



NSAI
Standards

Irish Standard
I.S. EN 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 (ISO 52016-1:2017)

I.S. EN ISO 52016-1:2017

Incorporating amendments/corrigenda/National Annexes issued since publication:

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I.S. xxx: Irish Standard — national specification based on the consensus of an expert panel and subject to public consultation.

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National Foreword

I.S. EN ISO 52016-1:2017 is the adopted Irish version of the European Document EN 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 (ISO 52016-1:2017)

Annex I of the Energy Performance of Buildings Directive 2010/31/EU (EPBD) as amended by Directive 2018/844/EU (EPBD) outlines requirements for determining Energy Performance of Buildings and methodologies.

In Ireland:

- The national calculation methodology required by the EPBD is described following the annexes of the overarching standards namely I.S. EN ISO 52000-1, I.S. EN ISO 52003-1, I.S. EN ISO 52010-1, I.S. EN ISO 52016-1, and I.S. EN ISO 52018-1.

- The completed annexes are published in the National Calculation Methodologies, namely the Dwelling Energy Assessment Procedure (DEAP) and the Non-domestic Energy Assessment Procedure (NEAP), and are available from the Sustainable Energy Authority of Ireland (SEAI).

For the values specified in Annex A of this Irish Standard, users are therefore referred to the National Calculation Methodologies.

Note: For any standards mandated under the EPBD Directive, which permit the use of national annexes to specify national calculation methodologies, parameters, limits or values, where a national value is specified, the user is directed towards the National Calculation Methodologies, referred to above and relevant Technical Guidance Documents of the Building Regulations.

This document does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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In line with international standards practice the decimal point is shown as a comma (,) throughout this document.

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EUROPEAN STANDARD

EN ISO 52016-1

NORME EUROPÉENNE

EUROPÄISCHE NORM

July 2017

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Supersedes EN 15255:2007, EN 15265:2007, EN ISO 13790:2008, EN ISO 13791:2012, EN ISO 13792:2012

English Version

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

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 (ISO 52016-1:2017)

Energetische Bewertung von Gebäuden - Berechnung des Energiebedarfs für Heizung und Kühlung, Innentemperaturen sowie der Heiz- und Kühllast in einem Gebäude oder einer Gebäudezone - Teil 1: Berechnungsverfahren (ISO 52016-1:2017)

This European Standard was approved by CEN on 27 February 2017.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

EN ISO 52016-1:2017 (E)

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European foreword

This document (EN ISO 52016-1:2017) 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 January 2018 and conflicting national standards shall be withdrawn at the latest by January 2018.

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.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

This document is part of the set of standards on the energy performance of buildings (the set of EPB standards) and has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association (Mandate M/480, see reference [EF1] below), and supports essential requirements of EU Directive 2010/31/EC on the energy performance of buildings (EPBD, [EF2]).

In case this standard 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, in particular for the application within the context of EU Directives transposed into national legal requirements.

Further target groups are users of the voluntary common European Union certification scheme for the energy performance of non-residential buildings (EPBD art.11.9) and any other regional (e.g. Pan European) parties wanting to motivate their assumptions by classifying the building energy performance for a dedicated building stock.

This International Standard cancels and replaces EN ISO 13790 that was developed during the first EPBD mandate (M/343) and was published in 2008.

This document supersedes EN 15255:2007, EN 15265:2007, EN ISO 13790:2008, EN ISO 13791:2012, EN ISO 13792:2012.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

References:

[EF1] Mandate M/480, Mandate to CEN, CENELEC and ETSI for the elaboration and adoption of standards for a methodology calculating the integrated energy performance of buildings and promoting the energy efficiency of buildings, in accordance with the terms set in the recast of the Directive on the energy performance of buildings (2010/31/EU) of 14th December 2010

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[EF2] EPBD, Recast of the Directive on the energy performance of buildings (2010/31/EU) of 14th December 2010

[EF3] EN 15265:2007, Energy performance of buildings — Calculation of energy needs for space heating and cooling using dynamic methods — General criteria and validation procedures

[EF4] EN 15255:2007, Thermal performance of buildings Sensible room cooling load calculation - General criteria and validation procedures

Endorsement notice

The text of ISO 52016-1:2017 has been approved by CEN as EN ISO 52016-1:2017 without any modification.

INTERNATIONAL STANDARD

**ISO
52016-1**

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
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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

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);

- 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^[2] the same table can be found, with, for each module, the numbers of the relevant EPB standards and accompanying technical reports that are published or in preparation.

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

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

| Sub module | Overarching | | Building (as such) | | Technical Building Systems | | | | | | | | | |
|------------|---|----|---|---------|--|----------|----------|--------------|-----------------|--------------------|----------------------|-----------|-----------------------------------|--------------|
| | Descriptions | | Descriptions | | Descriptions | Heat-ing | Cool-ing | Venti-lation | Humid-ification | 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 cate-gories 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 | Distrib-ution 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.

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

Part 1: Calculation procedures

1 Scope

This document specifies calculation methods for the assessment of:

- a) the (sensible) energy need for heating and cooling, based on hourly or monthly calculations;
- b) the latent energy need for (de-)humidification, based on hourly or monthly calculations;
- c) the internal temperature, based on hourly calculations;
- d) the sensible heating and cooling load, based on hourly calculations;
- e) the moisture and latent heat load for (de-)humidification, based on hourly calculations;
- f) the design sensible heating or cooling load and design latent heat load using an hourly calculation interval;
- g) the conditions of the supply air to provide the necessary humidification and dehumidification.

The calculation methods can be used for residential or non-residential buildings, or a part of it, referred to as “the building” or the “assessed object”.

This document also contains specifications for the assessment of thermal zones in the building or in the part of a building. The calculations are performed per thermal zone. In the calculations, the thermal zones can be assumed to be thermally coupled or not.

The calculation methods have been developed for the calculation of the basic energy loads and needs, without interaction with specific technical building systems, and for the calculation of the system specific energy loads and needs, including the interaction with specific systems. The hourly calculation procedures can also be used as basis for calculations with more extensive system control options.

This document is applicable to buildings at the design stage, to new buildings after construction and to existing buildings in the use phase.

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.

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*

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