SLOVENSKI STANDARD
oSIST prEN ISO 52120-1:2020

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Energijske lastnosti stavb - 1. del: Vpliv avtomatizacije, regulacije in upravljanja stavb - 1. del: Moduli M10-4, 5, 6, 7, 8, 9, 10 (ISO/DIS 52120-1:2020)

Energy performance of buildings - Contribution of building automation and controls and building management - Part 1: Modules M10-4,5,6,7,8,9,10 (ISO/DIS 52120-1:2020)

Energieeffizienz von Gebäuden - Einfluss von Gebäudeautomation und Gebäudemanagement - Teil 1: Module M10☐4, 5, 6, 7, 8, 9, 10 (ISO/DIS 52120-1:2019)

Performance énergétique des bâtiments - Impact de l'automatisation, de la régulation et de la gestion technique des bâtiments - Partie 1: Modules M10-4,5,6,7,8,9,10 (ISO/DIS 52120-1:2020)

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ICS:

91.120.10	Toplotna izolacija stavb	Thermal insulation of buildings
97.120	Avtomatske krmilne naprave za dom	Automatic controls for household use

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Energy performance of buildings — Contribution of building automation and controls and building management —

Part 1:
Modules M10-4,5,6,7,8,9,10

Performance énergétique des bâtiments — Impact de l'automatisation, du contrôle et de la gestion techniques des bâtiments —

Partie 1: Modules M10-4,5,6,7,8,9,10

ICS: 91.120.10

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Contents

Page

ISO/DIS 52120-1:2020(E)

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 meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

ISO 52120-1 was prepared by International Standardization Organisation (ISO) technical committee ISO/TC 205 "Building Environmental Design" under Vienna Agreement with ISO Lead.).

ISO 52120 consists of the following parts, under the general title Impact of Building Automation, Controls and Building Management:

— Part 1: General framework and procedures

— Part 2: Explanation and justification of ISO 52120-1

Introduction

This International Standard is part of a series of standards aiming at international harmonization of the methodology for the assessment of the energy performance of buildings, called "EPB set of standards".

As part of the "EPB set of standards" it complies with the requirements for the set of basic EPB documents ISO 52000-1 (see Normative references), CEN/TS 16628 and CEN/TS 16629 (see Bibliography[2] and[3]) developed under a mandate given to CEN by the European Commission and the European Free Trade Association (Mandate M/480).

This standard is clearly identified in the modular structure developed to ensure a transparent and coherent EPB standard set in ISO 52000-1. BAC (Building Automation and Control) is identified in the modular structure as Technical Building System M10However, other standards issued by ISO TC 205 deal with control accuracy, control functions and control strategies using standards communications protocol (these last standards do not belong to the EPB standards set).

To avoid a duplication of calculation due to the BAC (avoid double impact), no calculation are done in BAC EPB standard set, but in each underlying standard of EPB set of standards (from M1 to M9 in the Modular Structure), an IDENTIFIER developed and present in the M10 covered by ISO DIS 52120-1 is used where appropriate. These way of interaction is described in detailed in the Technical Report (ISO/TR 52000-2) accompanying the over-arching standard. As consequence, the Annex A and Annex B concept as EXCEL sheet with the calculation formulas used in the EPB standards are not applicable for this standard.

The main target groups of this standard are all the users of the set of EPB standards (e.g. architects, engineers, regulators).

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 standard (draft ISO TR 52120-2[5]).

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Energy performance of buildings — Contribution of building automation and controls and building management —

Part 1:
Modules M10-4,5,6,7,8,9,10

1 Scope

This International Standard specifies:

— a structured list of control, building automation and technical building management functions which contribute to the energy performance of buildings; functions have been categorized and structured according to building disciplines and so called Building automation and control (BAC);

— a method to define minimum requirements or any specification regarding the control, building automation and technical building management functions contributing to energy efficiency of a building to be implemented in building of different complexities;

— a factor based method to get a first estimation of the effect of these functions on typical buildings types and use profiles;

— detailed methods to assess the effect of these functions on a given building.

Table 1 shows the relative position of this standard within the set of EPB standards in the context of the modular structure as set out in ISO 52000-1.

NOTE 1   In ISO/TR 52000-2 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 2   The modules represent EPB standards, although one EPB standard may cover more than one module and one module may be covered by more than one EPB standard, for instance a simplified and a detailed method respectively.

