



# PRECEPT

Less Energy > Smarter Buildings

Project Acronym: **PRECEPT**

Project Title: **“A novel decentralized edge-enabled PREsCriptivE and ProacTive framework for increased energy efficiency and well-being in residential buildings”**

## Deliverable D6.13

Report summarizing existing standards and standards under development

Work Package : **WP6**  
Deliverable Status : **Final**  
Due Date : **30/09/2021**  
Submission Date : **30/09/2021**  
Leading Partner : **ASI**  
Dissemination Level : **Public**



This project has received funding from the European Union's Horizon 2020 research and innovation programme under **grant agreement No 958284**

## LIST OF BENEFICIARIES

Short Name	Full Name	Country
<b>WVT<sup>1</sup></b>	WATT AND VOLT A.E.	Greece
<b>CERTH</b>	Centre for Research and Technology Hellas	Greece
<b>KTU</b>	Kaunas University of Technology	Lithuania
<b>FRC</b>	Frederick Research Center	Cyprus
<b>CLEO</b>	Cleopa GmbH	Germany
<b>NURO</b>	Nuromedia	Germany
<b>OdinS</b>	Odin Solutions S.L.	Spain
<b>DEMO</b>	DEMO Consultants bv	The Netherlands
<b>ASI</b>	Austrian Standards International	Austria
<b>LCII</b>	LC Innoconsult International	Hungary
<b>PSACEA</b>	STATE HIGHER EDUCATIONAL INSTITUTION PRYDNIPROVSKA STATE	Ukraine
<b>CON</b>	Contecht GmbH	Germany
<b>STROITEL-P</b>	PRIVATE CONSTRUCTION AND ASSEMBLY ENTERPRISE	Ukraine
<b>MIWENERGIA</b>	MY ENERGIA ONER S.L.	Spain
<b>POLIMI</b>	Politecnico di Milano	Italy

### **Disclaimer**

*This document reflects only the author's views and the European Union is not liable for any use that may be made of the information contained therein.*

---

<sup>1</sup> Coordinator

## REVISION CONTROL

Version	Date	Author / Reviewer	Status
0.1	31/08/2021	Olga Radchuk (ASI), Fernando Moya Cervelló (ASI)	1 <sup>st</sup> draft
0.2	13/09/2021	Ramón Ruiz Molina (MIWENERGIA)	Reviewed
0.3	14/09/2021	Rahul Tomar (NURO)	Reviewed
<b>1.0</b>	<b>24/09/2021</b>	<b>Fernando Moya Cervelló (ASI)</b>	<b>Final</b>

# TABLE OF CONTENTS

1	Introduction .....	9
1.1	Report structure.....	9
1.1.1	Objectives of the report.....	10
1.2	Scope of the report .....	10
1.3	Target audience .....	10
1.4	Methodology.....	10
1.5	Definitions.....	10
1.6	Keywords.....	11
2	Deliverable context and role.....	12
2.1	Role of the Task 6.5 Contribution to standards for the development of proactive buildings in the context of PRECEPT .....	12
2.2	Deliverable interdependencies.....	12
3	Standards for BEP.....	13
4	Conclusion.....	60

## LIST OF FIGURES

This document does not contain any figure.

## LIST OF TABLES

<b>Table 1:</b> Standards for BEP .....	14
---	----

## LIST OF DEFINITIONS AND ABBREVIATIONS

Abbreviation	Definition
AWI	Approved Working Item
BEP	Building Energy Performance
CD	Committee draft
CEN	European Committee for Standardisation
CENELEC	European Committee for Electrotechnical Standardisation
CWA	CEN and/or CENELEC Workshop Agreement; standardisation deliverable from a CEN and/or CENELEC workshop
EC	European Commission
EN	Standard adopted by CEN, CENELEC and/or ETSI
EIF	Enterprise Interoperability Framework
ESO	European Standardisation organisation; The ESO's are CEN, CENELEC and ETSI
ETSI	European Telecommunications Standards Institute
EU	European Union
IEC	International Electrotechnical Commission / standards developed by IEC
IEEE	Institute of Electrical and Electronics Engineers / standards developed by IEEE
ISO	International Standardisation Organisation / standards developed by ISO
JTC	Joint Technical Committee
NSB	National Standardisation Body
NWIP	New Work Item Proposal
SDO	Standards Development Organization
SR	Special report developed by ESO
TC	Technical committee
TR	Technical report developed by SDO
TS	Technical specification developed by SDO
WD	Working Draft developed by SDO
WG	Working Group to which work is allocated by a Technical Committee based on an approved new work item and drafting standardisation deliverables
WP	Work Package

## EXECUTIVE SUMMARY

Development of standards to set the grounds for the deployment and operation of proactive residential buildings is important to transform traditional reactive buildings to intelligent and proactive ones by employing 6D BIM technology, as well as to enhance their performance. The framework, proposed by the PRECEPT consortium to reach this goal, introduces a “plug&play” Predictive and Proactive building energy management system (PP-BMS) installed locally at building level. The proposed PP-BMS is self-adapted, self-learned, -managed, -monitored, -healing and -optimized, requiring no (or minimum) installation costs and no maintenance.

Along with the development of such BMS, the project aims to further contribute to the development of new standards with the focus on the topics of building and construction. The inclusion of the outcomes of the project in new or future standards, external to the consortium that can be easily used by the European or international industry and research will increase the impact of the project and will positively contribute to the transfer of the knowledge generated within the project to the industry and society.

It is therefore necessary to get an overview of the global landscape of standardisation related to proactive buildings to take advantage of existing standardisation activities and to ensure a thorough understanding of the needs and requirements of the involved stakeholders.

The objective of the present document is to analyse the status of current standardisation related to proactive buildings and to point towards actions that can increase their efficiency, ensure inclusion of all relevant stakeholders and their interests. Further objective of the document is to provide a baseline for subsequent analysis of the topics and processes related to residential buildings that are not addressed by current standardisation activities.

The report is structured around the most relevant standards, developed by various Standards Development Organizations (SDO) on European and international levels. It covers also non-formal standards, i.e., guidelines, regulations, recommendations etc. that are considered as standards but are not developed by a recognized SDO.

The report reviews relevant standards and outlines the scope of each in effort to help identify the gaps in the areas not properly addressed by ongoing standardisation activities. Gap analysis will be further addressed in the deliverable D6.14 Report containing gap analysis of the existing standardization landscape vs the consortium needs, which will align the end users' requirements with the existing standards.

# 1 Introduction

## 1.1 Report structure

The report represents the first Deliverable of the Task 6.5 6 (WP6) of the PRECEPT (A novel decentralized edge-enabled PREsCRIPTivE and ProacTive framework for increased energy efficiency and well-being in residential buildings) research project and summarises all applicable standards and best practices that are currently relevant for residential buildings in the context of their energy performance.

The report is comprised of three main sections:

### **Deliverable context and role**

This section provides an overview of Task 6.5, its objectives and role within the project. It also outlines the role of the present deliverable including target audience and document interdependencies.

### **Building Energy Performance (BEP) standardisation landscape**

This section provides a general overview of the standardisation actions undertaken around BEP. It outlines the main standard development organisations and committees responsible for these standards, as well as national and international guidelines, regulations or recommendations applied in the area. This section includes three sub-sections:

#### Specific standards for BEP

This sub-section provides information on the existing standards as well as standards under development that are directly relevant for BEP (e.g., heat generating systems, control systems, communication networks).

#### General standards, relevant for building, construction and BIM

This sub-section provides information on the existing standards as well as standards under development that describe general procedures and requirements around BEP. They can be widely applicable and define the requirements that go above and beyond energy performance (e.g., information exchange systems, knowledge and object libraries, service life planning models etc.).

#### Non-formal standards, relevant for BEP (general and specific)

This sub-section provides information on the manuals, guidelines and other documents that are relevant for the project but do not belong to formal standards.

### **Conclusion**

This section contains a summary of the findings from the previous sections and provides a background for the following deliverables: D6.14 Report containing gap analysis of the existing standardization landscape vs the consortium needs, and D6.15 PRECEPT New Work Item Proposal (NWIP).

## **1.2 Objectives of the report**

The first aim of this report is to provide a systematic overview of the standardisation landscape, including national and international standardization activities as well as other efforts relevant for the area of BEP (e.g., guidelines, regulations, recommendations etc.).

The second aim of the report is to provide background information for future gap identification and analysis: detection of the most important gaps between the requirements of the consortium members, end users as well as other relevant stakeholders, and the current standardisation landscape.

This report together with the gap analysis will serve as a cornerstone for the set of NWIPs, produced in the end of the project.

## **1.3 Scope of the report**

The report identifies national and international standards, guidelines and regulations relevant for smart buildings and BEP. This will help set a direction for future standardisation activities.

## **1.4 Target audience**

This public report is developed for the PRECEPT consortium members and all interested stakeholders (internal as well as external).

## **1.5 Methodology**

Initial literature review on BEP was conducted by Austrian Standards International (ASI). It identified the broad areas of focus that were further classified according to their scope of application as defined below (general and specific standards).

The content of this report is based on a combination of resources, derived from standards databases of The European Committee for Standardization (CEN), The European Committee for Electrotechnical Standardization (CENELEC), The International Organization for Standardization (ISO), as well as contributions from the consortium partners.

The database search was performed using the following keywords: energy performance, smart building, BIM, building monitoring, IoT. All identified standards were checked for their relevance to the project.

## **1.6 Definitions**

**Standardisation**

Standardisation is an activity of establishing, regarding actual or potential problems, provisions for common and repeated use, aimed at the achievement of the optimum degree of order in a given context<sup>2</sup>.

NOTE 1: In particular, the activity consists of the processes of formulating, issuing and implementing standards.

NOTE 2: Important benefits of standardisation are improvement of the suitability of products, processes and services for their intended purposes, prevention of barriers to trade and facilitation of technological cooperation.

Standards can be developed by National, Regional (e.g., European), or international standardisation organisations, by a group of companies (industrial standards, e.g., USB, IEEE) or by companies itself (company standard).

As defined in Regulation (EU) 1025/2012<sup>3</sup>, Article 2a “standard” means a technical specification, adopted by a recognised standardisation body, for repeated or continuous application, with which compliance is not compulsory.

## **Regulations**

A regulation is a document providing binding legislative rules, that is adopted by an authority<sup>3</sup>.

For example, when the EU intends to make sure that there are common safeguards on goods imported from outside the EU, it issues a regulation that all imports need to accompany with.

NOTE 1: Regulations are adopted by the European Parliament and the European Council.

## **Directives**

A directive is a legislative act that sets out a goal that all EU countries must achieve<sup>4</sup>.

However, it is up to the individual countries to devise their own laws on how to reach these goals. One example is the EU Consumer Rights Directive<sup>5</sup>, which strengthen rights for consumers across the EU by eliminating hidden charges and costs on the internet and thus extending the period under which consumers can withdraw from a sales contract.

## **1.7 Keywords**

BIM, energy performance, smart building, building monitoring, IoT, NWIP, standard

---

<sup>2</sup> <https://www.iso.org/standard/39976.html>

<sup>3</sup> <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:316:0012:0033:EN:PDF>

<sup>4</sup> [https://europa.eu/european-union/eu-law/legal-acts\\_en](https://europa.eu/european-union/eu-law/legal-acts_en)

<sup>5</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32011L0083>

## 2 Deliverable context and role

### 2.1 Role of the Task 6.5 Contribution to standards for the development of proactive buildings in the context of PRECEPT

The objectives of the T6.5 include:

- to provide an overview of the standardization landscape in the areas of building, construction and building management, as well as other topics relevant for the project,
- to provide consortium members with an access to and support their interaction with the relevant European and international standardization technical committees,
- to conduct a gap analysis and identify any missing topics in existing standards that are relevant for the project implementation
- to contribute to new standards development with the focus on the topics of building and construction

### 2.2 Deliverable interdependencies

The output of Task 6.5 is the deliverables D6.13 Report summarizing existing standards and standards under development, D6.14 Report containing gap analysis of the existing standardization landscape vs the consortium needs, and D6.15 PRECEPT New Work Item Proposal (NWIP).

D6.13 provides background information not only for the following deliverables of the corresponding task, but also for the DD6.2-6.3 Dissemination and Communication Plans, D6.5 Project Website and Dissemination Materials, DD6.7-6.8 Reports on Dissemination Activities, and DD6.9-6.10 Plan for the exploitation of the project's results.

In addition, D6.13 can be used as reference for the D2.4 PRECEPT Building Capturing & Energy Modelling, DD2.5-2.6 PRECEPT's digital twin platform, DD2.7-2.8 Energy Disaggregation and Building Behaviour Inference Engine, DD2.9-2.10 PRECEPT prescriptive maintenance tool (WP2 BIM & Digital Twin Technologies); DD3.1-3.2 PRECEPT federated learning technology, DD3.3-3.4 PRECEPT Smart Grid Tools, DD3.5-3.6 Agent-based prediction framework, DD3.7-3.8 Predictive Analytics & Control Modelling, D3.9 PRECEPT Security & Privacy Mechanisms (WP3 PRECEPT Distribution, Modelling and Security Technologies); DD4.1-4.2 Algorithms for providing the optimal proactive operation of HVAC, D4.4 Advanced building elasticity prediction algorithms (WP4 Pred(scr)ictive and Proactive Building Management System); D5.3 PRECEPT evaluation framework, D5.5 Evaluation report for PRECEPT pilots (WP5 System Integration, Demonstration & Impact Assessment).

