
**Energy performance of buildings —
Building management system —**

**Part 1:
Module M10-12**

*Performance énergétique des bâtiments — Système de gestion
technique des bâtiments*

Partie 1: Module M10-12

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO/PRF 52127-1](https://standards.iteh.ai/catalog/standards/sist/9da2526d-a419-474a-a05d-1ba319cea9c7/iso-prf-52127-1)

<https://standards.iteh.ai/catalog/standards/sist/9da2526d-a419-474a-a05d-1ba319cea9c7/iso-prf-52127-1>

PROOF / ÉPREUVE



iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO/PRF 52127-1](https://standards.iteh.ai/catalog/standards/sist/9da2526d-a419-474a-a05d-1ba319cea9c7/iso-prf-52127-1)

<https://standards.iteh.ai/catalog/standards/sist/9da2526d-a419-474a-a05d-1ba319cea9c7/iso-prf-52127-1>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2020

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

| | Page |
|---|-----------|
| Foreword..... | v |
| Introduction..... | vi |
| 1 Scope..... | 1 |
| 2 Normative references..... | 1 |
| 3 Terms and definitions..... | 1 |
| 4 Symbols and subscripts..... | 2 |
| 4.1 Symbols..... | 2 |
| 4.2 Subscripts..... | 2 |
| 5 Description of the methods..... | 2 |
| 5.1 Output of the method..... | 2 |
| 5.2 General description of the method(s)..... | 3 |
| 5.3 Calculation time steps..... | 3 |
| 6 BMS function 1 (management of setpoints)..... | 4 |
| 6.1 Output data..... | 4 |
| 6.2 Input data – source of data..... | 4 |
| 6.3 Calculation procedure..... | 5 |
| 6.3.1 Operating conditions calculation..... | 5 |
| 6.3.2 Energy calculation..... | 6 |
| 7 BMS function 2 (runtime management)..... | 7 |
| 7.1 Output data..... | 7 |
| 7.2 Input data..... | 7 |
| 7.2.1 Source of data..... | 7 |
| 7.2.2 Operating conditions..... | 7 |
| 7.3 Calculation procedure..... | 8 |
| 7.3.1 Operating conditions calculation..... | 8 |
| 7.3.2 Energy calculation..... | 8 |
| 8 BMS function 3 (sequencing of generators)..... | 9 |
| 8.1 Output data..... | 9 |
| 8.2 Input data..... | 9 |
| 8.2.1 Source of data..... | 9 |
| 8.2.2 Operating conditions..... | 9 |
| 8.3 Calculation procedure..... | 9 |
| 8.3.1 Operating conditions calculation..... | 9 |
| 8.3.2 Energy calculation..... | 10 |
| 9 BMS function 4 (Local energy production and renewable energies)..... | 11 |
| 9.1 Output data..... | 11 |
| 9.2 Input data – source of data..... | 12 |
| 9.3 Calculation procedure – energy calculation..... | 12 |
| 10 BMS function 5 (heat recovery/heat shifting)..... | 12 |
| 10.1 Output data..... | 12 |
| 10.2 Input data..... | 12 |
| 10.2.1 Source of data..... | 12 |
| 10.2.2 Operating conditions..... | 12 |
| 11 BMS function 6 (smart grid)..... | 12 |
| 11.1 Output data..... | 12 |
| 11.2 Input data..... | 13 |
| 12 Simplified input data correlations..... | 13 |
| 13 Quality control..... | 13 |

| | | |
|-----------|--|-----------|
| 14 | Compliance check | 13 |
| | Annex A (informative) Short description of BMS main functions | 14 |
| | Bibliography | 15 |

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO/PRF 52127-1](https://standards.iteh.ai/catalog/standards/sist/9da2526d-a419-474a-a05d-1ba319cea9c7/iso-prf-52127-1)

<https://standards.iteh.ai/catalog/standards/sist/9da2526d-a419-474a-a05d-1ba319cea9c7/iso-prf-52127-1>

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 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 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 References [4] and [5]) developed under a mandate given to CEN by the European Commission and the European Free Trade Association (Mandate M/480), and supports essential requirements of EU Directive 2010/31/EU on the energy performance of buildings (EPBD).

This document 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 M10. However, 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 calculations 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 presented in the M10 covered by ISO 52120-1, is used where appropriate. The way of interaction is described in detail in ISO/TR 52000-2 accompanying the over-arching standard. As a consequence, the Annex A and Annex B concept as Excel sheets with the calculation formulas used in the EPB standards are not applicable for this document.

The main target groups of this document 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 ISO/TR 52127-2^[3], the technical report accompanying this document.

[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 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 can cover more than one module and one module can be covered by more than one EPB standard, for instance a simplified and a detailed method respectively.

Table 1 — Position of this document (in casu M10–12), within the modular structure of the set of EPB standards

| Sub module | Over-arching | Building (as such) | Technical building system | | | | | | | | | |
|------------|---|---|------------------------------------|---------|---------|-------------|----------------|------------------|---------------------|----------|---------------------------------|-------------|
| | Descriptions | Descriptions | Descriptions | Heating | Cooling | Ventilation | Humidification | Dehumidification | Domestic hot waters | Lighting | Building automation and control | PV, wind... |
| | 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 | | | | | | | | | |
| 5 | Building functions and building boundaries | Heat transfer by transmission | Emission and control | | | | | | | | | |
| 6 | Building occupancy and operating conditions | Heat transfer by infiltration and ventilation | Distribution and control | | | | | | | | | |
| 7 | Aggregation of energy services and energy carriers | Internal heat gains | Storage and control | | | | | | | | | |
| 8 | Building partitioning | Solar heat gains | Generation and control | | | | | | | | | |

^a The shaded modules are not applicable.

