# SLOVENSKI STANDARD
# SIST-TP CEN ISO/TR 52120-2:2022

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**Nadomešča:**
**SIST-TP CEN/TR 15232-2:2018**

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**Energijske lastnosti stavb - Vpliv avtomatizacije, regulacije in upravljanja stavb - 2. del: Razlaga in utemeljitev ISO 52120-1 (ISO/TR 52120-2:2021)**

Energy performance of buildings - Contribution of building automation, controls and building management - Part 2: Explanation and justification of ISO 52120-1 (ISO/TR 52120-2:2021)



Energieeffizienz von Gebäuden - Einfluss von Gebäudeautomation und Gebäudemanagement - Teil 2: Erläuterung und Begründung von ISO 52120-1 (ISO/TR 52120-2:2021)

Performance énergétique des bâtiments - Impact de l'automatisation, de la régulation et de la gestion technique des bâtiments - Partie 2: Explication et justification de l'ISO 52120-1 (ISO/TR 52120-2:2021)



**Ta slovenski standard je istoveten z:** **CEN ISO/TR 52120-2:2022**

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| 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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TECHNICAL REPORT

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# CEN ISO/TR 52120-2

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ICS 91.120.10

Supersedes CEN/TR 15232-2:2016

English Version

# Energy performance of buildings - Contribution of building automation, controls and building management - Part 2: Explanation and justification of ISO 52120-1 (ISO/TR 52120-2:2021)

Performance énergétique des bâtiments - Impact de l'automatisation, de la régulation et de la gestion technique des bâtiments - Partie 2: Explication et justification de l'ISO 52120-1 (ISO/TR 52120-2:2021)

Energieeffizienz von Gebäuden - Einfluss von Gebäudeautomation und Gebäudemanagement - Teil 2: Erläuterung und Begründung von ISO 52120-1 (ISO/TR 52120-2:2021)

This Technical Report was approved by CEN on 23 June 2020. It has been drawn up by the Technical Committee CEN/TC 247.

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## European foreword

This document (CEN ISO/TR 52120-2:2022) has been prepared by Technical Committee ISO/TC 205 "Building environment design" in collaboration with Technical Committee CEN/TC 247 “Building Automation, Controls and Building Management” the secretariat of which is held by SNV.

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

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.

## Endorsement notice

The text of ISO/TR 52120-2:2021 has been approved by CEN as CEN ISO/TR 52120-2:2022 without any modification.

TECHNICAL REPORT

# ISO/TR 52120-2

First edition
2021-12

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

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



*Performance énergétique des bâtiments — Impact de l'automatisation, de la régulation et de la gestion technique des bâtiments —*

*Partie 2: Explication et justification de l'ISO 52120-1*



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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).

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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 Technical Committee ISO/TC 205, *Building environment design*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 247, *Building Automation, Controls and Building Management*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).



A list of all parts in the ISO 52120 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.

# Introduction

This document consolidates information that is considered important for users to properly understand, apply and nationally adapt the EPB standards.

The detailed technical rules in CEN/TS 16629 ask for a clear separation between normative and informative contents:

— to avoid flooding and confusing the actual normative part with informative content;

— to reduce the page count of the actual standard;

— to facilitate understanding of the package.

Therefore, it is important that each EPB standard is accompanied by an informative technical report, like this document, where all informative contents are collected. Table 1 shows the relative position of this document within the EPB set of standards.

**Table 1 — Position of this document within the EPB set of standards**

| | Over-arching | Building (as such) | Technical building system | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sub module | Descriptions | 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 |
| 1 | General | General | General | | | | | | | | | |
| 2 | Common terms and definitions; symbols, units and subscripts | Building energy needs | Needs | | | | | | | | | |
| 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 | | | | | | | | | | | |
| 14[a] | Economic calculation | | | | | | | | | | | |

[a] The shaded modules are not applicable.

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

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

## 1 Scope

This document contains information to support the correct understanding, use and adoption of ISO 52120-1.

## 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 52120-1, *Energy performance of buildings — Contribution of building automation, controls and building management — Part 1: General framework and procedures*

ISO 7345, *Thermal performance of buildings and building components — Physical quantities and definitions*

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



## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 7345, ISO 52000-1 and ISO 52120-1 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

## 4 Symbols and abbreviated terms

### 4.1 Symbols

For the purposes of this document, the symbols given in ISO 52000-1 and ISO 52120-1 apply.

### 4.2 Abbreviated terms

For the purposes of this document, the abbreviations in ISO 52120-1 apply.

# 5 Method description

## 5.1 Effect of building automation and control (BAC) and technical building management (TBM)

### 5.1.1 General

The key-role of building automation and control and TBM is to ensure the balance between the desired human comfort, which should be maximal, and energy used to obtain this goal, which should be minimal.

The scope of BAC and TBM covers in accordance with their role from one side all technical building systems (where the effect of the BAC is used in the calculation procedures) and from another side the global optimization energy performance of a building.

Several categories of controls could be identified.

— Technical building systems specific controls: these controllers are dedicated to the physical chain of transformation of the energy, from generation to storage, distribution and emission. We find them in the matrix starting with the Modules M3-5 to M9-5 and finishing with M3-8 till M9-8. We could consider that one controller exists by module, but sometimes one controller does the control among several modules. More often, these controllers are communicating between them via a standardized open bus, such as BACnet, KNX or LON.

