016-3:2023)

Performance énergétique des bâtiments - Besoins
d'énergie pour le chauffage et le refroidissement, les
températures intérieures et les chaleurs sensible et
latente - Partie 3: Méthodes de calcul des éléments
adaptables de l'enveloppe du bâtiment (ISO 52016-
3:2023)

Energetische Bewertung von Gebäuden -
Energiebedarf für Heizung und Kühlung,
Innentemperaturen sowie fühlbare und latente
Heizlasten - Teil 3: Berechnungsverfahren für adaptive
Elemente der Gebäudehülle (ISO 52016-3:2023)

This European Standard was approved by CEN on 3 September 2023.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and United Kingdom.

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

**CEN-CENELEC Management Centre:  Rue de la Science 23,  B-1040 Brussels**

Ref. No. EN ISO 52016-3:2023 E

**EN ISO 52016-3:2023 (E)**

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# European foreword

This document (EN ISO 52016-3:2023) has been prepared by Technical Committee ISO/TC 163 "Thermal performance and energy use in the built environment" in collaboration with Technical Committee CEN/TC 89 "Thermal performance of buildings and building components" the secretariat of which is held by SIS.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2024, and conflicting national standards shall be withdrawn at the latest by April 2024.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

Any feedback and questions on this document should be directed to the users' national standards body/national committee. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

# Endorsement notice

The text of ISO 52016-3:2023 has been approved by CEN as EN ISO 52016-3:2023 without any modification.

# INTERNATIONAL STANDARD

# ISO 52016-3

First edition
2023-09

# Energy performance of buildings — Energy needs for heating and cooling, internal temperatures and sensible and latent heat loads —

## Part 3:
## Calculation procedures regarding adaptive building envelope elements

*Performance énergétique des bâtiments — Besoins d'énergie pour le chauffage et le refroidissement, les températures intérieures et les chaleurs sensible et latente —*

*Partie 3: Méthodes de calcul des éléments adaptables de l'enveloppe du bâtiment*

**ISO 52016-3:2023(E)**

**ISO 52016-3:2023(E)**

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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 document 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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

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

For an explanation of 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 www.iso.org/iso/foreword.html.

This document 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 the parts in the ISO 52016 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

**ISO 52016-3:2023(E)**

# Introduction

This document, along with other international standards, assesses the overall energy performance of buildings (EPB). Throughout this document, this group of standards is referred to as the "set of EPB standards". A list of the standards in this set can be found on the EPB Center website.[1]

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.

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

Further target groups are parties who want to motivate their assumptions by classifying the EPB for a dedicated building stock.

This document is also important for manufacturers and suppliers of adaptive building envelope elements.

Background information, including justification, explanation and demonstration of the calculation procedures in this document, is provided in ISO/TR 52016-4.[2]

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 EPB;

— calculation procedures on the internal temperature in buildings (e.g. in case of no space heating or cooling);

— indicators for partial EPB requirements related to thermal energy balance and fabric features;

— 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.

This document presents procedures for taking into account the effect of adaptive building envelope elements in the calculation of the energy needs for heating and cooling, internal temperatures and sensible and latent heat loads according to ISO 52016-1.

This document takes precedence if there is a conflict with any provision in ISO 52016-1.

NOTE 1     For instance some of the simplified calculation procedures in ISO 52016-1:2017, Annex G, *Dynamic transparent building elements,* are in conflict with the more refined procedures in this document.

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 in Table A.1) and Annex B (informative default choice in Table B.1).

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).

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1)  https://epb.center/support/documents.

2)  Under preparation. Stage at the time of publication: ISO/WD TR 52016-4.

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[7] 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 under preparation.

NOTE 3    The modules in Tables A.1 and B.1 represent EPB standards, although one EPB standard can cover more than one module and one module can be covered by more than one EPB standard, for instance a simplified and a detailed method respectively.

**Table 1 — Position of this document (in casu M2-2 and M2-3), within the modular structure of the set of EPB standards**

| Submod-ule | Overarching Descrip-tions | | Building (as such) Descrip-tions | | Technical building systems Descriptions | Heating | Cooling | Ventilation | Humidification | Dehumidification | Domestic hot water | Lighting | Building automa-tion and control | e.g. PV, wind |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| sub1 | | M1 | | M2 | | M3 | M4 | M5 | M6 | M7 | M8 | M9 | M10 | M11 |
| 1 | General | | General | | Gener-al | | | | | | | | | |
| 2 | Common terms and definitions; symbols, units and subscripts | | Building energy needs | ISO 52016-3 (this docu-ment) | Needs | | | | | | | | a | |
| 3 | Applica-tions | | (Free) Indoor condi-tions without systems | ISO 52016-3 (this docu-ment) | Maxi-mum load and power | | | | | | | | | |
| 4 | Ways to express energy per-formance | | Ways to express energy perfor-mance | | Ways to ex-press energy perfor-mance | | | | | | | | | |
| 5 | Building categories and build-ing bounda-ries | | Heat transfer by trans-mission | | Emis-sion and control | | | | | | | | | |
| 6 | Building occupan-cy and operating conditions | | Heat transfer by infil-tration and ven-tilation | | Distri-bution and control | | | | | | | | | |

a    The shaded modules are not applicable.

**ISO 52016-3:2023(E)**

**Table 1** *(continued)*

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

a    The shaded modules are not applicable.

INTERNATIONAL STANDARD    ISO 52016-3:2023(E)

# Energy performance of buildings — Energy needs for heating and cooling, internal temperatures and sensible and latent heat loads —

## Part 3:
## Calculation procedures regarding adaptive building envelope elements

## 1   Scope

This document specifies procedures for the calculation of the energy needs for heating and cooling, internal temperatures and sensible and latent heat loads of a building according to the hourly calculation methodology in ISO 52016-1. Additions or modifications of the calculations are provided in this document if the building envelope contains one or more adaptive building envelope elements (building envelope elements with adaptive components that are either environmentally or actively controlled as a function of specific conditions). The adaptive building envelope element replaces the transparent building element in the calculation according to ISO 52016-1.

The three types of adaptive building envelope elements covered in this document are:

— building envelope elements with dynamic solar shading;

— building envelope elements with chromogenic glazing;

— building envelope elements with an actively ventilated cavity.

Environmentally activated control is described for building envelope elements with chromogenic glazing, but can also occur for other types of adaptive building envelope elements. In that case the same approach applies as for environmentally activated chromogenic glazing.

This document is applicable to the assessment of the energy performance of buildings (EPB) (energy performance labels and certificates), including comparison between buildings and checking conformity with minimum energy performance criteria.

It is also applicable to assess the contribution of the adaptive building envelope element to the smart readiness of a building.

In addition, this document provides indicators for the impact of the adaptive building envelope element on the performance of the building compared to a reference building envelope element. It is applicable to buildings at the design stage, to new buildings after construction and to existing buildings in the use phase.

This document is not applicable to geometrically complex adaptive building envelope elements that can only be modelled as multiple coupled thermal zones.

NOTE    The background to the selection of adaptive building envelope elements is given in ISO/TR 52016-4.

## 2   Normative references

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

ISO 52016-3:2023(E)

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

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

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

ISO 52016-1:2017, *Energy performance of buildings — Energy needs for heating and cooling, internal temperatures and sensible and latent heat loads — Part 1: Calculation procedures*

koniec náhľadu – text ďalej pokračuje v platenej verzii STN