
**Energy performance of buildings —
Common terms, definitions and
symbols for the overall energy
performance rating and certification**

*Performance énergétique des bâtiments — Termes, définitions
et symboles communes pour l'évaluation de la performance et la
certification énergétique*

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

In exceptional circumstances, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example), it may decide by a simple majority vote of its participating members to publish a Technical Report. A Technical Report is entirely informative in nature and does not have to be reviewed until the data it provides are considered to be no longer valid or useful.

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.

ISO/TR 16344 was prepared by Technical Committee ISO/TC 163, *Thermal performance and energy use in the built environment*, in conjunction with TC 205, *Building environment design*.

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Introduction

This Technical Report is one of three closely linked documents dealing with definitions and general procedures for overall building energy performance rating and certification (see also Figure 1):

- ISO/TR 16344, *Energy performance of buildings — Common terms, definitions and symbols for the overall energy performance rating and certification*;
- ISO 16343, *Energy performance of buildings — Methods for expressing energy performance and for energy certification of buildings*;
- ISO 16346, *Energy performance of buildings — Assessment of overall energy performance*.

Their development greatly benefited from similar CEN documents (viz. CEN/TR 15615, EN 15217 and EN 15603, respectively) developed to support the European Energy Performance of Buildings Directive (EPBD).

The main differences between this Technical Report (i.e. ISO/TR 16344) and CEN/TR 15615 are:

- this Technical Report covers only the subjects covered in CEN/TR 15615:2008, Annex C (Definitions) and Annex D (Common symbols and subscripts);
- this Technical Report includes specific definitions added from other sources without jeopardizing the consistency and integrity of the document;
- some editorial changes have been made.

Note that a revision of the set of CEN documents to support the EPBD is anticipated in the near future. Issuing the corresponding ISO documents aims to bring the key subject of building energy performance assessment to the fore at the global level.

Given the strong demand for these documents at ISO level, it was decided not to delay the advancement of the ISO documents by waiting for these CEN developments. However, it is expected that a future revision of the ISO documents will be carried out in collaboration with CEN under the Vienna Agreement.

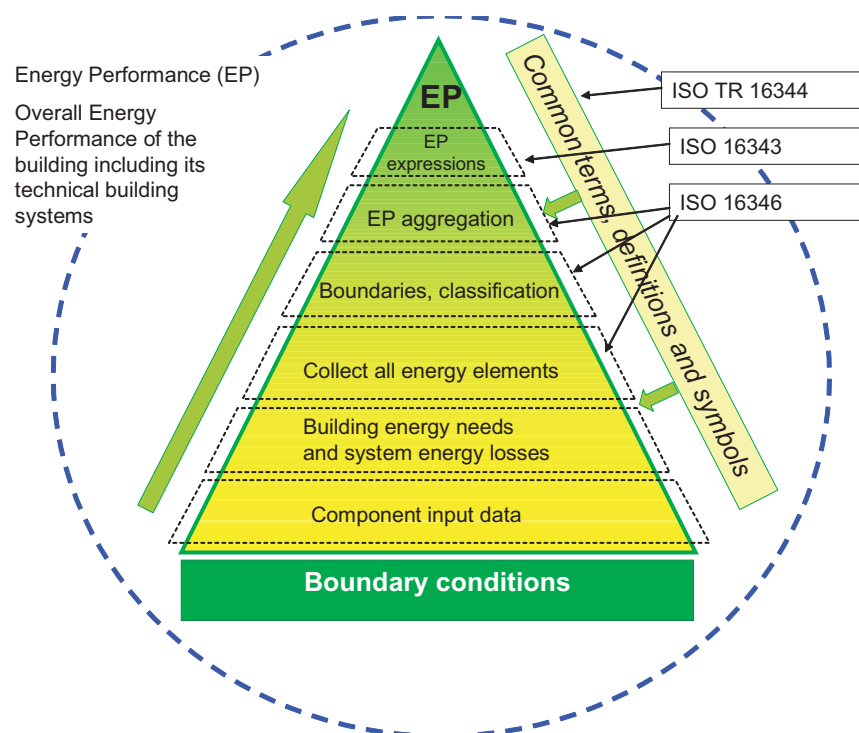


Figure 1 — Flow diagram illustrating the successive elements of the general procedures

The difference between this Technical Report and ISO 16818, *Building environment design — Energy efficiency — Terminology*, is that ISO 16818 gives terms and definitions for use in the design of energy-efficient buildings, while this Technical Report provides an unambiguous and consistent common set of terms, definitions and symbols for all elements of the assessment of the overall energy performance of buildings. The unambiguous and consistent use of terms, definitions and symbols is essential when the energy performance is assessed in the context of national or regional building regulations, e.g. to check compliance with minimum energy performance requirements and/or to produce energy performance certificates for a building.