End user and consortium partner requirements, necessary to complete the D6.14 Report containing gap analysis of the existing standardization landscape vs the consortium needs, and D6.15 PRECEPT New Work Item Proposal (NWIP), will be derived from the WP1 PRECEPT Requirements, Specifications and Architecture deliverables. The list of standards provided in current deliverable will be checked against the requirements, which will define the scope and content of the future NWIPs.

### 3 Standards for BEP

The search identified a total of 209 standards from the European and international standardisation bodies as listed in the table 1 below.

Of the 209 standards; 99 European standards have been developed by CEN or CEN and CENELEC and 109 are international standards jointly developed by ISO or ISO and IEC.

Many NSBs in Europe adopt these standards in lieu of developing their own.

On the European level, standardization around BEP is being conducted at the following CEN committees:

- CEN/TC 169 - Light and lighting
- CEN/TC 228 Heating systems and water-based cooling systems in buildings
- CEN/TC 247 Building Automation, Controls and Building Management
- CEN/TC 350 Sustainability of construction works
- CEN/TC 371 Energy performance of buildings
- CEN/TC 442 - Building Information Modelling (BIM)
- CEN/WS BRESAER: Innovative and adaptable envelopes in building refurbishment. Design, economic assessment, logistics and installation guidelines
- CEN/WS Energy Retrofit: Sustainable Energy Retrofit Process Management for Multi-Occupancy Residential Buildings with Owner Communities
- CEN/CLC/JTC 10 Energy-related products - Material Efficiency Aspects for Ecodesign
- CEN/CLC/JTC 14 Energy management and energy efficiency in the framework of energy transition
- CEN/CLC/WS SEP-IoT Workshop on Best Practices and a Code of Conduct for Licensing Industry Standard Essential Patents in 5G and the Internet of Things (IoT), including the Industrial Internet.

On international level, the committees working on BEP standards include:

- ISO/TC 59 Buildings and civil engineering works
- ISO/TC 163 Thermal performance and energy use in the built environment
- ISO/TC 205 Building environment design
- ISO/TC 207 Environmental management
- ISO/TC 211 Geographic information/Geomatics
- ISO/TC 301 Energy management and energy savings
- ISO/IEC JTC 1 Information technology
- ISO/IEC JTC 1/SC 41 Internet of Things and related technologies
- ISO/IEC JTC 1/SC 42 Artificial intelligence.

The next section considers standards identified in analysis and outline the relevance and scope of each in relation to building energy performance. The grey shaded standards are currently under development.

**Table 1:** Standards for BEP

	<b>Committee</b>	<b>Standard</b>	<b>Scope</b>
1.	<b>CEN/TC 169 - Light and lighting</b>	EN 15193-1:2017 Energy performance of buildings - Energy requirements for lighting - Part 1: Specifications, Module M9	This standard specifies the methodology for evaluating the energy performance of lighting systems for providing general illumination in residential and non-residential buildings and for calculating or measuring the amount of energy required or used for lighting in buildings. The method may be applied to new, existing or refurbished buildings. It also provides a methodology (LENI) as the measure of the energy efficiency of the lighting installations in buildings.
2.		CEN/TR 15193-2:2017 Energy performance of buildings - Energy requirements for lighting - Part 2: Explanation and justification of EN 15193-1, Module M9	This Technical Report will provide information to support the correct understanding, use and national implementations of EN 15193–1. It will give explanations on the procedures and background information. It will also provide justifications of the choices that have been made and give validations of the calculation procedures given in the standards.
3.		FprCEN/TS 17623 BIM Properties for lighting - Luminaires and sensing devices	This document identifies and clarifies lighting properties for digital building design and maintenance. This document provides all the needed properties to design and to describe luminaires and sensing devices. These properties are intended to be used as mapping properties for property providers and requesters. The mapping of the identifiers enables the exchange of luminaire and sensing device data within different databases. The unambiguous mapping and description of properties improve the data quality, reduce misinterpretations and the processing time in digital environments. Therefore, the properties listed in this document establish the essential description of luminaires and sensing devices in BIM systems and databases. The listed properties in this document are used to structure the product data sheet which is complemented with real product information.
4.	<b>CEN/TC 228 Heating systems and water based cooling systems in buildings</b>	EN 12831-1:2017, Energy performance of buildings - Method for calculation of the design heat load - Part 1: Space heating load, Module M3-3	This European Standard covers methods for the calculation of the design heat load for single rooms, building entities and buildings, where the design heat load is defined as the heat supply (power) needed to maintain the required internal design temperature under design external conditions. 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 EN ISO 52000 -1.
5.		EN 12831-3:2017, Energy performance of buildings - Method for calculation of the design heat load - Part 3: Domestic	This European Standard describes a method to calculate the power and the storage volume required for the dimensioning of domestic hot water systems (DHW). The applicability ranges from direct water heaters (no

		<p>hot water systems heat load and characterisation of needs, Module M8-2, M8-3</p>	<p>storage volume and a comparatively large effective heating power) to larger storage systems with a comparatively small heating power and large storage volumes. This European Standard is applicable to the following water storage systems: - storage systems characterized by a minimal mixing zone, (such as stratified charging storage tanks or storage tanks with external heat exchangers): these systems are nominated in this standard as "charging storage systems"; - storage tank water heaters and warm water storage tanks with a pronounced mixing zone (such as DHW storage tanks with internal heat exchangers), nominated in this standard as "mixed storage systems"; and for different uses. The scope also includes standardization methods for determining the energy need for domestic hot water. This European Standard covers the domestic hot water needs in buildings. The calculation of the energy needs for DHW-Systems applies to residential and non-residential buildings, a building or a zone of a building. Figure 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 EN ISO 52000-1.</p>
6.		<p>EN 15316-1:2017, Energy performance of buildings - Method for calculation of system energy requirements and system efficiencies - Part 1: General and Energy performance expression, Module M3-1, M3-4, M3-9, M8-1, M8-4</p>	<p>This European Standard is the general frame for the calculation of the energy use and the energy performance of heating and domestic hot water systems. This standards is only dealing with the heat, provided by water based systems, needed for heating, domestic hot water and cooling (e.g. absorption chiller). It specifies how to perform the calculation of the entire installation using the calculation modules (see Table 2) corresponding to the methods defined in the respective standards. It deals with common issues like operating conditions calculation and energy performance indicators. It standardises the inputs and outputs in order to achieve a common European calculation method. It allows the energy analysis of the heating and Domestic hot water systems and sub-systems including control (emission, distribution, storage, generation) by comparing the system losses and by defining energy performance indicators. The performance analysis allows the comparison between systems and sub-systems and makes possible to evaluate the impact of each sub-system on the energy performance of a building. The calculation of the system losses of each part of the heating sub-systems is defined in subsequent standards. Ventilation systems are not included in this standard (e.g. balanced systems with heat recovery), but if the air is preheated or an air heating system is installed, the systems providing the heat to the AHU (Air Handling Unit) are covered by this standard.</p>

7.		EN 15316-2:2017, Energy performance of buildings - Method for calculation of system energy requirements and system efficiencies - Part 2: Space emission systems (heating and cooling), Module M3-5, M4-5	This European Standard's scope is to standardize the required inputs, the outputs and the links (structure) of the calculation method in order to achieve a common European calculation method. This standard covers energy performance calculation of heating systems and water based cooling space emission sub-systems. 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 prEN ISO 52000 1.
8.		EN 15459-1:2017, Energy performance of buildings - Economic evaluation procedure for energy systems in buildings - Part 1: Calculation procedures, Module M1-14	This European Standard provides a calculation method for the economic issues of heating systems and other systems that are involved in the energy demand and consumption of the building. It applies to all types of new and existing buildings. The fundamental principles and terminology are explained in the standard. The main items of the standard will be: - the definitions and the structure of the types of costs which should be taken into account for the calculation of the economic efficiency of saving options in buildings; - data needed for definition of costs related to systems under consideration; - the calculation method(s); - expression of the result of the economic study. This European Standard is part of the method for calculation of economic performance of energy saving options in buildings (e.g., insulation, better performing generators and distribution systems, efficient lighting, renewable sources, combined heat and power). The scope of this specific part is to standardize: - the required inputs; - the required outputs; - the calculation formulas; - the type of energy systems concerned with the energy performance of the building.
9.		CEN/TR 12831-2:2017, Energy performance of buildings - Method for calculation of the design heat load - Part 2: Explanation and justification of EN 12831-1, Module M3-3	This Technical Report refers to standard FprEN 12831, module M3-3 (EN 12831-1). It contains information to support the correct understanding, use and national adaptation of standard EN 12831-1.
10.		CEN/TR 12831-4:2017, Energy performance of buildings - Method for calculation of the design heat load - Part 4: Explanation and justification of EN 12831-3, Module M8-2, M8-3	This technical report refers to standard EN 12831-3, module M8-2, M8-3. It contains information to support the correct understanding, use and national adaptation of standard EN 12831-3.
11.	<b>CEN/TC 247 Building Automation, Controls and Building Management</b>	EN 12098-1:2017 Energy Performance of Buildings - Controls for heating systems - Part 1: Control equipment for hot water heating systems - Modules M3-5, 6, 7, 8	This European Standard applies to electronic control equipment for heating systems with water as the heating medium and a supply water temperature up to 120 °C. This control equipment controls the distribution and/or the generation of heat in relation to the outside temperature and time and other reference variables. This standard covers also controllers

			that contain an integrated optimum start or an optimum start-stop control function.
12.		prEN 12098-1, Energy performance of buildings - Controls for heating systems - Part 1: Control equipment for hot water heating systems - Modules M3-5, 6, 7, 8	<p>This document applies to electronic control equipment for heating systems with water as the heating medium and a supply water temperature up to 120 °C. This control equipment controls the distribution and/or the generation of heat in relation to the outside temperature and time and other reference variables.</p> <p>This document covers also controllers that contain an integrated optimum start or an optimum start-stop control function. Safety requirements on heating systems remain unaffected by this document. The dynamic behaviour of the valves and actuators are not covered in this document. A multi-distribution and/or multi-generation system needs a coordinated solution to prevent undesired interaction and is not part of this document.</p>
13.		EN 12098-3:2017 Energy Performance of Buildings - Controls for heating systems - Part 3: Control equipment for electrical heating systems - Modules M3-5,6,7,8	<p>This European Standard applies to electronic control equipment for heating systems with direct electrical emission, which have an integrated outside compensated function and or optimum start/stop function. This control equipment controls the distribution and/or the generation of heat in relation to the outside temperature and time and other reference variables. This European Standard also covers controllers that contain an integrated optimum start or an optimum start-stop control function.</p>
14.		prEN 12098-3, Energy performance of buildings - Controls for heating systems - Part 3: Control equipment for electrical heating systems - Modules M3-5,6,7,8	<p>This document applies to electronic control equipment for heating systems with direct electrical emission, which have an integrated outside compensated function and or optimum start/stop function. This control equipment controls the distribution and/or the generation of heat in relation to the outside temperature and time and other reference variables.</p> <p>This document also covers controllers that contain an integrated optimum start or an optimum start-stop control function. The controller modulates heating or control modes of electronic individual zone or emitter control equipment.</p> <p>Safety requirements on heating systems remain unaffected by this document. The dynamic behaviour of the local thermostats, sensors, or actuators is not covered in this document.</p>
15.		EN 12098-5:2017 Energy Performance of Buildings - Controls for heating systems - Part 5: Start-stop schedulers for heating systems - Modules M3-5,6,7,8	<p>This European Standard applies to scheduling equipment for heating systems. The signals can be processed by using either analogue or digital techniques, or both. It applies to start-stop scheduling functions and sets minimum acceptable standards for functions, performance and documentation.</p>