— BAC used for all or several technical building systems that do multidiscipline (heating, cooling, ventilation, DHW, lighting) optimization and complex control functions. For example, one of them is INTERLOCK, a control function that avoids heating and cooling at the same time.

— If all technical building systems are used in the building, we have (depending of the size of the building) a technical building management system. Specific global functions are implemented here and are necessary to reach the key-role mentioned above. Usually, in this case, an interrelation with the building as such (Module M2) will occur, mainly to take in consideration the building needs; for example, due to outside temperature, taking into account the inertia of the building when the control will reach the set point in a room.



In a control system dedicated to a building, in this case BAC and TBM, we can distinguish three main characteristics as described in 5.1.2, 5.1.3 and 5.1.4.

### 5.1.2 Control accuracy

Control accuracy is the degree of correspondence between the ultimately controlled variable and the ideal value in a feedback control system. The controlled variable could be any physical variable such as a temperature, humidity, pressure, etc. The ideal value is in fact the setpoint established by the user (occupant) when he determines his level of comfort. It is clear that the entire control loop is concerned with all the elements constituent, such as sensors, valves and actuators. The equipment itself is another important element and usually specific equipment asks for a specific controller. For the energy carrier hot water, an important issue is the balancing of the hydraulic circuits. For that purposes, balancing hydraulic valves are need it.

The temperature control accuracy (CA) for a zone temperature is a key number that allows calculating the additional energy needed for heating or cooling caused by the inaccuracy of zone temperature control. The temperature control accuracy (CA) can be calculated from control variation (CV) and control set point deviation (CSD) as described in the main text of EN 15500-1:2017. The compliance with CA is also defined in EN 15500-1. This is an important input for EN 15316-2 and for EN 16798-7, where the effect of the control for heating, cooling and ventilation is taken into account.

The same standard (EN 15500-1:2017) describes also the four operations modes that deal with the levels of temperatures: comfort, pre-comfort, economy and frost/building protection. These four predefined operation modes are parameters that could be set by the users (occupant) (e.g. the

temperature allocated to each operation mode). These operations modes are important for the control strategy used for intermittence, which will be described below.

### 5.1.3 Control function

The control function is the ability of a controller (or set of communicative controllers) to perform a determined task(s). Usually the functions implemented in the controllers are parametric or freely programmable. The functions could be performed by a single controller or by a set of communicative controllers. A controller could perform several functions.

The control functions present in a BAC or TBM, are present in ISO 52120-1:2021, Table 5. These functions are organized in the matrix given by the modular structure of EPB standards. ISO 52120-1:2021, Table 5 starts with heating emission, distribution, storage and generation (M3-5, M3-6, M3-7, M3-8) followed by domestic hot water, cooling, ventilation and lighting (M9-5, M9-6, M9-7, M9-8). Each function is described in detail, in accordance with the type (level) of the function: from the lower type (NO AUTOMATIC CONTROL Type = 0) to most advanced types. For each function, an identifier that is the software language for BAC and TBM is also defined, as the destination of the module where the control function has its effect. An abstract from ISO 52120-1:2021, Table 5 is given below as an example.

For practical reasons, four different BAC efficiency classes (A, B, C, D) of functions are defined both for non-residential and residential buildings. This is the fastest way to specify a BAC or a TBM.

— Class D corresponds to non-energy efficient BAC. Building with such systems should be retrofitted. New buildings should not be built with such systems.

— Class C corresponds to standard BAC.

— Class B corresponds to advanced BAC and some specific TBM functions.

— Class A corresponds to high-energy performance BAC and TBM.



A building is in class D: if the minimum functions to be in class C are not implemented.



To be in class C: minimum functions defined in ISO 52120-1:2021, Table B.1 are implemented.

To be in class B: building automation function plus some specific functions defined in ISO 52120-1:2021, Table 5 are implemented in addition to class C. Room controllers are able to communicate with a building automation system.

To be in class A: technical building management function plus some specific functions defined in ISO 52120-1:2021, Table 5 are implemented in addition to class B. Room controllers should be able for demand controlled HVAC (e.g. adaptive set point based on sensing of occupancy, air quality, etc.) including additional integrated functions for multi-discipline interrelationships between HVAC and various building services (e.g. electricity, lighting, solar shading, etc.).

In addition, the hydraulic system is properly balanced.

The functions assignment to the BACS efficiency classes is listed in ISO 52120-1:2021, Table 6.

BAC functions with the purpose to control or monitor a plant or part of a plant which is not installed in the building do not have to be considered when determining the class even if they are shaded for that class. For example, to be in class B for a building with no cooling system no individual room control with communication is required for emission control of cooling systems.

If a specific function is required to be in a specific BAC efficiency class, it is not required that this function is strictly required everywhere in the building: if the designer can give good reasons as to why the application of a function does not bring a benefit in a specific case then it can be ignored. For example, if the designer can show that the heating load of a set of rooms is only dependant on the outdoor temperature and can be compensated with one central controller, no individual room control by thermostatic valves or electronic controllers is required to be in class C.