Table 1 — Position of this standard (in casu M10–4,5,6,7,8,9,10), within the modular structure of the set of EPB standards

Submodule	Over-arching Descriptions	Building (as such) Descriptions	Technical Building System									
			Descriptions	Heating	Cooling	Ventilation	Humidification	Dehumidification	Domestic Hot waters	Lighting	Building automation 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	Needs									
a The shaded modules are not applicable.												

ISO/DIS 52120-1:2020(E)

Table 1 *(continued)*

Submodule	Over-arching Descriptions	Building (as such) Descriptions	Descriptions	Heating	Cooling	Ventilation	Humidification	Dehumidification	Domestic Hot waters	Lighting	Building automation and control	PV, wind, ..
sub1	M1	M2		M3	M4	M5	M6	M7	M8	M9	M10	M11
3	Application	(Free) Indoor Conditions without Systems	Maximum Load and Power									
4	Ways to Express Energy Performance	Ways to Express Energy Performance	Ways to Express Energy Performance								x	
5	Building Functions and Building Boundaries	Heat Transfer by Transmission	Emission and control								x	
6	Building Occupancy and Operating Conditions	Heat Transfer by Infiltration and Ventilation	Distribution and control								x	
7	Aggregation of Energy Services and Energy Carriers	Internal Heat Gains	Storage and control								x	
8	Building Partitioning	Solar Heat Gains	Generation and control								x	
9	Calculated Energy Performance	Building Dynamics (thermal mass)	Load dispatching and operating conditions								x	
10	Measured Energy Performance	Measured Energy Performance	Measured Energy Performance								x	
11	Inspection	Inspection	Inspection									
12	Ways to Express Indoor Comfort		BMS									
13	External Environment Conditions											
14a	Economic Calculation											

a   The shaded modules are not applicable.

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2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 50001:2011, *Energy management systems — Requirements with guidance for use (ISO 50001:2011)*

ISO 52000-1:2017, *Energy performance of buildings — Overarching EPB assessment — Part 1: General framework and procedures*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 7345:1995, in ISO 52000-1:2017 and the following apply.

3.1
auxiliary energy
electrical energy used by technical building systems to support energy transformation to satisfy energy needs

Note 1 to entry: This includes energy for fans, pumps, electronics etc. Electrical energy input to the ventilation system for air transport and heat recovery is not considered as auxiliary energy, but as energy use for ventilation.

Note 2 to entry: In ISO 9488 the energy used for pumps and valves is called "parasitic energy".

[SOURCE: ISO 52000-1]

3.2
building automation and control
BAC
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

[SOURCE: ISO 52000-1:2017, modified – The symbol BAC was added.]

3.3
building automation and control system
BACS
system, comprising all products, software and engineering services for automatic controls (including interlocks), monitoring, optimization, for operation, human intervention, and management to achieve energy–efficient, economical, and safe operation of building services

Note 1 to entry: BACS is also referred to as BMS (Building management system).

Note 2 to entry: The use of the word 'control' does not imply that the system/device is restricted to control functions. Processing of data and information is possible.

Note 3 to entry: If a building control system, building management system, or building energy management system complies with the requirements of the ISO 16484- series, it should be designated as a building automation and control system (BACS).

Note 4 to entry: Building services is divided in technical, infrastructural and financial building services and energy management is part of technical building management.

Note 5 to entry: Building energy management system is part of a BMS.

Note 6 to entry: Building energy management system comprising data collection, logging, alarming, reporting, and analysis of energy usage etc. The system is designed to reduce the energy consumption, improve the utilization, increase the reliability, and predict the performance of the technical building systems, as well as optimize energy usage and reducing its cost.

[SOURCE: ISO 16484-2:2004, modified – Notes 1, 4 and 5 have been added.]

ISO/DIS 52120-1:2020(E)

3.4
building management
BM
totality of services involved in the management operation and monitoring of buildings (including plants and installations)

Note 1 to entry: Building management can be assigned as part of facility management.

[SOURCE: CEN/TS 15379:2006, modified – Second part of the definition became Note 1 to entry.]

3.5
control function
BAC effect of programs and parameters

Note 1 to entry: BAC functions are referred to as control functions, I/O, processing, optimization, management and operator functions. They are listed in the BAC FL (function list) for a specification of work.

Note 2 to entry: Function is a program unit that delivers exactly one data element, which can be a multiple value (i.e. an array or a structure). Functions can be an operand in a program. [EN 61131–3]

3.6
delivered energy
energy, expressed per energy carrier, supplied to the technical building systems through the assessment boundary, to satisfy the uses taken into account or to produce the exported energy

Note 1 to entry: Delivered energy can be calculated for defined energy uses or it can be measured.