16.		CEN/TR 12098-6:2016 Controls for heating systems - Part 6: Accompanying TR EN 12098-1:2015 - Modules M3-5,6,7,8	This Technical Report refers to EN 12098-1:2015, Controls for heating systems — Part 1: Control equipment for hot water heating systems — Modules M3-5,6,7,8. It contains information to support the correct understanding, use and national adaption of prEN 12098 1:2015.
17.		prCEN/TR 12098-6 rev, Controls for heating systems - Part 6: Accompanying TR EN 12098-1 - Modules M3-5,6,7,8	This Technical Report refers to prEN 12098-1:2015, Controls for heating systems — Part 1: Control equipment for hot water heating systems — Modules M3-5,6,7,8. It contains information to support the correct understanding, use and national adaption of EN 12098-1. This Technical Report does not contain any normative provision.
18.		CEN/TR 12098-7:2016 Controls for heating systems - Part 7: Accompanying TR EN 12098-3:2015 - Modules M3-5,6,7,8	This Technical Report refers to EN 12098-3, Controls for heating systems - Part 3: Control equipment for electrical heating systems - Modules M3-5,6,7,8. It contains information to support the correct understanding, use and national adaption of prEN 12098-3:2015.
19.		prCEN/TR 12098-7 rev, Controls for heating systems - Part 7: Accompanying TR EN 12098-3 - Modules M3-5,6,7,8	This Technical Report refers to EN 12098-3, Controls for heating systems - Part 3: Control equipment for electrical heating systems - Modules M3-5,6,7,8. It contains information to support the correct understanding, use and national adaption of EN 12098-3. This Technical Report does not contain any normative provision.
20.		CEN/TR 12098-8:2016 Controls for heating systems - Part 8: Accompanying TR EN 12098-5:2015 - Modules M3-5,6,7,8	This Technical Report refers to EN 12098-5:2015, Controls for heating systems - Part 5: Start-stop schedulers for heating systems - Modules M3-5,6,7,8. It contains information to support the correct understanding, use and national adaption of prEN 12098-5:2015.
21.		EN 13321-1:2012 Open data communication in building automation, controls and building management - Home and building electronic system - Part 1: Product and system requirements	This European Standard specifies, as for Home or Building Electronic Systems (HBES) for the domain of Building Automation and Control System Application and Building Management (BACS), common rules for a class of multi-application bus systems where the functions are decentralised and linked through a common communication process. This European Standard sets the basic requirements for products and systems.
22.		EN 14597:2012 Temperature control devices and temperature limiters for heat generating systems	This European Standard applies to electrical or non electrical temperature control devices which are used to control temperatures within heat generating systems by controlling the supply of energy. It also applies to limiting devices which ensure that the temperature in heat generating systems will not exceed a predefined limit. This European Standard specifies operating values, operating times, and operational sequences associated with the safety of the heat generating system. This European Standard also applies to controls using NTCs or PTCs thermistors,

			additional requirements for which are contained in Annex J of EN 60730-2-9:2010.
23.		EN 14908-1:2014 Open Data Communication in Building Automation, Controls and Building Management - Control Network Protocol - Part 1: Protocol Stack	This European Standard applies to a communication protocol for networked control systems in commercial Building Automation, Controls and Building Management. The protocol provides peer-to-peer communication for networked control and is suitable for implementing both peer-to-peer and master-slave control strategies. This specification describes services in layers 2 to 7.
24.		EN 14908-2:2014 Open Data Communication in Building Automation, Controls and Building Management - Control Network Protocol - Part 2: Twisted Pair Communication	This European Standard specifies the control network protocol (CNP) free-topology twisted-pair channel for networked control systems in commercial Building Automation, Controls and Building Management and is used in conjunction with EN 14908-1:2014.
25.		EN 14908-3:2014 Open Data Communication in Building Automation, Controls and Building Management - Control Network Protocol - Part 3: Power Line Channel Specification	This European Standard specifies all the information necessary to facilitate the exchange of data and control information over the power line medium for networked control systems in commercial Building Automation, Controls and Building Management. This European Standard establishes a minimal set of rules for compliance.
26.		EN 14908-4:2014 Open Data Communication in Building Automation, Controls and Building Management - Control Network Protocol - Part 4: IP Communication	This European Standard specifies the transporting of the Control Network Protocol (CNP) packets for commercial Building Automation, Controls and Building Management over Internet Protocol (IP) networks using a tunnelling mechanism wherein the CNP packets are encapsulated within IP packets. It applies to both CNP nodes and CNP routers. The purpose of this European Standard is to ensure interoperability between various CNP devices that wish to use IP networks to communicate using the CNP protocol. The main body of this European Standard is independent of the CNP protocol being transported over the IP network.
27.		EN 14908-5:2009 Open Data Communication in Building Automation, Controls and Building Management Implementation Guideline - Control Network Protocol - Part 5: Implementation	This specification contains all the information necessary to facilitate the exchange of data and control information in an interoperable fashion using EN 14908-1 and its associated data-transport media specifications. This specification establishes a minimal set of rules for compliance.
28.		EN 14908-6:2014 Open Data Communication in Building Automation, Controls and Building Management - Control Network Protocol - Part 6: Application elements	This European Standard provides mechanisms through which various vendors of building automation, control, and building management systems may exchange information in a standardized way. This document provides specifications for the Application Elements of Control Network Protocol packets as follows: - definitions of standardized packet

			(network-variable) data types; - definitions of device-interface files; - definitions of standardized configuration-property types; - definitions of standardized enumeration types; - definitions of standardized functional profiles; - definition of the standardized method of file transfer between devices. The purpose of this specification is to ensure interoperability between various CNP implementations.
29.		prEN 14908-6, Open Data Communication in Building Automation, Controls and Building Management - Control Network Protocol - Part 6: Application elements	This document provides mechanisms through which various vendors of building automation, control, and building management systems may exchange information in a standardized way. This document provides specifications for the Application Elements of Control Network Protocol packets as follows: - definitions of standardized packet (network-variable) data types; - definitions of device-interface files; - definitions of standardized configuration-property types; - definitions of standardized enumeration types; - definitions of standardized functional profiles; - definition of the standardized method of file transfer between devices. The purpose of this specification is to ensure interoperability between various CNP implementations. This document contains all the information necessary to read and interpret the format of data and control information that is used by EN 14908 5. It also defines the device interface for a device as specified, which is necessary to exchange data between various devices from different manufacturers.
30.		EN 14908-7:2019 Open communication in building automation, controls and building management - Control Network Protocol - Part 7: Communication via internet protocols	This document specifies a communication protocol for networked control systems. The protocol provides peer-to-peer communication for networked control using web-services. The document describes services in layer 2 and layer 3.
31.		EN 14908-8:2021, Open Data Communication in Building Automation, Controls and Building Management - Control Network Protocol - Part 8: Communication using Broadband over Power Line Networks - with internet protocols	This document specifies a communication protocol for networked control systems. The protocol provides peer-to-peer communication for networked control using web-services. This document describes services in layer 1 and layer 2.
32.		prEN 14908-9 Open Data Communication in Building Automation, Controls and Building Management -	This document specifies an adaptation layer for the control network protocol (CNP), as described in EN 14908-1 to utilize wireless communication network. This document defines the services of the

		Control Network Protocol - Part 9: Wireless Communication in ISM bands	wireless communication provided to CNP layer for delivering data and commands towards and from sensors, actuators, etc. which are wirelessly connected as part of the EN 14908-1 network. In addition, this document defines the requirements for the radio communication applicable for CNP layer operation. For the radio communication different frequency bands can be utilized. Annex A defines requirement for operation in different frequency bands.
33.		CEN/TS 15231:2006 Open data communication in building automation, controls and building management - Mapping between Lonworks and BACnet	The LONWORKS communication system is widely used in building automation systems for field-level and application-level functions for residential and non-residential controls in lighting, sun protection, HVAC, energy management and security applications. The BACnet communication system as well is also used in building automation systems for management-level and application-level functions. This technical specification defines the methods for combining BACnet networks with LONWORKS networks, and standardizes the interface between BACnet and LONWORKS systems.
34.		EN 15232-1:2017 Energy Performance of Buildings - Energy performance of buildings - Part 1: Impact of Building Automation, Controls and Building Management - Modules M10-4,5,6,7,8,9,10	This European 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.
35.		CEN/TR 15232-2:2016 Energy performance of buildings - Part 2: Accompanying TR prEN 15232-1:2015 - Modules M10-4,5,6,7,8,9,10	This Technical Report refers to EN 15232-1, Energy performance of buildings - Part 1: Impact of Building Automation, Controls and Building Management - Modules M10-4,5,6,7,8,9,10. It contains information to support the correct understanding, use and national adaption of standard EN 15232-1:2015.
36.		CEN/TS 15379:2006 Building management - Terminology and scope of services	The document provides a structure of Building Management (BM) and its Building Services and gives terms and definitions in the field of Building Management for general understanding.
37.		EN 15500-1:2017 Energy Performance of Buildings - Control for heating, ventilating and air conditioning	The purpose of this standard is to specify the applications, functionality set and application performance for electronic individual zone control equipment. The applications are for cooling and hot water or electrical

		applications - Part 1: Electronic individual zone control equipment - Modules M3-5, M4-5, M5-5	heating as described in Annex B. This standard applies specifically to individual zone control equipment for maintaining temperature, humidity and air flow as a function of occupancy and demand operated with auxiliary electrical energy.
38.		CEN/TR 15500-2:2016 Energy Performance of Buildings - Control for heating, ventilating and air-conditioning applications — Part 2: Accompanying TR prEN 15500-1:2015 - Modules M3-5, M4-5, M5-5	This Technical Report refers to EN 15500 1, Control for heating, ventilating and air-conditioning applications — Part 1: Electronic individual zone control equipment — Modules M3-5, M4-5, M5-5. It contains information to support the correct understanding, use and national adaption of EN 15500 1:2017.
39.		CEN/TS 15810:2008 Graphical symbols for use on integrated building automation equipment	This document provides a synopsis of graphical symbols which are intended to be placed on building equipment and/or technical documentation of products in order to instruct the person(s) using the equipment. These graphical symbols are primary intended: to identify control or automation or technical management equipment or part of these equipment: electronic devices (e.g. controller, scheduler, optimiser, etc.), sensors, actuators, to indicate functions and their operating modes, to indicate settings for modes and functions parameters introduction, to designate connections, to provide instruction to users (professional and/or end user) for the operation of the equipment.
40.		EN ISO 16484-1:2010 Building automation and control systems (BACS) - Part 1: Project specification and implementation	It specifies guiding principles for project design and implementation and for the integration of other systems into the building automation and control systems (BACS). ISO 16484-1:2010 specifies the phases required for the BACS project, including: design (determination of project requirements and production of design documents including technical specifications), engineering (detailed function and hardware design), installation (installing and commissioning of the BACS), and completion (handover, acceptance and project finalization). ISO 16484-1:2010 also specifies the requirements for as-built documentation and training.
41.		EN ISO 16484-2:2004 Building automation and control systems (BACS) - Part 2: Hardware	It specifies the requirements for the hardware to perform the tasks within a building automation and control system (BACS). It provides the terms, definitions and abbreviations for the understanding of ISO 16484-2 and ISO 16484-3. ISO 16484-2:2004 relates only to physical items/devices, i.e. devices for management functions, operator stations and other human system interface devices; controllers, automation stations and application specific controllers; field devices and their interfaces; cabling and interconnection of devices; engineering and commissioning tools.

42.		EN ISO 16484-3:2005 Building automation and control systems (BACS) - Part 3: Functions	It specifies the requirements for the overall functionality and engineering services to achieve building automation and control systems. It defines terms, which shall be used for specifications and it gives guidelines for the functional documentation of project/application specific systems. It provides a sample template for documentation of plant/application specific functions, called BACS points list.
43.		EN ISO 16484-5:2017 Building automation and control systems (BACS) - Part 5: Data communication protocol EN ISO 16484-5:2017/A1:2020	The purpose of ISO 16484-5:2017 is to define data communication services and protocols for computer equipment used for monitoring and control of HVAC&R and other building systems and to define, in addition, an abstract, object-oriented representation of information communicated between such equipment, thereby facilitating the application and use of digital control technology in buildings.
44.		EN ISO 16484-6:2020 Building automation and control systems (BACS) - Part 6: Data communication conformance testing	This standard provides a comprehensive set of procedures for verifying the correct implementation of each capability claimed on a BACnet PICS including: (a) support of each claimed BACnet service, either as an initiator, executor, or both, (b) support of each claimed BACnet object-type, including both required properties and each claimed optional property, (c) support of the BACnet network layer protocol, (d) support of each claimed data link option, and (e) support of all claimed special functionality.
45.		EN 16946-1:2017 Energy Performance of Buildings - Inspection of Automation, Controls and Technical Building Management - Part 1: Module M10-11	This European Standard defines guidelines for the inspection of installed an operational Functions of Building Automation, Controls and Technical Building Management System including its configuration.
46.		CEN/TR 16946-2:2016 Energy Performance of Buildings - Inspection of Building Automation, Controls and Technical Building Management - Part 2: Accompanying TR prEN 16946-1:2015 - Modules M10-11	This Technical Report refers to EN 16946 1, Inspection of Building Automation, Controls and Technical Building Management — Module M10-11. It contains information to support the correct understanding, use and national adaption of standard EN 16946 1:2017.
47.		EN 16947-1:2017 Energy Performance of Buildings - Building Management System - Part 1: Module M10-12	This European Standard 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.
48.		CEN/TR 16947-2:2016 Building Management System - Part 2: Accompanying prEN 16947-1:2015 - Modules M10-12	This Technical Report refers to EN 16947-1:2017, Building Management System - Module M10-12. It contains information to support the correct understanding, use and national adaption of prEN 16947-1:2017.

49.		prEN 17609 Building automation and control systems - Control applications	This part of the standard specifies control applications and function blocks focusing on but not limited to lighting, solar protection and HVAC applications. It describes how energy performance, comfort, and operational requirements of buildings are translated into functional specifications for integrated plant and room control.
50.		EN ISO 22510:2020 Open data communication in building automation, controls and building management - Home and building electronic systems - KNXnet/IP communication	This document defines the integration of KNX protocol implementations on top of Internet protocol (IP) networks, called KNXnet/IP. It describes a standard protocol for KNX devices connected to an IP network, called KNXnet/IP devices. The IP network acts as a fast (compared to KNX twisted pair transmission speed) backbone in KNX installations.
51.		prEN ISO 52120-1 Energy performance of buildings - Contribution of building automation and controls and building management - Part 1: Modules M10-4,5,6,7,8,9,10	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.
52.		FprCEN ISO/TR 52120-2 Energy performance of buildings - Contribution of building automation, controls and building management - Part 2: Explanation and justification of ISO 52120-1	No scope description available
53.		EN ISO 52127-1:2021, Energy performance of buildings - Building management system - Part 1: Module M10-12 (ISO 52127-1: 2021)	This International Standard 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. 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 52000-1:2017.