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Energy performance of buildings — Common terms, definitions and symbols for the overall energy performance rating and certification

1 Scope

This Technical Report provides a coherent set of terms, definitions and symbols for concepts and physical quantities related to the overall energy performance of buildings and its components, including definitions of system boundaries, to be used in all standards elaborated within ISO on energy performance of buildings.

These terms and definitions are applicable to energy calculations in accordance with this Technical Report and standards on the overall energy performance of buildings and their components, to provide input to this Technical Report or using output from this Technical Report. They are based on existing terms and definitions from standards and other documents referenced in the bibliography.

NOTE Slightly different definitions might be applicable to other situations, e.g. design of installations.

2 Terms and definitions

For the purposes of this Technical Report, the terms and definitions given in ISO 7345 and the following apply.

2.1 Terms

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2.1.1

air-conditioned floor area

area equipped with air-conditioning equipment, measured at floor level from the interior surfaces of the walls

NOTE See also “gross floor area”.

2.1.2

air-conditioning system

combination of all components required to provide a form of air treatment in which maximum or minimum temperature is controlled, possibly in combination with the control of ventilation, humidity and air cleanliness

2.1.3

auxiliary energy

electrical energy used by technical building systems for heating, cooling, ventilation and/or hot domestic water to support energy transformation to satisfy energy needs

NOTE 1 This includes energy for fans, pumps, electronics, etc. Electrical energy input to a ventilation system for air transport and heat recovery is not considered as auxiliary energy, but as energy used for ventilation (see 2.1.156).

NOTE 2 In ISO 9488, the energy used for pumps and valves is called “parasitic energy”.

2.1.4

building

construction as a whole, including its envelope and all technical building systems, for which energy is used to condition the indoor climate and to provide domestic hot water and illumination and other services related to the use of the building

NOTE The term can refer to the building as a whole or to parts thereof that have been designed or altered to be used separately.

2.1.5

building area

greatest horizontal area of a building above grade within the outside surface of the exterior walls or within the outside surface of the exterior wall and the centrelines of the fire walls

2.1.6

building automation and control

products, software and engineering services for automatic controls, monitoring and optimization, human intervention and management to achieve energy-efficient, economical and safe operation of building services equipment

2.1.7

building calculation model

mathematical model of the building, used to calculate its energy use

2.1.8

building energy cost

calculated annual energy cost of all purchased energy for the building

2.1.9

building heat transfer coefficient

sum of the transmission and ventilation heat transfer coefficients

2.1.10

building services

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

2.1.11

building type

classification of a building by usage as given in definitions 2.1.11.1 to 2.1.11.9

2.1.11.1

assembly

building or structure for the gathering together of persons, such as auditoriums, churches, reception halls, gymnasiums, theatres, museums, passenger depots, sports facilities and public assembly halls

2.1.11.2

health and institutional

building or structure for the purpose of providing medical treatment, confinement or care, and sleeping facilities such as hospitals, sanatoriums, clinics, orphanages, nursing homes, mental institutions, reformatories, jails and prisons

2.1.11.3

hotel or motel

building or structure for transient occupancy, including not only hotels and motels but also resorts, barracks and dormitories

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2.1.11.4**multifamily**

building or structure containing three or more dwelling units

NOTE See also “dwelling unit”.

2.1.11.5**office**

<business> building or structure for office, professional or service type transactions, such as medical offices, banks, libraries and governmental office buildings

2.1.11.6**restaurant**

building or structure for the consumption of food or drink, including fast food restaurants, coffee shops, cafeterias, bars and restaurants

2.1.11.7**retail**

<mercantile> building or structure for the display and sale (wholesale or retail) of merchandise, such as shopping malls, food markets, auto dealerships, department stores and specialty shops.

2.1.11.8**school**

<educational> building or structure for the purpose of instruction such as schools, colleges, universities, and academies

2.1.11.9**warehouse**

building or structure for storage, such as aircraft hangers, garages, warehouses, storage buildings and freight depots

2.1.12**building envelope**

elements of a building that enclose conditioned spaces through which thermal energy may be transferred to or from the exterior or to or from unconditioned spaces

2.1.13**building envelope, exterior**

elements of a building that separate conditioned spaces from the exterior

2.1.14**building envelope, semi-exterior**

elements of a building that separate conditioned spaces from unconditioned spaces or that enclose semi-heated spaces through which thermal energy may be transferred to or from the exterior, or to or from unconditioned spaces, or to or from conditioned spaces

NOTE 1 Building envelope defines the surfaces that need to be insulated, or weather-stripped. The outer shell of the building is not necessarily the same as the building envelope, particularly where the building contains semi-heated or unconditioned spaces.

