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First edition
2017-06

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

Part 1: Calculation procedures

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

Partie 1: Méthodes de calcul

Reference number
ISO 52016-1:2017(E)

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Contents

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Foreword

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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).

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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.

This document was prepared by 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 52016 series can be found on the ISO website.

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Introduction

This document is part of a series aimed at the international harmonization of the methodology for assessing the energy performance of buildings. Throughout, this series is referred to as a "set of EPB standards".

All EPB standards follow specific rules to ensure overall consistency, unambiguity and transparency.

All EPB standards provide a certain flexibility with regard to the methods, the required input data and references to other EPB standards, by the introduction of a normative template in Annex A and Annex B with informative default choices.

For the correct use of this document, a normative template is given in Annex A to specify these choices. Informative default choices are provided in Annex B.

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

Use by or for regulators: In case the document is used in the context of national or regional legal requirements, mandatory choices may be given at national or regional level for such specific applications. These choices (either the informative default choices from Annex B or choices adapted to national/regional needs, but in any case following the template of Annex A) can be made available as national annex or as separate (e.g. legal) document (national data sheet).

NOTE 1 So in this case:

— the regulators will specify the choices;

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

Topics addressed in this document can be subject to public regulation. Public regulation on the same topics can override the default values in Annex B. Public regulation on the same topics can even, for certain applications, override the use of this document. Legal requirements and choices are in general not published in standards but in legal documents. In order to avoid double publications and difficult updating of double documents, a national annex may refer to the legal texts where national choices have been made by public authorities. Different national annexes or national data sheets are possible, for different applications.

It is expected, if the default values, choices and references to other EPB standards in Annex B are not followed due to national regulations, policy or traditions, that:

— national or regional authorities prepare data sheets containing the choices and national or regional values, according to the model in Annex A. In this case a national annex (e.g. NA) is recommended, containing a reference to these data sheets;

— or, by default, the national standards body will consider the possibility to add or include a national annex in agreement with the template of Annex A, in accordance to the legal documents that give national or regional values and choices.

Further target groups are parties wanting to motivate their assumptions by classifying the building energy performance for a dedicated building stock.

More information is provided in the Technical Report accompanying this document (ISO/TR 52016-2[1]).

The subset of EPB documents prepared under the responsibility of ISO/TC 163/SC 2 (*Thermal performance and energy use in the built environment, Calculation methods*) cover inter alia:

— calculation procedures on the overall energy use and energy performance of buildings;

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

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

— 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 TCs for the details on e.g. appliances, technical building systems and indoor environment.

This document presents a coherent set of calculation methods at different levels of detail, for the energy needs involved in the space heating and cooling and for (de-)humidification of a building and/or for the internal temperatures and (sensible or latent) heat loads, including the influence from technical buildings systems, control aspects and boundary conditions where relevant for the calculation.

The result of the design loads is also of possible use for the checking of the appropriate sizing of the equipment at the occasion of inspections.

References are made to other International Standards or to national documents for input data and detailed calculation procedures not provided by this document.

This document supersedes ISO 13790:2008. The main differences are:

— integration in the set of EPB standards, as specified in the overarching EPB standard (ISO 52000-1). Including removal of calculation elements that are covered or to be covered in other standards (for instance, the general rules for zoning (partitioning) of the building is now at overarching level (EPB module M1-8); the conditions of use are now assumed to be in a separate standard (module M1-6);

— major editorial changes based on the detailed technical rules for all EPB standards. Including moving all informative annexes to a separate accompanying Technical Report (ISO/TR 52016-2[1]);

— revision of the monthly calculation method and removal of the seasonal method;

— replacement of the simple hourly calculation method by a more direct and transparent method, with no need to add input data;

— integration of the calculation of the design heating and cooling load, including latent heat load, initially prepared as prEN 16798-11:2015 by CEN/TC 156.

Relevant editorial changes have been made based on the detailed technical rules for all EPB standards, including moving all informative annexes, if not covered elsewhere, to a separate accompanying Technical Report (ISO/TR 52016-2[1]).

Together with ISO 52017-1 this document also supersedes ISO 13791:2012[3] and ISO 13792:2012[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 in preparation.

NOTE 3 The modules represent EPB standards, although one EPB standard could cover more than one module and one module could be covered by more than one EPB standard, for instance a simplified and a detailed method respectively. See also Clause 2 and Tables A.1 and B.1.

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Table 1 — Position of this document (in casu M2-2, M2-3, M2-6, M3-3, M4-3, M6-3, M7-3), within the modular structure of the set of EPB standards

	Overarching		Building (as such)		Technical Building Systems									
Sub module	Descrip-tions		Descrip-tions		Descrip-tions	Heat-ing	Cool-ing	Venti-lation	Humid-ifica-tion	Dehu-midifi-cation	Do-mes-tic hot water	Light ing	Build ing auto mation 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	52016-1	Needs								[a]	
3	Applica-tions		(Free) Indoor conditions without systems	52016-1	Maximum load and power	52016-1	52016-1		52016-1	52016-1				
4	Ways to express energy per-formance		Ways to express energy per-formance		Ways to express energy per-formance									
5	Building catego-ries and building boundaries		Heat trans-fer by trans-mission		Emission and control									
6	Building occupan-cy and operating conditions		Heat trans-fer by infil-tration and ventilation	52016-1	Distribu-tion 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 per-formance		Building dynamics (thermal mass)		Load dispatch-ing and operating conditions									
10	Measured energy per-formance		Measured energy per-formance		Measured energy per-formance									
11	Inspection		Inspection		Inspection									
12	Ways to express indoor comfort				BMS									
13	External en-vironment conditions													
14	Economic calculation													

NOTE The shaded modules are not applicable.

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