54.		CEN ISO/TR 52127-2 Energy performance of buildings - Building automation, controls and building management - Part 2: Explanation and justification of ISO 52127-1	This document contains information to support the correct understanding, use and adoption of ISO 52127-1
55.		(WI=00247114), Smart Buildings	This International Standard specifies a structured set of functions that: - Uses the methodology currently being applied in EN 15232-1 - Requirements of relations of BACS functions with smart grid functions - Requirements to enable interoperability at least on a per building service level
56.	<b>CEN/TC 350 Sustainability of construction works</b>	EN 15643:2021, Sustainability of construction works - Framework for assessment of buildings and civil engineering works	This document provides principles and requirements for the assessment of environmental, social and economic performance of buildings and civil engineering works taking into account their technical characteristics and functionality. Assessments of environmental, social and economic performance are the three aspects of sustainability assessment of buildings and civil engineering works, or combination thereof, (hereafter referred to as “construction works”). The framework applies to all types of construction works, both new and existing, and it is relevant for the assessment of the environmental, social and economic performance of new construction works over their entire life cycle, and of existing construction works over their remaining service life and end of life stage. The sustainability assessment of construction works concentrates on the assessment of environmental, social and economic aspects and impacts of construction works expressed with quantifiable indicators. It includes the assessment of a construction works’ influence on the environmental, social and economic aspects and impacts on the local area (area of influence) and of the local infrastructure beyond the curtilage of the building and the civil engineering works. It excludes environmental, social and economic risk assessment. The European Standards developed under this framework do not set the rules for how the different assessment methodologies may provide valuation methods; nor do they prescribe levels or classes for measuring performance.
57.		EN 16309:2014+A1:2014, Sustainability of construction works - Assessment of social performance of buildings - Calculation methodology	This European Standard is one part of a suite of European Standards. The standard provides the specific methods and requirements for the assessment of social performance of a building while taking into account the building’s functionality and technical characteristics. This European Standard applies to all types of buildings, both new and existing. In this first version of the standard, the social dimension of sustainability

			concentrates on the assessment of aspects and impacts for the use stage of a building expressed using the following social performance categories (from EN 15643-3): - accessibility; - adaptability; - health and comfort; - impacts on the neighbourhood; - maintenance; - safety and security.
58.		EN 15978:2011, Sustainability of construction works - Assessment of environmental performance of buildings - Calculation method	<p>This European Standard specifies the calculation method, based on Life Cycle Assessment (LCA) and other quantified environmental information, to assess the environmental performance of a building, and gives the means for the reporting and communication of the outcome of the assessment. The standard is applicable to new and existing buildings and refurbishment projects.</p> <p>The standard gives:</p> <ul style="list-style-type: none"> <li>- the description of the object of assessment;</li> <li>- the system boundary that applies at the building level;</li> <li>- the procedure to be used for the inventory analysis;</li> <li>- the list of indicators and procedures for the calculations of these indicators;</li> <li>- the requirements for presentation of the results in reporting and communication;</li> <li>- and the requirements for the data necessary for the calculation.</li> </ul> <p>The approach to the assessment covers all stages of the building life cycle and is based on data obtained from Environmental Product Declarations (EPD), their "information modules" (EN 15804) and other information necessary and relevant for carrying out the assessment. The assessment includes all building related construction products, processes and services, used over the life cycle of the building. The interpretation and value judgments of the results of the assessment are not within the scope of this European Standard.</p>
59.		EN 16627:2015, Sustainability of construction works - Assessment of economic performance of buildings - Calculation methods	<p>This European Standard specifies the calculation methods, based on Life Cycle Costing (LCC) and other quantified economic information, to assess the economic performance of a building, and gives the means for the reporting and communication of the outcome of the assessment. This European Standard is applicable to new and existing buildings and refurbishment projects. This European Standard gives:</p> <ul style="list-style-type: none"> <li>- the description of the object of assessment;</li> <li>- the system boundary that applies at the building level;</li> <li>- the scope and procedure to be used for the analysis;</li> <li>- the list of indicators and procedures for the calculations of these indicators;</li> </ul>

			<p>the requirements for presentation of the results in reporting and communication; - and the requirements for the data necessary for the calculation. The approach to the assessment covers all stages of the building life cycle and includes all building related construction products, processes and services, used over the life cycle of the building. The interpretation and value judgments of the results of the assessment are not within the scope of this European Standard.</p>
60.		<p>prEN 17680, Sustainability of construction works — Evaluation of the potential for sustainable refurbishment of buildings, Sustainability of construction works — Evaluation of the potential for sustainable refurbishment of buildings</p>	<p>This document provides a process for the evaluation of the potential for sustainable refurbishment of an existing building, as a mean of contributing to the circular economy. This document gives guidelines to assess performance of existing buildings in order to determine what to do in a set of alternatives: Refurbish for similar or new use, use as is or tear down.</p> <p>Sustainable refurbishment aims to close the gap between current performance and current requirements. It can be used for a building or part(s) of a building, as well as a portfolio of buildings. This document gives a method for assessing performance of existing buildings:</p> <ul style="list-style-type: none"> <li>-Technical (including energy) characteristics;</li> <li>- Usability for users;</li> <li>- Adaptability for changes;</li> <li>- Indoor environment (health aspects);</li> <li>- Economic feasibility;</li> <li>- Embodied environmental impacts.</li> </ul>
61.	<b>CEN/TC 371 Energy performance of buildings</b>	<p>EN ISO 52000-1: 2018, Energy performance of buildings - Overarching EPB assessment - Part 1: General framework and procedures (ISO 52000-1:2017)</p>	<p>This document establishes a systematic, comprehensive and modular structure for assessing the energy performance of new and existing buildings (EPB) in a holistic way. It is applicable to the assessment of overall energy use of a building, by measurement or calculation, and the calculation of energy performance in terms of primary energy or other energy-related metrics. It takes into account the specific possibilities and limitations for the different applications, such as building design, new buildings 'as built', and existing buildings in the use phase as well as renovation.</p>
62.		<p>CEN ISO/TR 52000-2:2017, Energy performance of buildings - Overarching EPB assessment - Part 2: Explanation</p>	<p>This document refers to the overarching EPB-standard, ISO 52000-1. It contains information to support the correct understanding, use and national implementation of EN ISO 52000-1. This includes: — explanation on the procedures and background information and justification of the</p>

		and justification of ISO 52000-1 (ISO/TR 52000-2:2017)	choices that have been made; — reporting on validation of calculation procedures given in the standard; — explanation for the user and for national standards writers involved with implementation of the set of EPB standards, including detailed examples.
63.		EN 17423:-2021, Energy performance of buildings - Determination and reporting of Primary Energy Factors (PEF) and CO2 emission coefficient - General Principles, Module M1-7	This document provides a transparent framework for reporting on the choices related to the procedure to determine primary energy factors (PEFs) and CO2 emission coefficients for energy delivered to and exported from the buildings as described in EN ISO 52000-1. This document specifies the choices to be made to calculate the PEF(s) and CO2 emission coefficients related to different energy carriers. PEFs and CO2 emission coefficients for exported energy can be different from those chosen for delivered energy. This document is primarily intended for supporting and complementing EN ISO 52000-1, as the latter requires values for the PEFs and CO2 emission coefficients to complete the EPB calculation. But it can also be used for other applications.
64.		CEN/TS 16628:2014, Energy Performance of Buildings - Basic Principles for the set of EPB standards	This Technical Specification describes the basic principles to be followed in the development of standards intended to support the assessment of the energy performance of buildings using a holistic approach. The main goal is to obtain a set of EPB-standards that are a systematic, clear and comprehensive package for the benefit of professionals and government entities. This Technical Specification gives general, qualitative guidance on the required quality, accuracy, usability and consistency of EPB-standards in order to provide a balance between: — the accuracy and level of detail, and — the simplicity and availability of input data. Hidden complexities are also taken into account, such as the impact of differences in the overall legal frameworks on the national choices and national input data. The basic principles are the basis for detailed technical rules and for a common overarching structure for the set of EPB-standards. The basic principles for EPB-standards cover the following aspects: <ul style="list-style-type: none"> <li>— the standardization process, including collaborations and consultations;</li> <li>— the application range of the standards;</li> <li>— common general organization of each standard and the national implementation;</li> <li>— the overarching structure for the energy performance assessment; — common model(s) and editorial rules for each standard;</li> <li>— common quality aspects for each standard.</li> </ul>

65.		prCEN/TS 16628 rev, Energy Performance of Buildings - Basic Principles for the set of EPB standards	<p>This Technical Specification describes the basic principles to be followed in the development of standards intended to support the assessment of the energy performance of buildings using a holistic approach. The main goal is to obtain a set of EPB-standards that are a systematic, clear and comprehensive package for the benefit of professionals and government entities.</p> <p>This Technical Specification gives general, qualitative guidance on the required quality, accuracy, usability and consistency of EPB-standards in order to provide a balance between:</p> <ul style="list-style-type: none"> <li>— the accuracy and level of detail, and</li> <li>— the simplicity and availability of input data.</li> </ul> <p>Hidden complexities are also taken into account, such as the impact of differences in the overall legal frameworks on the national choices and national input data.</p> <p>The basic principles are the basis for detailed technical rules and for a common overarching structure for the set of EPB-standards.</p> <p>The basic principles for EPB-standards cover the following aspects:</p> <ul style="list-style-type: none"> <li>— the standardization process, including collaborations and consultations;</li> <li>— the application range of the standards;</li> <li>— common general organization of each standard and the national implementation;</li> <li>— the overarching structure for the energy performance assessment;</li> <li>— common model(s) and editorial rules for each standard;</li> <li>— common quality aspects for each standard.</li> </ul>
66.		CEN/TS 16629:2014, Energy Performance of Buildings - Detailed Technical Rules for the set of EPB-standards	<p>This Technical Specification provides guidance in the form of detailed technical rules based on the basic principles, both for the overarching standard and for each standard within the set of EPB-standards. These detailed technical rules give practical rules on the following subjects for EPB-standards:</p> <ul style="list-style-type: none"> <li>— the standardization process, including collaborations and consultations;</li> <li>— the application range of the standards;</li> <li>— common general organization of each standard and the national implementation;</li> <li>— the overarching structure for the energy performance assessment;</li> <li>— common model(s) and editorial rules for each standard;</li> <li>— common quality aspects for each standard.</li> </ul>

67.		prCEN/TS 16629 rev, Energy Performance of Buildings - Detailed Technical Rules for the set of EPB-standards	<p>This Technical Specification provides guidance in the form of detailed technical rules based on the basic principles, both for the overarching standard and for each standard within the set of EPB-standards. These detailed technical rules give practical rules on the following subjects for EPB-standards:</p> <ul style="list-style-type: none"> <li>— the standardization process, including collaborations and consultations;</li> <li>— the application range of the standards;</li> <li>— common general organization of each standard and the national implementation;</li> <li>— the overarching structure for the energy performance assessment;</li> <li>— common model(s) and editorial rules for each standard;</li> <li>— common quality aspects for each standard.</li> </ul>
68.	<b>CEN/TC 442 - Building Information Modelling (BIM)</b>	EN ISO 12006-2:2020 Building construction - Organization of information about construction works - Part 2: Framework for classification	It defines a framework for the development of built environment classification systems. It identifies a set of recommended classification table titles for a range of information object classes according to particular views, e.g., by form or function, supported by definitions. It shows how the object classes classified in each table are related, as a series of systems and sub-systems, e.g., in a building information model.
69.		EN ISO 12006-3:2016 Building construction - Organization of information about construction works - Part 3: Framework for object-oriented information	It specifies a language-independent information model which can be used for the development of dictionaries used to store or provide information about construction works. It enables classification systems, information models, object models and process models to be referenced from within a common framework.
70.		EN ISO 16739-1:2020 Industry Foundation Classes (IFC) for data sharing in the construction and facility management industries - Part 1: Data schema	The standard includes definitions that cover data required for buildings over their life cycle.
71.		EN ISO 16757-1:2019 Data structures for electronic product catalogues for building services - Part 1: Concepts, architecture and mode	The primary purpose of ISO 16757 is the provision of data structures for electronic product catalogues to transmit building services product data automatically into models of building services software applications. This includes a meta model for the specification of product classes and their properties and a meta model for the product data which is exchanged in product catalogues. Product data has to follow the specifications for their product groups.