ITeH STANDARD PREVIEW
(standards.iteh.ai)

Table 1 (continued)

| Sub module | Over-arching | Building (as such) | Technical building system | | | | | | | | | |
|-----------------|---------------------------------|----------------------------------|---|---------|---------|-------------|----------------|------------------|---------------------|----------|---------------------------------|-------------|
| | Descriptions | Descriptions | Descriptions | Heating | Cooling | Ventilation | Humidification | Dehumidification | Domestic hot waters | Lighting | Building automation and control | PV, wind... |
| | 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 ^a | Economic calculation | | | | | | | | | | | |

^a The shaded modules are not applicable.

Energy performance of buildings — Building management system —

Part 1: Module M10-12

1 Scope

This document specifies operational activities, overall alarming, fault detection and diagnostics, reporting, monitoring, energy management functions, functional interlocks and optimizations to set and maintain energy performance of buildings.

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

ISO 7345:2018, *Thermal performance of buildings and building components — Physical quantities and definitions*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 7345 and ISO 52000-1 and the following 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/>

3.1 building management system BMS

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

Note 1 to entry: Building services is divided in technical, infrastructural and financial building services and energy management is part of *technical building management* (3.2).

Note 2 to entry: Building energy management system is part of a BMS.

1) Under preparation. Stage at the time of publication ISO/DIS 52120-1:2020.

Note 3 to entry: Building energy management system comprises data collection, logging, alarming, reporting, and analysis of energy usage, etc. The system is designed to reduce the energy consumption, improve the utilisation, increase the reliability and predict the performance of the technical building systems, as well as optimize energy usage and reducing its cost.

3.2 technical building management

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.

4 Symbols and subscripts

4.1 Symbols

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

Table 2 — Symbols and units

| Symbol | Quantity | Unit |
|---------|-------------|------|
| β | Load factor | - |

4.2 Subscripts

<https://standards.iteh.ai/catalog/standards/sist/9da2526d-a419-474a-a05d-1ba319cea9c7/iso-prf-52127-1>

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

Table 3 — Subscripts

| Subscript | Term |
|-----------|----------------------------|
| BMS | building management system |
| boil | boiler |
| cgn | cogeneration |
| cmb | combustion |

5 Description of the methods

5.1 Output of the method

This method covers the calculation of the building operation data that could be influenced and optimized by a building management system. Those data are mainly related to:

- setpoint including set back,
- operation times of heating, ventilation, cooling and lighting systems including start-stop optimisation,
- sequencing of multiple generators,

- building energy management and load management with regard to the utilisation of local renewable energy and local energy production,
- heat recovery and heat shifting,
- smart grid interactions, demand side management, and peak shaving.

Calculation is, in general, independent from the time step chosen but is according to the time step of the input.

It is important to be aware that the technical building management (TBM) functions not fully automated will have an impact on energy performance of the building only if they are not only installed but actively used, i.e. that actions are taken if monitoring results ask for it.

5.2 General description of the method(s)

This document covers several functions of the application of the building management system. These functions shall be taken from ISO 52120-1. Each function is represented by at least one calculation method.

This document covers six of the functions described in ISO 52120-1:—²⁾, Table 4. This list of capabilities of controls and BMS functions is not exhaustive. Energy efficiency performance of building depends on the choice of control and BMS functions related to expected performance (following methodology described in ISO 52000-1), their implementation, commissioning and exploitation. The functions are as follows.

- “Function 1 – setpoints” is meant for setpoint definition and set back. This function refers to function 7.1 in ISO 52120-1:—, Table 4.
- “Function 2 – run-time” is intended for estimating run-times. This function refers to function 7.2 in ISO 52120-1:—, Table 4.
- “Function 3 – sequencing of generators” is intended for estimating the sequential arrangement of different generators. This function refers to function 7.9 in ISO 52120-1:—, Table 4.
- “Function 4 – local energy production and renewable energies” is intended for managing local renewable energy sources and other local energy productions as CHP. This function refers to function 7.5 in ISO 52120-1:—, Table 4.
- “Function 5 – heat recovery and heat shifting” is intended for shifting thermal energy inside the building. This function refers to function 7.6 in ISO 52120-1:—, Table 4.
- “Function 6 – smart grid” is meant for interactions between buildings and any smart grid. This function refers to function 7.7 in ISO 52120-1:—, Table 4.

All methods applicable to calculate the aforementioned functions are described in detail in [Clauses 6 to 11](#). In general, functions could be used independently from each other depending on the BMS features installed in the building. Nevertheless, in some cases, methods do represent different levels of a similar function and will reference each other. More details are given in the relevant clauses.

A short description of BMS main functions is given in [Annex A](#).

5.3 Calculation time steps

The calculation algorithms for all the functions described in [Clause 6](#) are suitable for the following calculation time steps:

- yearly (seasonal);
- monthly;

2) Under preparation. Stage at the time of publication ISO/DIS 52120-1:2020.