TECHNICAL REPORT

ISO/TR 52127-2

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Energy performance of buildings — Building automation, controls and building management —

Part 2: Explanation and justification of ISO 52127-1

Performance énergétique des bâtiments — Automatisation, régulation et gestion technique du bâtiment —

Partie 2: Explication et justification de l'ISO 52127-1

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

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 52127 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 adopt 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, each EPB standard should be 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**	**Ventila-tion**	**Humidifi-cation**	**Dehumidi-fication**	**Domestic hot waters**	**Lighting**	**Building au-tomation 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 en-ergy needs	Needs									
3	Application	(Free) Indoor con-ditions with-out systems	Maximum load and power									
4	Ways to ex-press energy performance	Ways to ex-press energy performance	Ways to ex-press energy performance									
5	Building functions and building boundaries	Heat transfer by transmis-sion	Emission and control									
6	Building oc-cupancy and operating conditions	Heat transfer by infiltra-tion and ventilation	Distribution and control									
7	Aggregation of energy services and energy carriers	Internal heat gains	Storage and control									
8	Building par-titioning	Solar heat gains	Generation and control									

NOTE The shaded modules are not applicable.

Table 1 *(continued)*

	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**
9	Calculated energy performance	Building dynamics (thermal mass)	Load dispatching and operating conditions									
10	Measured energy performance	Measured energy performance	Measured energy performance									
11	Inspection	Inspection	Inspection									
12	Ways to express indoor comfort		BMS								x	
13	External environment conditions											
14	Economic calculation											

NOTE The shaded modules are not applicable.

Energy performance of buildings — Building automation, controls and building management —

Part 2: Explanation and justification of ISO 52127-1

1 Scope

This document contains information to support the correct understanding, use and adoption of ISO 52127-1.

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 52127-1, *Energy performance of buildings — Building management system — Part 1: Module M10-12*

ISO 7345, *Thermal insulation 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 52127-1 apply.

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

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

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

4 Symbols

For the purposes of this document, the symbols given in ISO 52000-1 and ISO 52127-1 apply.

5 Method description

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

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 of the 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 system 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:

— control accuracy,

— control function,

— control strategy.

Technical building management systems are implemented to realize an overall building operation strategy by interdisciplinary orchestration of building energy systems (heating, cooling, ventilation, lighting) whereas systems are controlled by BAC functions. Further information about control accuracy and control functions can be found in ISO/TR 52120-2. ISO 52120-1 describes two approaches, how to evaluate the contribution of building automation and how to control the energy performance of buildings. This document is dedicated to control strategy and technical building management issues covered by ISO 52127-1.

5.2 Control strategy

The control strategy is applied to achieve a given level of control to reach a goal. Optimal control strategies deliver a desired level of control at a minimum cost. A control strategy could consist of a control function or a group of control functions. An example of a control strategy implemented by a control function is optimum start, optimum stop or night set back described in EN 12098-1 and EN 12098-3. The timer function is described in EN 12098-5.

An example of a control strategy that is carried out by a group of control functions is the control strategy used by intermittence. This function uses several control functions, operation modes, optimum start-stop and timer at the same time. All elements together are called either building profile or user pattern. Usually, to implement such building profile, a TBM is a prerequisite.

The most important control strategy described and implemented in ISO 52120-1 is demand-oriented control. Usually these strategies implement the sense of the energy flow (from generation to emission) with flow of calculation (from building needs to delivered energy). Usually for this complex control strategy, a TBM is necessary with a distributed specific control for each technical building system that communicates in system architecture via a communication standardized bus such as BACnet, KNX or LON.

Explained in more detail, this demand oriented control works as follows: when the comfort is reached in the emission area, the controller from the emission sends the message to the controller in charge of distribution to stop to distribute energy, then the controller in charge of distribution sends the message to the controller in charge of storage to either store the energy or if the storage cannot store more