72.	EN ISO 16757-2:2019 Data structures for electronic product catalogues for building services - Part 2: Geometry	ISO 16757-2:2016 describes the modelling of building services product geometry. The description is optimized for the interchange of product catalogue data and includes - shapes for representing the product itself, - symbolic shapes for the visualization of the product's function in schematic diagrams, - spaces for functional requirements, - surfaces for visualization, and - ports to represent connectivity between different objects.
73.	EN 17412-1:2020 Building Information Modelling - Level of Information Need - Part 1: Concepts and principles	This document specifies concepts and principles to establish a methodology for specifying level of information need and information deliveries in a consistent way when using Building Information Modelling (BIM). This document specifies the characteristics of different levels used for defining the detail and extent of information required to be exchanged and delivered throughout the life cycle of built assets. It gives guidelines for principles required to specify information needs.
74.	CEN/TR 17439:2020 Guidance on how to implement EN ISO 19650-1 and -2 in Europe	The scope of this guidance is deliberately restricted only to refer to EN ISO 19650-1 and -2, highlighting and describing the manner in which to use it -and not extending or contradicting the scope and content of the standard The document aims simply to provide minimum supporting text to achieve a basic understanding and ability to implement EN ISO 19650-1 and -2.
75.	prEN 17473 Building information modelling (BIM) - Data templates for construction objects used in the life cycle of any built asset - Data templates based on harmonised technical specifications under the Construction Products Regulation (CPR)	This document provides a methodology and process to create data templates for construction products that are covered by harmonised technical specifications (harmonised product standards (hEN) and European Assessment Documents (EAD)), under Regulation (EU) No 305/2011 - the Construction Products Regulation (CPR).
76.	prEN 17549-1 Building Information Modelling (BIM) – Information structure based on EN ISO 16739-1:2018 to exchange data templates and data sheets for construction objects - Part 1: Data templates and configured construction objects	No scope description available.
77.	prEN 17632 Semantic Modelling and Linking Standard (SMLS) for data integration in the built environment	This document discusses an integrated and unified approach for data aspects, specifically for assets in the built environment, using EIF terminology. This document specifies: - a generic Top Level “M1: Data model” as common form;

			<p>- a conceptual “L1: Data language” as common meta-model with four ‘linked data’-based concrete language bindings (SKOS, RDFS, OWL and SHACL), including:</p> <ul style="list-style-type: none"> <li>• a choice of RDF-based formats (to be used for all modelling and language levels);</li> <li>• a set of data modelling patterns (for identification, naming, handling of enumeration types, quantity modelling, asset decomposition, grouping, etc.);</li> <li>• a linking approach for interlinking data sets, interlinking data models and linking data sets and data models which are relevant within the built environment from many perspectives such as: <ul style="list-style-type: none"> <li>• Building information modelling (BIM);</li> <li>• Geo-spatial information systems (GIS);</li> <li>• Systems engineering (SE);</li> <li>• Monitoring &amp; control (M&amp;C);</li> <li>• Electronic document management (EDM).</li> </ul> </li> </ul>
78.		EN ISO 19650-1:2018 Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) - Information management using building information modelling - Part 1: Concepts and principles	This document outlines the concepts and principles for information management at a stage of maturity described as "building information modelling (BIM) according to the ISO 19650 series". This document provides recommendations for a framework to manage information including exchanging, recording, versioning and organizing for all actors.
79.		EN ISO 19650-2:2018 Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) - Information management using building information modelling - Part 2: Delivery phase of the assets	This document specifies requirements for information management, in the form of a management process, within the context of the delivery phase of assets and the exchanges of information within it, using building information modelling. This document can be applied to all types of assets and by all types and sizes of organizations, regardless of the chosen procurement strategy.
80.		EN ISO 19650-3:2020 Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) - Information management using building information	This document specifies requirements for information management, in the form of a management process, within the context of the operational phase of assets and the exchanges of information within it, using building information modelling.

		modelling - Part 3: Operational phase of the assets	
81.		prEN ISO 19650-4 Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) - Information management using building information modelling — Part 4: Information exchange	ISO 19650-4 provides the detailed process and criteria for the decision points when executing an information exchange as defined by ISO 19650 so as to ensure the quality of the resulting project or asset information model. It promotes a proportional and sustainable approach to information exchange where the immediate delivery of information does not limit its future use. It details the implementation of the concepts in ISO19650-1 and is applicable to any information exchange within the delivery stages covered by ISO 19650-2 and operational events covered by ISO 19650-3. The use of appropriate quality assurance and quality control measures supports the fulfilment of a specific Exchange Information Requirement related to an individual information exchange by enumerating criteria relating to completeness, compliance to formal exchange schemas, the continuity of concepts between exchanges and the elimination of spatial and specification conflicts.
82.		EN ISO 19650-5:2020 Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) - Information management using building information modelling - Part 5: Security-minded approach to information management	This document specifies the principles and requirements for security-minded information management at a stage of maturity described as "building information modelling (BIM) according to the ISO 19650 series", and as defined in ISO 19650-1, as well as the security-minded management of sensitive information that is obtained, created, processed and stored as part of, or in relation to, any other initiative, project, asset, product or service. It addresses the steps required to create and cultivate an appropriate and proportionate security mindset and culture across organizations with access to sensitive information, including the need to monitor and audit compliance.
83.		EN ISO 21597-1:2020 Information container for linked document delivery - Exchange specification - Part 1: Container	This document defines an open and stable container format to exchange files of a heterogeneous nature to deliver, store and archive documents that describe an asset throughout its entire lifecycle. It is suitable for all parties dealing with information concerning the built environment, where there is a need to exchange multiple documents and their interrelationships, either as part of the process or as contracted deliverables.
84.		EN ISO 21597-2: 2021 Information container for linked document delivery - Exchange specification - Part 2: Link types	This document provides the opportunity to add information about the contents of a container by further specializing the generic types of links specified in ISO 21597-1. The defined link types have been chosen to enhance the use of the container by allowing the addition of semantic

			relationships that are human interpretable to provide greater clarity about those links.
85.		EN ISO 23386:2020 Building information modelling and other digital processes used in construction - Methodology to describe, author and maintain properties in interconnected data dictionaries	This document establishes the rules for defining properties used in construction and a methodology for authoring and maintaining them, for a confident and seamless digital share among stakeholders following a BIM process.
86.		EN ISO 23387:2020 Building information modelling (BIM) - Data templates for construction objects used in the life cycle of built assets - Concepts and principles	This document sets out the principles and structure for data templates for construction objects. It is developed to support digital processes using machine-readable formats using a standard data structure to exchange information about any type of construction object, e.g. product, system, assembly, space, building etc., used in the inception, brief, design, production, operation and demolition of facilities. This document provides the specification of a taxonomy model that defines concepts from ISO 12006-3:2007, i.e. objects, collections and relationships between them, to support the information need for the specific purpose of the data template.
87.		EN ISO 29481-1:2017 Building information models - Information delivery manual - Part 1: Methodology and format	This document specifies a methodology that links the business processes undertaken during the construction of built facilities with the specification of information that is required by these processes, and - a way to map and describe the information processes across the life cycle of construction works.
88.		EN ISO 29481-2:2016 Building information models - Information delivery manual - Part 2: Interaction framework	This document specifies a methodology and format for describing “coordination acts” between actors in a building construction project during all life cycle stages. It therefore specifies a methodology that describes an interaction framework, an appropriate way to map responsibilities and interactions that provides a process context for information flow, a format in which the interaction framework should be specified.
89.	<b>CEN/WS BRESAER: Innovative and adaptable envelopes in building refurbishment. Design, economic assessment, logistics and installation guidelines</b>	CWA 17437:2019, Innovative and adaptable envelopes over existing façades in building refurbishment - Design, economic assessment, logistics and installation guidelines	This CEN Workshop Agreement (CWA) provides orientation for the: – design process of an innovative and adaptable envelope over existing façades for building refurbishment, describing the possible different technologies and components, and providing guidelines on the selection criteria, limitations for the implementation, estimated costs and payback calculations. This information is intended to help building envelope designers to make informed decisions considering the building particularities. – production, transport, storage and installation aspects for

			each system component of an innovative and adaptable envelope for building refurbishment, providing advice for installers on the overall logistics for the real implementation. – assessment and evaluation of innovative and complex envelope system at building level that is not completely addressed by existing standards. Tests to be selected to feasibly assess an envelope system composed by different components.
90.	<b>CEN/WS Energy Retrofit: Sustainable Energy Retrofit Process Management for Multi-Occupancy Residential Buildings with Owner Communities</b>	CWA 17382:2020, Sustainable Energy Retrofit Process Management for Multi-Occupancy Residential Buildings with Owner Communities	This CEN Workshop Agreement (CWA) specifies a workflow and an overall quality and process management methodology for the initial (engagement and decision making) phase of the retrofit process in existing multi-occupancy residential buildings with owner communities in CEN member states. This CWA targets all relevant stakeholders in the initial phase of the energy retrofit process including owner communities, property and facility managers, owner community management boards, planners, energy efficiency consultants, financial institutions, and policy makers.
91.	<b>CEN/CLC/JTC 10 Energy-related products - Material Efficiency Aspects for Ecodesign</b>	EN 45559:2019, Methods for providing information relating to material efficiency aspects of energy-related products	This document establishes a common methodology for the provision of information related to the material efficiency aspects of energy-related products. It has two key intentions: Its provisions are intended to apply to generic or horizontal material efficiency standards being prepared under the standardization request M/543, by providing a format for reporting material efficiency aspects. This document does not include any product-specific provisions, but rather it proposes a generic methodology on how to create a communication strategy related to material efficiency aspects to be applied by standard writers when preparing product or product-group standards.
92.	<b>CEN/CLC/JTC 14 Energy management and energy efficiency in the framework of energy transition</b>	EN 16212:2012, Energy Efficiency and Savings Calculation, Top-down and Bottom-up Methods	This European Standard provides a general approach for energy efficiency and energy savings calculations with top-down and bottom-up methods. The general approach is applicable for energy savings in buildings, cars, appliances, industrial processes, etc. This European Standard covers energy consumption in all end-use sectors. The standard does not cover energy supply, e.g. in power stations, as it considers only final energy consumption. This European Standard deals with savings on energy supplied to end-users. Some forms of renewable energy “behind-the-meter” (e.g. from solar water heating panels) reduce supplied energy and therefore can be part of the calculated energy savings. Users of the standard should be aware that this renewable energy behind the meter can also be claimed as energy generated. The standard is meant to be used for ex-post evaluations of realised savings as well as ex-ante evaluations of expected savings. This European Standard provides saving calculations for

			any period chosen. However, short data series may limit the possible periods over which savings can be calculated. The standard is not intended to be used for calculating energy savings of individual households, companies or other end-users.
93.		EN 16231:2012, Energy efficiency benchmarking methodology	This European Standard specifies requirements and provides recommendations for energy efficiency benchmarking methodology. The purpose of energy efficiency benchmarking is to establish the relevant data and indicators on energy consumption, both technical and behavioural, qualitative and quantitative in comparing performance between or within entities. Energy efficiency benchmarking can be either internal (within a specific organisation) or external (between organisations including competitors). This standard describes how to establish the boundaries of what is being benchmarked, including for example facilities, activities, processes, products, services and organisations. This European Standard provides guidance on the criteria to be used in order to choose the appropriate level of detail for the data collection, processing and reviewing which suits the objective of the benchmarking.
94.		EN 16247-1:2012, Energy audits - Part 1: General requirements	This European standard specifies the requirements, common methodology and deliverables for energy audits. It applies to all forms of establishments and organisations, all forms of energy and uses of energy, excluding individual private dwellings. This European standard covers the general requirements common to all energy audits. Specific energy audit requirements will complete the general requirements in separate parts dedicated to energy audits for buildings, industrial processes and transportation.
95.		EN 16247-2:2014, Energy audits - Part 2: Buildings	This European Standard is applicable to specific energy audit requirements in buildings. It specifies the requirements, methodology and deliverables of an energy audit in a building or group of buildings, excluding individual private dwellings. It shall be applied in conjunction with, and is supplementary to, EN 16247-1, Energy audits — Part 1: General requirements. It provides additional requirements to EN 16247-1 and shall be applied simultaneously. If processes are included in the scope of the energy audit, the energy auditor may choose to apply EN 16247-3, Energy audits — Part 3: Processes. If on-site transport on a site is included in the scope of the energy audit, the energy auditor may choose to apply EN 16247-4, Energy audits — Part 4: Transport.
96.		EN 15900:2010, Energy efficiency services - Definitions and requirements	This European Standard specifies the definitions and minimum requirements for an energy efficiency service.

97.		prEN 16247-1, Energy audits - Part 1: General requirements	This document specifies the requirements, common methodology and deliverables for energy audits. It applies to all forms of establishments and organizations, all forms of energy and energy uses. This document covers the general requirements common to all energy audits. Specific energy audit requirements complete the general requirements in separate parts dedicated to energy audits for buildings, industrial processes and transport.
98.		prEN 16247-2, Energy audits - Part 2: Buildings	This document is applicable to specific energy audit requirements in buildings. It specifies the requirements, methodology and deliverables of an energy audit in a building or group of buildings. It is applied in conjunction with, and is supplementary to, EN 16247-1, Energy audits — Part 1: General requirements. It provides additional requirements to EN 16247-1 and is applied simultaneously. If processes are included in the scope of the energy audit, the energy auditor can choose to apply EN 16247-3, Energy audits — Part 3: Processes. If on-site transport on a site is included in the scope of the energy audit, the energy auditor can choose to apply EN 16247-4, Energy audits — Part 4: Transport.
99.	<b>CEN/CLC/WS SEP-IoT Workshop on Best Practices and a Code of Conduct for Licensing Industry Standard Essential Patents in 5G and the Internet of Things (IoT), including the Industrial Internet</b>	CWA 17431:2019, Principles and guidance for licensing Standard Essential Patents in 5G and the Internet of Things (IoT), including the Industrial Internet	<p>Introduction</p> <p>Following on from the wave of technology that saw the widespread adoption of smartphones and tablets, we are now riding a new wave of technology which some call a fourth industrial revolution. This new wave is based, among other things, on the spread of the Internet of Things (IoT) where products beyond smartphones and tablets rely on a connection to the internet that will use mobile communications technology such as 5G. As companies with experience in licensing Standard Essential Patents (SEPs) - as SEP owners and as users of standards - we want to play our part to help new participants in SEP licensing feel more confident negotiating the licences that they may require. To do this we formed a Workshop under the auspices of CEN and CENELEC which has resulted in this CEN/CENELEC Workshop Agreement (CWA), “Principles and Guidance for Licensing Standard Essential Patents in 5G and the Internet of Things (IoT)”. This document has been developed and approved by consensus of the organisations responsible for its content. It has two main elements. The first is a set of Principles and Guidance which draws on our combined experience of SEP licensing for Information and Communication Technologies (ICT)1 standards. Licensing is a complex and evolving area and the development of new IoT products and services may bring new approaches and practices. We have therefore identified</p>