NOTE 2 In some cases, the designer can determine the location of the exterior building envelope by the location that they place the insulation. For instance, it is not uncommon for a stairwell to be at the outside edge of the building. If that stairwell does not have any heating or cooling supply, it could be insulated on the outside edge or the side adjacent to other heated or cooled spaces. If insulated on the outside, the stairwell becomes indirectly conditioned, and the outside wall is the exterior building envelope. If insulated on the inside, the inside wall is likely to become the exterior building envelope (unless the outside exposure is so small that it would still be indirectly conditioned space).

NOTE 3 Where a building with conditioned space also contains semi-heated spaces or unconditioned spaces, the building envelope for the conditioned space is the roofs, walls, floors, doors, fenestration, etc., that separate the conditioned space from the exterior. These elements must comply with the residential or non-residential conditioned-space requirements.

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NOTE 4 For semi-heated spaces, the building envelope includes any roofs, walls, floors, doors, fenestration, etc., that separate the semi-heated space from conditioned or unconditioned spaces (as well as from the exterior). These elements must comply with the semi-heated space requirements, as must elements separating conditioned space from unconditioned space.

2.1.15

building heat transfer coefficient

sum of the transmission and ventilation heat transfer coefficients

2.1.16

calculated energy rating

energy rating based on calculations of the weighted net delivered energy used by a building for heating, cooling, ventilation, domestic hot water and lighting

NOTE National bodies can decide whether other energy uses resulting from occupants' activities, such as cooking, production, laundering, computer equipment, etc., are included or not. If included, standard input data needs to be provided for the various types of building and uses. Lighting is always included except (by decision of national bodies) for residential buildings.

2.1.17

calculation step

discrete time interval for the calculation of the energy needs and uses for heating, cooling, humidification, dehumidification and lighting

2.1.18

calculation period

period of time over which a calculation is performed

NOTE The calculation period can be divided into a number of calculation-step periods

2.1.19

CO_{2e} emission coefficient

for a given energy carrier, quantity of CO₂ emitted to the atmosphere per unit of delivered energy

NOTE The CO_{2e} emission coefficient includes the equivalent emissions of other greenhouse gases (e.g. methane).

2.1.20

cogeneration

simultaneous generation in one process of thermal energy and electrical or mechanical energy

NOTE Also known as combined heat and power (CHP).

2.1.21

cooling

removal of latent and/or sensible heat

2.1.22

commissioning

sequence of events to enable the functioning of a building and its heating, ventilation and air-conditioning (HVAC) system in accordance with the design parameters

2.1.23

conditioned space

cooled space, heated space or indirectly conditioned space as defined in definitions 2.1.23.1 to 2.1.23.3

2.1.23.1

cooled space

enclosed space within a building that is cooled by a cooling system

2.1.23.2**heated space**

enclosed space within a building that is heated by a heating system whose output capacity relative to the floor area is greater than or equal to the design criteria

2.1.23.3**indirectly conditioned space**

enclosed space within a building that is not a heated space or a cooled space but which is heated or cooled indirectly by being connected to adjacent space(s) provided: (a) the product of the U-factor(s) and surface area(s) of the space(s) adjacent to the connected space(s) exceeds the combined sum of the product of the U-factor(s) and surface areas(s) of the space(s) adjoining the outdoors, unconditioned spaces and semi-heated spaces (e.g. corridors), or (b) that air from heated or cooled spaces is intentionally transferred (naturally or mechanically) into the space at a rate exceeding three air changes per hour (ACH)

2.1.24**conditioned area**

floor area of conditioned spaces, excluding non-habitable cellars or non-habitable parts of a space, including the floor area on all storeys if more than one

NOTE 1 Internal, overall internal or external dimensions may be used. This leads to different areas for the same building, however.

NOTE 2 Some services, such as lighting or ventilation, might be provided to areas not included in this definition (e.g. a car park).

NOTE 3 The precise definition of the conditioned area is given by national authorities.

NOTE 4 Conditioned area can be taken as the useful area unless it is otherwise defined in national regulations.