[SOURCE: ISO 52000-1]

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3.7
energy carrier
substance or phenomenon that can be used to produce mechanical work or heat or to operate chemical or physical processes

[SOURCE: ISO 52000-1]

3.8
energy need for heating or cooling
heat to be delivered to or extracted from a thermally conditioned space to maintain the intended space temperature conditions during a given period of time

Note 1 to entry: The energy need can include additional heat transfer resulting from non-uniform temperature distribution and non-ideal temperature control, if they are taken into account by increasing (decreasing) the effective temperature for heating (cooling) and not included in the heat transfer due to the heating (cooling) system.

3.9
energy efficiency
ratio or other quantitative relationship between an output of performance, service, goods or energy, and an input of energy

EXAMPLE   Efficiency conversion energy; energy required/energy used; output/input; theoretical energy used to operate/energy used to operate.

Note 1 to entry: Both input and output need to be clearly specified in quantity and quality, and be measureable.

[SOURCE: ISO 50001-1:2011 modified - Symbol removed]

3.10
energy efficiency improvement
increase in energy efficiency as a result of technological, behavioural or economic changes

[SOURCE: ISO 50001-1:2011]

3.11
integrated building automation and control systems
BACS designed to be interoperable and with the ability to be connected to one or more specified 3rd party building automation and control devices/systems through open data communication network or interfaces performed by standardized methods, special services and permitted responsibilities for system integration

EXAMPLE   Interoperability between 3rd party BACS devices/systems for HVAC, domestic hot water, lighting, electrical power distribution, energy metering, elevators and escalators, other plants, as well as systems for communications, access control, security, life safety etc.

3.12
integrated function
BAC effect of programs, shared data points and parameters for multi-discipline interrelationships between various building services and technologies

3.13
measured energy performance
energy performance based on measured amounts of delivered and exported energy

Note 1 to entry: The measured rating is the weighted sum of all energy carriers used by the building, as measured by meters or derived from measured energy by other means. It is a measure of the in-use performance of the building after correction or extrapolation. This is particularly relevant to certification of actual energy performance.

Note 2 to entry: Also known as "operational rating".

[SOURCE: ISO 52000-1]

3.14
set-point temperature of a conditioned zone
internal (minimum) temperature, as fixed by the control system in normal heating mode, or internal (maximum) temperature, as fixed by the control system in normal cooling mode

Note 1 to entry: The corrected value of a temperature setpoint is used for the calculation of energy performance. It enables the impact of the accuracy of the control system on the energy performance to be taken into account.

3.15
thermally activated building systems
TABS
massive building fabric actively heated or cooled by integrated air or water based systems

3.16
technical building management
TBM
process(es) and services related to operation and management of buildings and technical building system through the interrelationships between the different disciplines and trades

Note 1 to entry: The disciplines and trades comprise all technical building services for the purpose of optimized maintenance and energy consumption.

EXAMPLE   Optimization of buildings through interrelationships ranging from heating, ventilation and air conditioning (HVAC) to lighting and day lighting to life safety and security to electric power systems and energy monitoring and metering; to its services, including communications and maintenance and to its management.

3.17
technical building system
technical equipment for heating, cooling, ventilation, humidification, dehumidification, domestic hot water, lighting and electricity production

Note 1 to entry: A technical building system can refer to one or to several building services (e.g. heating, heating and DHW).

ISO/DIS 52120-1:2020(E)

Note 2 to entry: A technical building system is composed of different subsystems.

Note 3 to entry: Electricity production can include cogeneration and photovoltaic systems.

[SOURCE: ISO 52000-1]

4 Symbols, subscripts and abbreviations

4.1 Symbols

For the purposes of this document, the symbols given in ISO 52000-1:2017, Clause 4 and Annex C and the specific symbols listed in Table 2 apply.

Table 2 — Symbols and units

Symbol	Quantity	Unit
a	normalized level, e.g. occupancy or gains	-
$\bar{\beta}$	mean part load	-
Φ	heat flow rate, thermal power	kW

4.2 Subscripts

For the purposes of this document, the subscript given in ISO 52000-1:2017, Clause 4 and Annex C and the specific subscripts listed in Table 3 apply.