			<p>broad principles which should form a solid foundation for future practice. The second element is a set of Questions and Answers. These are addressed mainly to those who are new to the implementation and use of standardised technology and the licensing of patents that cover those technologies. As with other Q&amp;A documents, it is only intended to be informative and does not cover every situation. This document ends by looking forward to SEP licensing in 5G and the IoT.</p>
100.	<b>ISO/TC 59 Buildings and civil engineering works</b>	ISO 15392:2019 Sustainability in buildings and civil engineering works — General principles	<p>This document identifies and establishes general principles for the contribution of buildings, civil engineering works and other types of construction works (hereinafter referred to collectively as construction works) to sustainable development. It is based on the concept of sustainable development as it applies to the life cycle of construction works, from inception to the end-of-life.</p>
101.		ISO 15928-5:2013 Houses — Description of performance — Part 5: Operating energy	<p>ISO 15928-5:2013 sets out a method for describing the operating energy performance of houses. It covers user needs, provides performance descriptions and outlines evaluation processes. It includes the description of relevant parameters for external and internal climatic conditions, user functional requirements, energy used by the house and energy generated by the house.</p>
102.		ISO 16354:2013 Guidelines for knowledge libraries and object libraries	<p>The aim of ISO 16354:2013 is to distinguish categories of knowledge libraries and to lay the foundation for uniform structures and content of such knowledge libraries and for commonality in their usage.</p>
103.		ISO 16745-1:2017 Sustainability in buildings and civil engineering works — Carbon metric of an existing building during use stage — Part 1: Calculation, reporting and communication	<p>This document provides requirements for determining and reporting a carbon metric of an existing building, associated with the operation of the building. It sets out methods for the calculation, reporting and communication of a set of carbon metrics for GHG emissions arising from the measured energy use during the operation of an existing building, the measured user-related energy use, and other relevant GHG emissions and removals.</p>
104.		ISO 16745-2:2017 Sustainability in buildings and civil engineering works — Carbon metric of an existing building during use stage — Part 2: Verification	<p>This document specifies requirements for the verification of a carbon metric calculation for GHG emissions of an existing building during the use stage, where the carbon metric calculation is performed in accordance with ISO 16745-1.</p>
105.		ISO 19208:2016 Framework for specifying performance in buildings	<p>This document provides the framework for specifying the performance of a building as a whole or a part thereof in order to satisfy specified user requirements and societal expectations. ISO 19208:2016 covers buildings as constructed and inbuilt fixed components. It does not cover</p>

			<p>a) the use of the land for buildings,  b) the design and operation of the environment within which buildings are located, and  c) moveable contents within buildings.</p>
106.		ISO 20887:2020 Sustainability in buildings and civil engineering works — Design for disassembly and adaptability — Principles, requirements and guidance	This document provides an overview of design for disassembly and adaptability (DfD/A) principles and potential strategies for integrating these principles into the design process.
107.		ISO 22263:2008 Organization of information about construction works — Framework for management of project information	It specifies a framework for the organization of project information (process-related as well as product-related) in construction projects.
108.		ISO/TS 12720:2014 Sustainability in buildings and civil engineering works — Guidelines on the application of the general principles in ISO 15392	ISO/TS 12720:2014 provides guidance for the application of the general principles of sustainability in buildings and civil engineering works elaborated in ISO 15392. It shows the different actors involved with the construction works how to take these principles into account in their decision-making processes in order to increase the contribution of the construction works to sustainability and sustainable development.
109.		ISO/TS 12911:2012 Framework for building information modelling (BIM) guidance	It establishes a framework for providing specifications for the commissioning of building information modelling (BIM).
110.		ISO/CD 15928-6.2 Houses — Description of performance — Part 6: Contribution to sustainable development	<p>This document sets out a framework for describing the potential impact of choices on sustainable development made regarding building materials, construction methods and equipment and people, operating energy, water services and sanitary systems for a house. It outlines a performance based decision making approach to assessing such impacts.</p> <p>This document is intended for use in the evaluation of houses that may be separated from, or linked horizontally, to another house(s). Where houses are linked, and some sharing of services occurs, performance may be assessed both for individual houses, as well as a group of houses that are linked together.</p> <p>This standard covers the house as constructed including permanent services and finishings. It does not cover:</p> <p>a) the use of the land for houses;  b) the design and operation of the environment within which houses are located;  c) household waste for the use stage; and</p>

			d) moveable contents within homes.
111.		ISO/WD 29481-3 Building information modelling — Information delivery manual — Part 3: Data schema and classification	No scope description available
112.	<b>ISO/TC 163 Thermal performance and energy use in the built environment</b>	ISO 12655:2013, Energy performance of buildings — Presentation of measured energy use of buildings	This International Standard sets out a consistent methodology to present energy use in buildings, which is specified clearly with the energy usage, corresponding boundary and the energy data (presented with original energy carriers or equivalent energy). This International Standard is applicable to the presentation of energy use of civil buildings for data collection, metering, statistics, audit and analysis.
113.		ISO 17772-1:2017, Energy performance of buildings — Indoor environmental quality — Part 1: Indoor environmental input parameters for the design and assessment of energy performance of buildings	This International Standard sets out a consistent methodology to present energy use in buildings, which is specified clearly with the energy usage, corresponding boundary and the energy data (presented with original energy carriers or equivalent energy). This International Standard is applicable to the presentation of energy use of civil buildings for data collection, metering, statistics, audit and analysis.
114.		ISO/TR 17772-2:2018, Energy performance of buildings — Overall energy performance assessment procedures — Part 2: Guideline for using indoor environmental input parameters for the design and assessment of energy performance of buildings	This document deals with the indoor environmental parameters for thermal environment, indoor air quality, lighting and acoustic. It explains how to use ISO 17772-1 for specifying indoor environmental input parameters for building system design and energy performance calculations. This document: <ul style="list-style-type: none"> <li>— specifies methods for long-term evaluation of the indoor environment obtained as a result of calculations or measurements;</li> <li>— specifies criteria for measurements which can be used if required to measure compliance by inspection;</li> <li>— identifies parameters to be used by monitoring and displaying the indoor environment in existing buildings.</li> </ul> This document is applicable where the criteria for indoor environment are set by human occupancy and where the production or process does not have a major impact on indoor environment. It explains how different categories of criteria for the indoor environment can be used.
115.		ISO 18523-1:2016, Energy performance of buildings — Schedule and condition of building, zone and space usage for energy calculation — Part 1: Non-residential buildings	This document specifies the formats to present schedule and condition of building, zone and space usage, which is to be referred to as input data of energy calculations for non-residential buildings. The schedule and condition include schedules of occupancy, operation of technical building systems, ventilation rate, hot water usage and internal heat gains due to

			<p>occupancy, lighting and equipment. This document also gives categories of building, zone and space according to differentiating schedule and condition. Depending on necessary minuteness of the energy calculation, different levels of schedule and condition from the view point of time and space averaging are specified. The values and categories for the schedule and condition are given in annexes for more information for the application when the users of this document do not have detailed information on the values and categories for the schedule and condition. The schedule and condition in this document are basically different from assumptions in order to determine the size of technical building systems in the process of design, where possible largest values are to be assumed. Instead, most usual and average values, which are assumed for the building energy calculation, are dealt with in this document.</p>
116.		<p>ISO 18523-2:2018, Energy performance of buildings — Schedule and condition of building, zone and space usage for energy calculation — Part 2: Residential buildings</p>	<p>This document specifies the formats to present the schedule and conditions of zone and space usage (referred to as input data of energy calculations) for residential buildings. The schedule and conditions include schedules of occupancy, operation of technical building systems, ventilation rates, hot water usage, usage of appliances and internal heat gains due to occupancy, lighting and appliances. The schedule and conditions for lighting are applicable to fixed installed lighting fixtures. This document also gives categories of residential building, zone and space according to differentiating schedule and condition. For residential buildings or its housing units which contain any category of space or zone of non-residential buildings, ISO 18523-1 applies. Depending on necessary minuteness of the energy calculation, different levels of schedule and condition from the view point of time and space averaging are specified. The values and categories for the schedule and condition are included informatively.</p>
117.		<p>ISO 52000-1: 2017, Energy performance of buildings — Overarching EPB assessment — Part 1: General framework and procedures</p>	<p>This document establishes a systematic, comprehensive and modular structure for assessing the energy performance of new and existing buildings (EPB) in a holistic way. It is applicable to the assessment of overall energy use of a building, by measurement or calculation, and the calculation of energy performance in terms of primary energy or other energy-related metrics. It takes into account the specific possibilities and limitations for the different applications, such as building design, new buildings 'as built', and existing buildings in the use phase as well as renovation.</p>

118.		ISO 52003-1: 2017, Energy performance of buildings — Indicators, requirements, ratings and certificates — Part 1: General aspects and application to the overall energy performance	The set of EPB assessment standards produces a great number of overall and partial EPB indicators as outputs. This document provides general insight to both private parties and public regulators (and all stakeholders involved in the regulatory process) on how to make good use of these outputs for different purposes (post-processing). This document describes the relation between the EPB indicators and the EPB requirements and EPB ratings, and it discusses the importance of project-specific, tailored values as requirement or reference for certain EPB indicators. This document also includes a couple of possible EPB labels and it lists the different steps to be taken when establishing an EPB certification scheme. This document provides standardized tables for reporting in a structured and transparent manner the choices that are to be made with respect to overall EPB requirements. The tables are non-restrictive, thus allowing for full regulatory flexibility. This document does not provide such tables for partial EPB requirements (related to the fabric or technical buildings systems), as this is dealt with in other documents. NOTE Table 1 in the Introduction 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.
119.		ISO/TR 52003-2:2017, Energy performance of buildings — Indicators, requirements, ratings and certificates — Part 2: Explanation and justification of ISO 52003-1	This document refers to ISO 52003-1. It contains information to support the correct understanding and use of ISO 52003-1 and does not contain any normative provisions.
120.		ISO/AWI 52000-3, Energy performance of buildings — Overarching EPB assessment — Part 3: General Principles for determination and reporting of Primary Energy Factors (PEF) and CO2 emission coefficient (Module M1-7)	No scope description available
121.	<b>ISO/TC 205 Building environment design</b>	ISO 13153:2012, Framework of the design process for energy-saving single-family residential and small commercial buildings	This International Standard specifies a framework of the design process for energy-saving single-family residential and small commercial buildings, with the energy consumption ratio as the key criterion. It is intended to assist in the development of design guidelines for practitioners who design energy-related parts of buildings. This International Standard is applicable only to the design process for single-family residential and small commercial buildings.

122.		<p>ISO 13612-1:2014, Heating and cooling systems in buildings — Method for calculation of the system performance and system design for heat pump systems — Part 1: Design and dimensioning</p>	<p>This International Standard is applicable to heat pumps for space heating and cooling, heat pump water heaters (HPWH), and heat pumps with combined space heating and cooling and domestic hot water production, in alternate or simultaneous operation, where the same heat pump is used for space heating and cooling and domestic hot water heating. This part of ISO 13612 establishes the required inputs, calculation methods, and required outputs for heat generation for space heating and domestic hot water production and control of the following heat pump systems:</p> <ul style="list-style-type: none"> <li>— electrically driven vapour compression cycle (VCC) heat pumps;</li> <li>— combustion engine-driven VCC heat pumps;</li> <li>— thermally-driven vapour absorption cycle (VAC) heat pumps.</li> </ul> <p>This part of ISO 13612 specifies the design and dimensioning criteria for the heating and cooling systems in buildings using heat pumps alone or in combination with other heat generators. These include the following: — water–water; — brine–water; — refrigerant–water (direct expansion systems); — air–air; — air–water; — combined; — systems driven by electricity or gas. This part of ISO 13612 takes into account the heating requirements of attached systems (e.g. domestic hot water, process heat) in the design of heat supply, but does not cover the design of these systems. This part of ISO 13612 covers only the aspects dealing with the heat pump, the interface with the heat distribution and emission system (e.g. buffering system), the control of the whole system, and the aspects dealing with the energy source of the system.</p>
123.		<p>ISO 13612-2:2014, Heating and cooling systems in buildings — Method for calculation of the system performance and system design for heat pump systems — Part 2: Energy calculation</p>	<p>This International Standard is applicable to heat pumps for space heating and cooling, heat pump water heaters (HPWH), and heat pumps with combined space heating and/or cooling and domestic hot water production, in alternate or simultaneous operation, where the same heat pump is used for space heating and domestic hot water heating. This part of ISO 13612 provides a calculation method under steady conditions that corresponds to one calculation step. The results of this calculation are incorporated in larger building models and take into account the influence of the external conditions and building control that influence the energy requirements for heating and cooling supplied by the heat pump system. This part of ISO 13612 specifies the required inputs, calculation methods, and required outputs for output thermal power generation for space heating and cooling and domestic hot water production of the following heat pump systems.</p>

