
Energetska učinkovitost stavb - Potrebna energija za ogrevanje in hlajenje, notranje temperature ter zaznavna in latentna toplotna obremenitev - 3. del: Računski postopki v zvezi z adaptivnimi elementi ovoja stavbe (ISO 52016-3:2023)

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)

Energieeffizienz 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)

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)

Ta slovenski standard je istoveten z: EN ISO 52016-3:2023

ICS:

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

SIST EN ISO 52016-3:2024**en,fr,de**

EUROPEAN STANDARD

EN ISO 52016-3

NORME EUROPÉENNE

EUROPÄISCHE NORM

October 2023

ICS 91.120.10

English Version

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

Contents	Page
European foreword.....	3

iTeh Standards
(<https://standards.itih.ai>)
Document Preview

[SIST EN ISO 52016-3:2024](https://standards.itih.ai/catalog/standards/sist/4fcce9cd-f1d9-4073-82a3-8e47e1b20fa1/sist-en-iso-52016-3-2024)

<https://standards.itih.ai/catalog/standards/sist/4fcce9cd-f1d9-4073-82a3-8e47e1b20fa1/sist-en-iso-52016-3-2024>

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.

[SIST EN ISO 52016-3:2024](https://standards.iteh.ai/catalog/standards/sist/4fce9cd-f1d9-4073-82a3-8e47e1b20fa1/sist-en-iso-52016-3-2024)

<https://standards.iteh.ai/catalog/standards/sist/4fce9cd-f1d9-4073-82a3-8e47e1b20fa1/sist-en-iso-52016-3-2024>

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* [52016-3:2024](https://standards.iteh.ai/catalog/standards/sist/4fce9cd-f1d9-4073-82a3-8e47e1b20fa1/sist-en-iso-52016-3-2024)

<https://standards.iteh.ai/catalog/standards/sist/4fce9cd-f1d9-4073-82a3-8e47e1b20fa1/sist-en-iso-52016-3-2024>



Reference number
ISO 52016-3:2023(E)

© ISO 2023

ISO 52016-3:2023(E)

iTeh Standards (<https://standards.iteh.ai>) Document Preview

[SIST EN ISO 52016-3:2024](https://standards.iteh.ai/catalog/standards/sist/4fccc9cd-f1d9-4073-82a3-8e47e1b20fa1/sist-en-iso-52016-3-2024)

<https://standards.iteh.ai/catalog/standards/sist/4fccc9cd-f1d9-4073-82a3-8e47e1b20fa1/sist-en-iso-52016-3-2024>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2023

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

	Page
Foreword	v
Introduction	vi
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Symbols, subscripts and abbreviated terms	4
4.1 Symbols.....	4
4.2 Subscripts.....	5
4.3 Abbreviated terms.....	7
5 Description of the method	7
5.1 Output of the method.....	7
5.2 General description of the method.....	7
6 Calculation method	9
6.1 Output data.....	9
6.2 Calculation time intervals.....	10
6.3 Input data.....	10
6.3.1 General.....	10
6.3.2 Input data of a simplified adaptive building envelope element.....	11
6.3.3 Input data of a detailed adaptive building envelope element.....	11
6.3.4 Control related input data.....	13
6.3.5 Climatic input data.....	15
6.3.6 Constants and physical data.....	15
6.3.7 Input data from Annex A and Annex B	15
6.4 Properties of the adaptive building envelope element.....	15
6.4.1 General.....	15
6.4.2 Simplified or detailed adaptive building envelope element.....	16
6.4.3 Properties of a simplified adaptive building envelope element.....	17
6.4.4 Model and properties of a detailed adaptive building envelope element.....	24
6.5 Connection of the model of the adaptive building envelope element to the model of the thermal zone of ISO 52016-1.....	25
6.5.1 Simplified adaptive building envelope element.....	25
6.5.2 Detailed adaptive building envelope element.....	25
6.6 Selection of control type.....	25
6.7 Modelling of the control of the environmentally activated adaptive building envelope element.....	26
6.8 Modelling of the control scenario for the actively controlled adaptive building envelope element.....	27
6.8.1 General.....	27
6.8.2 Selection of conditions and events.....	27
6.8.3 Selection of sensors.....	29
6.8.4 Selection of methods to identify the conditions or events.....	29
6.8.5 Basic rules for the reference control scenario.....	36
6.8.6 Modelling of the user behaviour.....	38
6.8.7 Reference control scenarios.....	39
6.9 Hourly calculation procedures.....	42
6.10 Post-processing: performance characteristics.....	42
7 Quality control	43
8 Conformance check	43
Annex A (normative) Input and method selection data sheet — Template	45
Annex B (informative) Input and method selection data sheet — Default choices	46

ISO 52016-3:2023(E)

Annex C (normative) Reference control scenarios for adaptive building envelope elements with active solar shading or chromogenic glazing	48
Bibliography	54

iTeh Standards
(<https://standards.itih.ai>)
Document Preview

[SIST EN ISO 52016-3:2024](https://standards.itih.ai/catalog/standards/sist/4fcce9cd-f1d9-4073-82a3-8e47e1b20fa1/sist-en-iso-52016-3-2024)

<https://standards.itih.ai/catalog/standards/sist/4fcce9cd-f1d9-4073-82a3-8e47e1b20fa1/sist-en-iso-52016-3-2024>

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 52016-4²⁾.

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).

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^[Z] 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

Submodule	Overarching		Building (as such)		Technical building systems										
	Descriptions		Descriptions		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	
1	General		General		General										
2	Common terms and definitions; symbols, units and subscripts		Building energy needs	ISO 52016-3 (this document)	Needs								a		
3	Applications		(Free) Indoor conditions without systems	ISO 52016-3 (this document)	Maximum load and power										
4	Ways to express energy performance		Ways to express energy performance		Ways to express energy performance										
5	Building categories and building boundaries		Heat transfer by transmission		Emission and control										
6	Building occupancy and operating conditions		Heat transfer by infiltration and ventilation		Distribution and control										

^a The shaded modules are not applicable.

ISO 52016-3:2023(E)

Table 1 (continued)

Submodule	Overarching		Building (as such)		Technical building systems									
	Descriptions		Descriptions		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.