2.1.25**conditioned zone**

part of a conditioned space with a given set-point temperature or set-point temperatures, throughout which there is the same occupancy pattern and the internal temperature is assumed to have negligible spatial variations, and which is controlled by a single heating system, cooling system and/or ventilation system

2.1.26**confidence interval**

interval that has a high probability (e.g. 95 %) of including the actual value

2.1.27**construction**

erection of a new building, or any addition to or alteration of an existing building

2.1.28**construction documents**

drawings and specifications used to construct a building, building systems or portions thereof

2.1.29**daylight space**

space bounded by vertical planes rising from the boundaries of the daylight area on the floor to the floor above or to the roof

2.1.30**daylight zone**

types of daylight zone are as given in definitions 2.1.30.1 and 2.1.31.2

2.1.30.1**under a skylight**

area under a skylight whose horizontal dimension in each direction is equal to the skylight dimension in that direction plus either the floor to ceiling height or the dimension to an opaque partition, or one-half the distance to an adjacent skylight or vertical glazing, whichever is least

2.1.30.2

adjacent to vertical glazing

area adjacent to vertical glazing which receives daylighting from the glazing

NOTE For the purposes of this definition and unless more detailed daylighting analysis is provided, the daylighting zone depth is assumed to extend into the space a distance of 45 m or to the nearest opaque partition, whichever is less. The daylighting zone width is assumed to be the width of the window plus either 6 m on each side, the distance to an opaque partition, or one-half the distance to an adjacent skylight or vertical glazing, whichever is least.

2.1.31

control

action or device to regulate the operation of equipment

2.1.32

dehumidification

process of removing water vapour from air to reduce the relative humidity

2.1.33

delivered energy

energy, expressed per energy carrier, supplied to the technical building systems through the system boundary to satisfy the uses taken into account (heating, cooling, ventilation, domestic hot water, lighting, appliances, etc.) or to produce electricity

NOTE 1 For active solar and wind energy systems, the solar radiation incident on solar panels or on solar collectors or the kinetic energy of wind is not part of the energy balance of the building. It is decided at national level whether or not renewable energy produced on site is part of the delivered energy.

NOTE 2 Delivered energy can be calculated for defined energy uses or it can be measured.

2.1.34

demand-controlled ventilation

ventilation system in which the room airflow rate is governed by an automatic control depending upon the levels of occupancy and activity within the space

NOTE Examples are the speed of fans controlled by a presence indicator such as the CO₂ level in the room air, a presence detector or a timer.

2.1.35

design conditions

specified environmental conditions, such as temperature and light intensity, required to be produced and maintained by a system and under which the system must operate

2.1.36

design criteria

set of descriptions based on a particular environmental element such as indoor air quality, thermal, acoustical and visual comfort, energy efficiency and the associated system controls to be used for assessing the design presented

2.1.37

design documentation

written description of the essential design elements of a plant

2.1.38

design energy rating

calculated energy rating using design data for a building and a standard use data set

NOTE It represents the calculated intrinsic annual energy use of a building design under standardized conditions. This is particularly relevant in order to obtain a building permit at the design stage.

2.1.39**design parameters**

set values of the internal environmental conditions to be achieved regardless of the changing external environmental conditions

2.1.40**design process**

course of purposive actions performed to produce a set of design drawings and specifications in which a building having the potential to provide the functionalities required is described

NOTE Any changes in the building environment design after iterations of decisions and evaluations of the design have been made must be analysed until the final design stage is reached.

2.1.41**distribution system**

conveying means, such as ducts, pipes and wires, to bring substances or energy from a source to the point of use

NOTE The distribution system includes auxiliary equipment such as fans, pumps and transformers.

2.1.42**domestic hot water heating**

process of heat supply to raise the temperature of cold water to the intended delivery temperature

2.1.43**efficiency**

performance at specified conditions for the assessment of the energy performance

2.1.44**efficiency of HVAC system**

ratio of the useful energy output (at the point of use) to the energy input in consistent units, for a designated time period, expressed in percent

2.1.45**energy**

capability for doing work; having several forms that may be transformed from one to another, such as thermal (heat), mechanical (work), electrical or chemical

2.1.46**energy carrier**

substance or phenomenon that can be used to produce mechanical work or heat or to operate chemical or physical processes

[ISO 13600:1997]

NOTE The energy content of fuels is given by their gross calorific value.

2.1.47**energy certification**

procedures enabling an energy certificate to be obtained

2.1.48**energy certificate**

document, recognized by a member state or a legal person designated by it, which includes the energy performance of a building

NOTE The meanings of the terms “certificate” and “certification” in this Technical Report differ from those in ISO/IEC 17000:2004.

2.1.49**energy class**

easy-to-understand designation system (e.g. A to G) for indicating the energy performance of a building