124.		ISO 13675:2013, Heating systems in buildings — Method and design for calculation of the system energy performance — Combustion systems (boilers)	This International Standard is the general standard on generation by combustion sub-systems (boilers) for oil, gas, coal and biomass burning. It specifies the — required inputs, — calculation method, and — resulting outputs for space heating generation by combustion sub-systems (boilers) including control. This International Standard is also intended for the case of generation for both domestic hot water production and space heating.
125.		ISO 16813:2006, Building environment design — Indoor environment — General principles	This International Standard establishes the general principles of building environment design taking into account healthy indoor environment for the occupants and protecting the environment for future generations. This International Standard promotes an approach in which the various parties involved in building environmental design collaborate with one another to provide a sustainable building environment. The unique features of the design process are articulated by the following aims: — to provide the constraints concerning sustainability issues from the initial stage of the design process, including building and plant life cycle together with owning and operating costs to be considered at all stages in the design process; — to assess the proposed design with rational criteria for indoor air quality, thermal comfort, acoustical comfort, visual comfort, energy efficiency and HVAC system controls at every stage of the design process; — to make iterations between decisions and evaluations of the design throughout the design process. The building environment design involves not only architectural design associated with environmental quality but also environmental system design associated with effective controls. This International Standard is applicable to building environment design for new construction and the retrofit of existing buildings.
126.		ISO 16818:2008, Building environment design — Energy efficiency — Terminology	This International Standard gives terms and definitions for use in the design of energy-efficient buildings. This International Standard is applicable to new buildings and retrofitted existing buildings.
127.		ISO/TR 16822:2016, Building environment design — List of test procedures for heating, ventilating, air-conditioning and domestic hot water equipment related to energy efficiency	This Technical Report lists testing and rating procedures for determining energy efficiency of heating, ventilating, and air conditioning equipment. This Technical Report is applicable to space conditioning and water heating equipment. Testing and rating procedures are listed in two ways.
128.		ISO 17800:2017, Facility smart grid information model	This model provides the basis for common information exchange between control systems and end use devices found in single - and multi-family homes, commercial and institutional buildings, and industrial facilities that is independent of the communication protocol in use. It provides a common basis for electrical energy consumers to describe,

			<p>manage, and communicate about electrical energy consumption and forecasts.</p> <p>The model defines a comprehensive set of data objects and actions that support a wide range of energy management applications and electrical service provider interactions including:</p> <ul style="list-style-type: none"> <li>a) on-site generation,</li> <li>b) demand response,</li> <li>c) electrical storage,</li> <li>d) peak demand management,</li> <li>e) forward power usage estimation,</li> <li>f) load shedding capability estimation,</li> <li>g) end load monitoring (sub metering),</li> <li>h) power quality of service monitoring,</li> <li>i) utilization of historical energy consumption data, and</li> <li>j) direct load control.</li> </ul>
129.		ISO 18566-1:2017, Building environment design — Design, test methods and control of hydronic radiant heating and cooling panel systems — Part 1: Vocabulary, symbols, technical specifications and requirements	<p>This document specifies the design, test conditions and methods for the determination of the cooling and heating capacity and control of radiant heating and cooling panels with an open air gap. This document applies to all types of prefabricated radiant panels that are part of the room periphery such as ceiling, walls and floor. This document is applicable to water-based heating and cooling panel systems (free hanging) in residential, commercial and industrial buildings. The methods apply to systems mounted to the wall, floor or ceiling construction with an open air gap. This document does not cover panels embedded into ceiling, wall or floor structures and hybrid (combined thermal radiation and forced-convection) ceiling panels. This document specifies the definition, symbols, comfort criteria, technical specifications and requirements of ceiling mounted radiant panels.</p>
130.		ISO 18566-4:2017, Building environment design — Design, test methods and control of hydronic radiant heating and cooling panel systems — Part 4: Control of ceiling mounted radiant heating and cooling panels	<p>This document specifies the control of ceiling mounted radiant heating and cooling panels. The requirements in this document are applicable only to the components of the heating/cooling systems and the elements which are part of the heating/cooling panels and which are installed to provide heating and/or cooling. This document is applicable to water-based ceiling mounted radiant heating and cooling panels in residential, commercial and industrial buildings. The methods apply to systems mounted under the ceiling with or without open air gaps between the panels and the ceiling.</p>
131.		ISO 19455-1:2019, Planning for functional performance testing for	<p>This document specifies a planning method for functional performance testing (FPT). This document is applicable to the planning of the FPT during</p>

		building commissioning — Part 1: Secondary hydronic pump, system and associated controls	the design phase of new buildings and retrofit projects, which is defined in ISO 16813. This document establishes how to design building environmental systems when the FPT is being carried out. This document defines the following: — what kind of information regarding the system is required (for example, design documents, drawings and product specifications); — what kind of data should be measured (though concrete measurement techniques are not specified in this document); — how the measured data is analysed. Such clear definition of the FPT makes it possible for building designers to prepare and plan for FPT throughout the design process. This document specifies an FPT method for secondary hydronic pump, system and associated controls in heating, ventilation and air conditioning (HVAC) systems.
132.		ISO 22510:2019, Open data communication in building automation, controls and building management — Home and building electronic systems — KNXnet/IP communication	This document defines the integration of KNX protocol implementations on top of Internet protocol (IP) networks, called KNXnet/IP. It describes a standard protocol for KNX devices connected to an IP network, called KNXnet/IP devices. The IP network acts as a fast (compared to KNX twisted pair transmission speed) backbone in KNX installations.
133.		ISO 23045:2008, Building environment design — Guidelines to assess energy efficiency of new buildings	This International Standard gives guidelines related to energy efficiency in buildings as introduced in ISO 16813. The objectives of this International Standard are to assist designers and practitioners when collecting and providing the useful data that are required at different stages of the design process and to fulfil the definitions of the building as prepared by building designers. This International Standard applies to new buildings and is applicable to space air-conditioning equipment and the heating plant in new buildings. It is assumed that the conditions of indoor spaces are maintained within a comfort range with regard to temperature, humidity, air quality, acoustics and light, or conditions maintained to provide freeze protection for piping or stored materials. Systems to be considered when assessing the energy efficiency of the building are heating, cooling, lighting, domestic hot water, service water heating, ventilation and related controls.
134.		ISO 52031:2020, Energy performance of buildings — Method for calculation of system energy requirements and system efficiencies — Space emission systems (heating and cooling)	This document establishes the required inputs, outputs and links (structure) of the calculation method for heating and cooling space emission systems. This document is applicable to the energy performance calculation of heating systems and water-based cooling space emission sub-systems.
135.		ISO/AWI TR 5242, Technical analysis for a new perspective on thermal comfort	No scope description available

136.		ISO/AWI TR 5863, Integrative design of the building envelope — General principles	No scope description available
137.		ISO/PRF TS 23764, Approach for non-residential Zero Energy Buildings (ZEB)	No scope description available
138.		ISO/AWI TR 52032-2, Energy performance of buildings — Energy requirements and efficiencies of heating, cooling and DHW distribution systems — Part 2: Explanation and justification of ISO 52032-1	No scope description available
139.	<b>ISO/TC 207 Environmental management</b>	EN ISO 14001:2015, Environmental management systems - Requirements with guidance for use	<p>This International Standard specifies the requirements for an environmental management system that an organization can use to enhance its environmental performance. This International Standard is intended for use by an organization seeking to manage its environmental responsibilities in a systematic manner that contributes to the environmental pillar of sustainability. This International Standard helps an organization achieve the intended outcomes of its environmental management system, which provide value for the environment, the organization itself and interested parties. Consistent with the organization's environmental policy, the intended outcomes of an environmental management system include:</p> <ul style="list-style-type: none"> <li>— enhancement of environmental performance;</li> <li>— fulfilment of compliance obligations;</li> <li>— achievement of environmental objectives.</li> </ul> <p>This International Standard is applicable to any organization, regardless of size, type and nature, and applies to the environmental aspects of its activities, products and services that the organization determines it can either control or influence considering a life cycle perspective. This International Standard does not state specific environmental performance criteria. This International Standard can be used in whole or in part to systematically improve environmental management. Claims of conformity to this International Standard, however, are not acceptable unless all its requirements are incorporated into an organization's environmental management system and fulfilled without exclusion.</p>
140.		EN ISO 14006:2020, Environmental management systems - Guidelines for incorporating ecodesign	This document gives guidelines for assisting organizations in establishing, documenting, implementing, maintaining and continually improving their management of ecodesign as part of an environmental management

			<p>system (EMS). This document is intended to be used by organizations that have implemented an EMS in accordance with ISO 14001, but it can also help in integrating ecodesign using other management systems. The guidelines are applicable to any organization regardless of its type, size or product(s) provided. This document is applicable to product-related environmental aspects and activities that an organization can control and those it can influence. This document does not establish specific environmental performance criteria.</p>
141.		EN ISO 14020:2001, Environmental labels and declarations - General principles	<p>This International Standard establishes guiding principles for the development and use of environmental labels and declarations. It is intended that other applicable standards in the ISO14020 series be used in conjunction with this International Standard. This International Standard is not intended for use as a specification for certification and registration purposes.</p>
142.		EN ISO 14031:2021, Environmental management - Environmental performance evaluation - Guidelines	<p>This document gives guidelines for the design and use of environmental performance evaluation (EPE) within an organization. It is applicable to all organizations, regardless of type, size, location and complexity. This document does not establish environmental performance levels. It is not intended for use for the establishment of any other environmental management system (EMS) conformity requirements. The guidance in this document can be used to support an organization's own approach to EPE including its commitments to compliance with legal and other requirements, the prevention of pollution and continual improvement, among others.</p>
143.		EN ISO 14040:2006, Environmental management - Life cycle assessment - Principles and framework	<p>This International Standard describes the principles and framework for life cycle assessment (LCA) including:</p> <ul style="list-style-type: none"> <li>a) the goal and scope definition of the LCA,</li> <li>b) the life cycle inventory analysis (LCI) phase,</li> <li>c) the life cycle impact assessment (LCIA) phase,</li> <li>d) the life cycle interpretation phase,</li> <li>e) reporting and critical review of the LCA,</li> <li>f) limitations of the LCA,</li> <li>g) relationship between the LCA phases, and</li> <li>h) conditions for use of value choices and optional elements.</li> </ul> <p>This International Standard covers life cycle assessment (LCA) studies and life cycle inventory (LCI) studies. It does not describe the LCA technique in detail, nor does it specify methodologies for the individual phases of the LCA. The intended application of LCA or LCI results is considered during the</p>

			goal and scope definition, but the application itself is outside the scope of this International Standard. This International Standard is not intended for contractual or regulatory purposes or registration and certification.
144.		EN ISO 14090:2019, Adaptation to climate change - Principles, requirements and guidelines	This document specifies principles, requirements and guidelines for adaptation to climate change. This includes the integration of adaptation within or across organizations, understanding impacts and uncertainties and how these can be used to inform decisions. This document is applicable to any organization, regardless of size, type and nature, e.g. local, regional, international, business units, conglomerates, industrial sectors, natural resource management units. This document can support the development of sector-, aspect- or element-specific climate change adaptation standards.
145.	<b>ISO/TC 211 Geographic information/Geomatics</b>	ISO/TS 19158:2012 Geographic information — Quality assurance of data supply	This International Standard provides a framework for quality assurance specific to geographic information. It is based upon the quality principles and quality evaluation procedures of geographic information identified in ISO 19157 and the general quality management principles defined in ISO 9000.
146.		ISO/TS 19159-1:2014 Geographic information — Calibration and validation of remote sensing imagery sensors and data — Part 1: Optical sensors	This document defines the calibration and validation of airborne and spaceborne remote sensing imagery sensors. The term "calibration" refers to geometry, radiometry, and spectral, and includes the instrument calibration in a laboratory as well as in situ calibration methods. The validation methods address validation of the calibration information.
147.		ISO/TS 19159-2:2016 Geographic information — Calibration and validation of remote sensing imagery sensors and data — Part 2: Lidar	This document defines the data capture method, the relationships between the coordinate reference systems and their parameters, as well as the calibration of airborne lidar (light detection and ranging) sensors. ISO/TS 19159-2:2016 also standardizes the service metadata for the data capture method, the relationships between the coordinate reference systems and their parameters and the calibration procedures of airborne lidar systems as well as the associated data types and code lists that have not been defined in other ISO geographic information international standards.
148.		ISO/TS 19159-3:2018 Geographic information — Calibration and validation of remote sensing imagery sensors and data — Part 3: SAR/InSAR	This document defines the calibration of SAR/InSAR sensors and validation of SAR/InSAR calibration information. This document addresses earth based remote sensing. The specified sensors include airborne and spaceborne SAR/InSAR sensors. This document also addresses the metadata related to calibration and validation.
149.		ISO/TS 19163-1:2016 Geographic information — Content	This document classifies imagery and regularly spaced gridded thematic data into types based on attribute property, sensor type and spatial

		components and encoding rules for imagery and gridded data — Part 1: Content model	property, and defines an encoding-neutral content model for the required components for each type of data. It also specifies logical data structures and the rules for encoding the content components in the structures.
150.		ISO/TS 19163-2:2020 Geographic information — Content components and encoding rules for imagery and gridded data — Part 2: Implementation schema	This document specifies an implementation schema based on the content models for geographic imagery and gridded thematic data defined in the ISO/TS 19163-1. This document defines a structure that is suitable for binding content components and specific encoding formats. It also provides an implementation schema for binding a concrete, implementable, conformance-testable coverage structure as defined in ISO 19123-2.
151.		ISO 19165-1:2018 Geographic information — Preservation of digital data and metadata — Part 1: Fundamentals	ISO 19165-1:2018 defines a preservation metadata extension of ISO 19115-1. ISO 19165-1:2018 defines the requirements for the long-term preservation of digital geospatial data. These data also include metadata, representation information, provenance, context and any other content items that capture the knowledge that are necessary to fully understand and reuse the archived data. This document also refers to characteristics of data formats that are useful for the purpose of archiving.
152.		ISO/TS 19166:2021 Geographic information — BIM to GIS conceptual mapping (B2GM)	This document defines the conceptual framework and mechanisms for mapping information elements from Building Information Modelling (BIM) to Geographic Information Systems (GIS) to access the required information based on specific user requirements.
153.		ISO 19116:2019 Geographic information — Positioning services	This document specifies the data structure and content of an interface that permits communication between position-providing device(s) and position-using device(s) enabling the position-using device(s) to obtain and unambiguously interpret position information and determine, based on a measure of the degree of reliability, whether the resulting position information meets the requirements of the intended use.
154.		ISO/TR 19121:2000 Geographic information — Imagery and gridded data	This Technical Report is intended to identify the manner by which ISO/TC 211 should handle imagery and gridded data in the context of its standards.
155.		ISO/TS 19129:2009 Geographic information — Imagery, gridded and coverage data framework	This document defines the framework for imagery, gridded and coverage data. This framework defines a content model for the content type imagery and for other specific content types that can be represented as coverage data. These content models are represented as a set of generic UML patterns for application schemas.
156.		ISO 19130-1:2018 Geographic information — Imagery sensor models	This document identifies the information required to determine the relationship between the position of a remotely sensed pixel in image coordinates and its geolocation. It supports exploitation of remotely