Table 3 — Subscripts

Subscript	Term	Subscript	Term	Subscript	Term
amb	ambient	end	end	th	thermal
BAC	building automation and control	r	room	trans	transfer
cor	correction	ref	reference		
DHW	domestic hot water	sta	start		

5 Description of the method

5.1 Output of the method

This standard describes two methods of how to calculate the contribution of building automation and controls to the energy performance of buildings. The two methods are:

— Detailed method: Output of the detailed method is a list of automation, control and management function types that is used to run a detailed calculation of building energy performance based on other EPBD standards. Beside this the detailed method would also allow classification of a building automation and control system according to a set of criteria defined in this standard. There is no limitation regarding the time step.

— Factor based method: Output of the factor based method is the energy demand of a building according to a given building automation and control classification. The time step of the output is a yearly step.

5.2 General description of the method(s)

Two methods are given:

— method 1, defined in <u>Clause 6</u> "Method 1 – Detailed method", is meant for a detailed energy performance analysis of a building in case detailed information about the building, the HVAC systems and especially the type of automation, control and management functions is available that can be applied in a holistic EPBD calculation method.

— method 2, defined in <u>Clause 7</u> "Method 2 – Factor based method" is intended for easily calculating a rough estimate of the impact of building automation, control and management on the energy performance of a building just based on a given energy performance (either a consumption metered, or a demand calculated) correlated to a certain BAC efficiency classification of the building.

5.3 Selection criteria between the methods

For the calculation of the impact of building automation, control and management functions on the building energy performance the detailed method is method 1 in this standard. The following <u>Figure 1</u> illustrates how to use the detailed method compared to the simplified BAC Factor method.
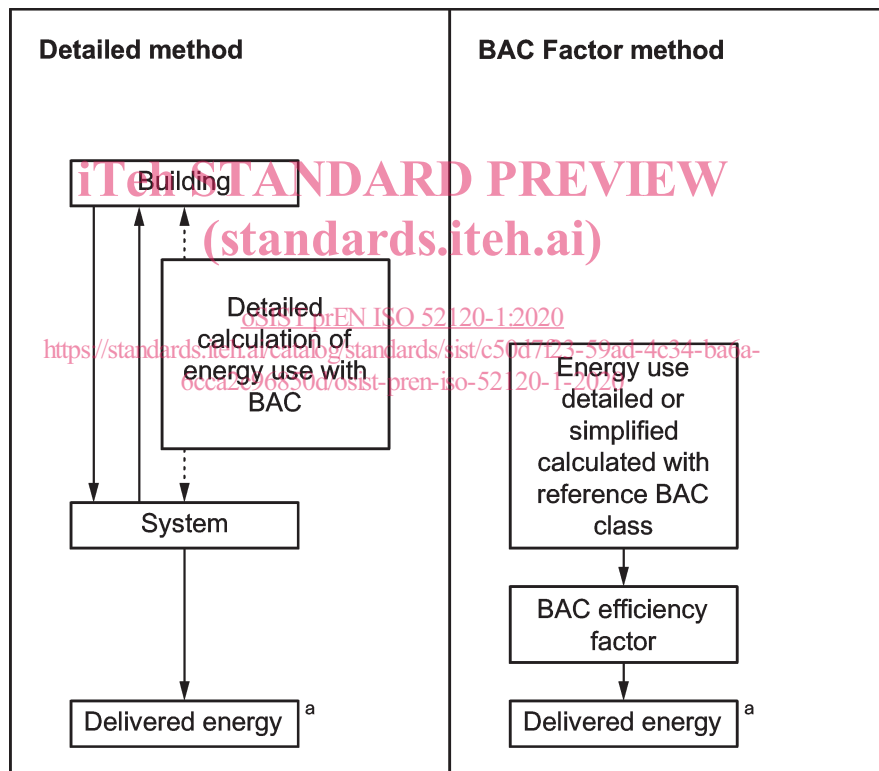
Key

a   delivered energy is the total energy, expressed per energy carrier (gas, oil, electricity etc.) used for heating, cooling, ventilation, domestic hot water or lighting

NOTE   Arrows illustrate only the calculation process and do not represent energy and/or mass flows.

Figure 1 — Detailed method in comparison with BAC Factor method

The detailed method should be used only when a sufficient knowledge about automation, control and management functions used for the building and the energy systems is available. The application of the detailed calculation procedure implies that all automation, control and management functions that have to be account for the operation of a building and its energy systems are known. <u>Clause 6</u> gives a general survey of those functions and declares how to use them in the context of energy performance calculations.