		for ge positioning — Part 1: Fundamentals	sensed images. It defines the metadata to be distributed with the image to enable user determination of geographic position from the observations.
157.		ISO/AWI TS 19124-1 Geographic information — Calibration and validation of remote sensing data and derived products — Part 1: Fundamentals	No scope description available
158.		ISO/DTS 19159-4 Geographic information — Calibration and validation of remote sensing imagery sensors — Part 4: Space-borne passive microwave radiometers	No scope description available
159.	<b>ISO/TC 301 Energy management and energy savings</b>	ISO/IEC 13273-1: 2015, Energy efficiency and renewable energy sources — Common international terminology — Part 1: Energy efficiency	This part of ISO/IEC 13273 contains transverse concepts and their definitions in the subject field of energy efficiency. This horizontal standard is primarily intended for use by technical committees in the preparation of standards in accordance with the principles laid down in IEC Guide 108.
160.		ISO/IEC 13273-2: 2015, Energy efficiency and renewable energy sources — Common international terminology — Part 2: Renewable energy sources	This part of ISO/IEC 13273 contains transversal concepts and their definitions in the subject field of renewable energy sources. This horizontal standard is primarily intended for use by technical committees in the preparation of standards in accordance with the principles laid down in IEC Guide 108.
161.		ISO 17741:2016, General technical rules for measurement, calculation and verification of energy savings of projects	This International Standard specifies the general technical rules for measurement, calculation and verification of energy savings in retrofits projects or new projects.
162.		ISO 17742:2015, Energy efficiency and savings calculation for countries, regions and cities	This International Standard provides a general approach for energy efficiency and energy savings calculations with indicator-based and measure-based methods for the geographical entities countries, regions, and cities. This International Standard considers all end-use sectors, such as households, industry, tertiary (services, etc.), agriculture, and transport. It does not incorporate calculation of energy efficiency and energy savings in energy supply sectors, such as power plants, refineries, and coal mines. Energy consumption does not include feedstock energy, such as oil products for the production of plastics. This International Standard is not intended to be used for calculating energy savings of individual households, organizations, companies, or other end users.

163.		ISO 17743:2016, Energy savings — Definition of a methodological framework applicable to calculation and reporting on energy savings	<p>This International Standard establishes a methodological framework that applies to the calculation and reporting of energy savings from existing (implemented) and prospective measures and actions which intend to save energy. This framework standard will be applicable to other standards in the field of energy saving determination. This International Standard addresses the following in the context of energy savings:</p> <ul style="list-style-type: none"> <li>— terminology;</li> <li>— definition of the system boundaries;</li> <li>— principles for the determination of a baseline;</li> <li>— principles for statistical indicator-based methods;</li> <li>— data used;</li> <li>— principles for reporting.</li> </ul> <p>The development of the methodology for measurement and verification of the energy savings is not in the scope of this International Standard. The methodology of construction of the scenarios for future energy saving measures and actions is not in the scope of this International Standard.</p>
164.		ISO 50001:2018, Energy management systems — Requirements with guidance for use	<p>This document specifies requirements for establishing, implementing, maintaining and improving an energy management system (EnMS). The intended outcome is to enable an organization to follow a systematic approach in achieving continual improvement of energy performance and the EnMS. This document:</p> <ul style="list-style-type: none"> <li>a) is applicable to any organization regardless of its type, size, complexity, geographical location, organizational culture or the products and services it provides;</li> <li>b) is applicable to activities affecting energy performance that are managed and controlled by the organization;</li> <li>c) is applicable irrespective of the quantity, use, or types of energy consumed;</li> <li>d) requires demonstration of continual energy performance improvement, but does not define levels of energy performance improvement to be achieved;</li> <li>e) can be used independently, or be aligned or integrated with other management systems.</li> </ul>
165.		ISO 50006:2014, Energy management systems — Measuring energy performance using energy baselines (EnB) and energy performance	<p>This International Standard provides guidance to organizations on how to establish, use and maintain energy performance indicators (EnPIs) and energy baselines (EnBs) as part of the process of measuring energy performance. The guidance in this International Standard is applicable to</p>

		indicators (EnPI) — General principles and guidance	any organization, regardless of its size, type, location or level of maturity in the field of energy management
166.		ISO/CD 50006-3, Energy management systems — Evaluating Energy Performance using Energy Baselines and Energy Performance Indicators	No scope description available
167.		ISO 50007:2017, Energy services — Guidelines for the assessment and improvement of the energy service to users	<p>This document addresses the relevant elements of energy service provided by energy suppliers to users. It envisages energy service as including two broad categories: — energy supply/generation and distribution; — advice on and improvement to energy efficiency. This document provides best practice guidelines for energy service providers in order to continually improve their practices and quality of interaction with users. The following are within the scope of this document:</p> <ul style="list-style-type: none"> <li>— definition of a language common to the different stakeholders;</li> <li>— definition of key components and characteristics of the energy service to users, with respect to their needs and expectations;</li> <li>— guidelines for satisfying users' needs and expectations;</li> <li>— assessment criteria for energy service to users;</li> <li>— introduction to performance indicators;</li> <li>— examples of performance indicators;</li> <li>— performance improvement;</li> <li>— education or training for users to understand the energy service provided by the energy service providers.</li> </ul>
168.		ISO/TS 50008:2018, Energy management and energy savings — Building energy data management for energy performance — Guidance for a systemic data exchange approach	<p>This document gives guidelines for how the energy management team (EnMT) in an organization can define, request and regularly access the data and information needed to implement an energy management system (EnMS) designed to continually improve energy performance in buildings. It is applicable to data provided by human processes or by building automation, control, information technology, or even accounting systems. If the building information system (BIS) is accessible by the EnMT, the BIS can facilitate the provision of data and information. This could include data used in determining significant energy uses (SEUs), managing to improve energy performance (including energy consumption, energy use and energy efficiency) through to the use of energy performance indicators (EnPIs). This document does not apply to: — residential or industrial buildings; — buildings containing an industrial process where the industrial processes cannot be separated from other uses. However, many</p>

			of the principles in this document can be applied to these or other types of buildings.
169.		ISO/AWI 50010, Energy management and energy savings - Guidance for zero net energy in operations	No scope description available
170.		ISO/AWI 50011, Energy management system —Measurement of energy management progress	No scope description available
171.		ISO 50046:2019, General methods for predicting energy savings	This document specifies general methods for the calculation of predicted energy savings (PrES), using measure-based calculation methods, also known as bottom-up or energy performance improvement actions (EPIAs)-based methods (see ISO 17742). Indicator-based methods (see ISO 17742) and total consumption-based methods (see ISO 50047) are not included in the scope of this document. This document provides general principles for categorizing and choosing the method, taking account of the context, targeted accuracy and resources available for calculating the PrES. It also provides guidance on the conditions for ensuring the quality of the PrES, their documentation and validation. It is applicable to calculation of PrES for any: <ul style="list-style-type: none"> <li>— type of EPIA;</li> <li>— end-use sector;</li> <li>— energy end-use;</li> <li>— level of aggregation of energy savings;</li> <li>— stakeholder.</li> </ul>
172.	<b>ISO/IEC JTC 1 Information technology</b>	ISO/IEC 20922:2016 Information technology — Message Queuing Telemetry Transport (MQTT) v3.1.1	This document is a Client Server publish/subscribe messaging transport protocol. It is light weight, open, simple, and designed so as to be easy to implement. These characteristics make it ideal for use in many situations, including constrained environments such as for communication in Machine to Machine (M2M) and Internet of Things (IoT) contexts where a small code footprint is required and/or network bandwidth is at a premium.
173.	<b>ISO/IEC JTC 1/SC 41 Internet of Things and related technologies</b>	ISO/IEC AWI 5618 Digital twin — Concepts and terminology	No scope description available
174.		ISO/IEC 20005:2013 Information technology — Sensor networks — Services and interfaces supporting	This document specifies services and interfaces supporting collaborative information processing (CIP) in intelligent sensor networks which includes:

		collaborative information processing in intelligent sensor networks	<ul style="list-style-type: none"> <li>- CIP functionalities and CIP functional model;</li> <li>- common services supporting CIP;</li> <li>- common service interfaces to CIP.</li> </ul>
175.		ISO/IEC 20924:2018 Information technology — Internet of Things (IoT) — Vocabulary	This document provides a definition of Internet of Things along with a set of terms and definitions forming a terminology foundation for the Internet of Things.
176.		ISO/IEC 21823-1:2019 Internet of things (IoT) — Interoperability for IoT systems — Part 1: Framework	This document provides an overview of interoperability as it applies to IoT systems and a framework for interoperability for IoT systems. This document enables IoT systems to be built in such a way that the entities of the IoT system are able to exchange information and mutually use the information in an efficient way.
177.		ISO/IEC 21823-2:2020 Internet of things (IoT) — Interoperability for IoT systems — Part 2: Transport interoperability	This document specifies a framework and requirements for transport interoperability, in order to enable the construction of IoT systems with information exchange, peer-to-peer connectivity and seamless communication both between different IoT systems and also among entities within an IoT system.
178.		ISO/IEC TR 22417:2017 Information technology — Internet of things (IoT) use cases	This technical report identifies IoT scenarios and use cases based on real-world applications and requirements. The use cases provide a practical context for considerations on interoperability and standards based on user experience.
179.		ISO/IEC 29182-1:2013 Information technology — Sensor networks: Sensor Network Reference Architecture (SNRA) — Part 1: General overview and requirements	This document provides a general overview of the characteristics of a sensor network and the organization of the entities that comprise such a network. It also describes the general requirements that are identified for sensor networks.
180.		ISO/IEC 29182-2:2013 Information technology — Sensor networks: Sensor Network Reference Architecture (SNRA) — Part 2: Vocabulary and terminology	This document is intended to facilitate the development of International Standards in sensor networks. It presents terms and definitions for selected concepts relevant to the field of sensor networks. It establishes a general description of concepts in this field and identifies the relationships among those concepts.
181.		ISO/IEC 29182-3:2014 Information technology — Sensor networks: Sensor Network Reference Architecture (SNRA) — Part 3: Reference architecture views	This document provides Sensor Network Reference Architecture (SNRA) views. The architecture views include business, operational, systems, and technical perspectives, and these views are presented in functional, logical, and/or physical views where applicable.
182.		ISO/IEC 29182-4:2013 Information technology — Sensor networks: Sensor Network Reference Architecture (SNRA) — Part 4: Entity models	This document presents models for the entities that enable sensor network applications and services according to the Sensor Network Reference Architecture (SNRA).

183.	ISO/IEC 29182-5:2013 Information technology — Sensor networks: Sensor Network Reference Architecture (SNRA) — Part 5: Interface definitions	This document provides the definitions and requirements of sensor network (SN) interfaces of the entities in the Sensor Network Reference Architecture and covers the following aspects: - interfaces between functional layers to provide service access for the modules in the upper layer to exchange messages with modules in the lower layer; - interfaces between entities introduced in the Sensor Network Reference Architecture enabling sensor network services and applications.
184.	ISO/IEC 29182-6:2014 Information technology — Sensor networks: Sensor Network Reference Architecture (SNRA) — Part 6: Applications	This document describes and provides a compilation of sensor network applications for which International Standardized Profiles (ISPs) are needed, guidelines for the structured description of sensor network applications, and examples for structured sensor network applications.
185.	ISO/IEC 29182-7:2015 Information technology — Sensor networks: Sensor Network Reference Architecture (SNRA) — Part 7: Interoperability guidelines	This document provides a general overview and guidelines for achieving interoperability between sensor network services and related entities in a heterogeneous sensor network.
186.	ISO/IEC 30101:2014 Information technology — Sensor networks: Sensor network and its interfaces for smart grid system	This document is for sensor networks in order to support smart grid technologies for power generation, distribution, networks, energy storage, load efficiency, control and communications, and associated environmental challenges. This International Standard characterizes the requirements for sensor networks to support the aforementioned applications and challenges.
187.	ISO/IEC 30128:2014 Information technology — Sensor networks — Generic Sensor Network Application Interface	This document specifies the interfaces between the application layers of service providers and sensor network gateways, which is Protocol A in interface 3, defined in ISO/IEC 29182-5. This International Standard covers: - description of generic sensor network applications' operational requirements, - description of sensor network capabilities, and - mandatory and optional interfaces between the application layers of service providers and sensor network gateways
188.	ISO/IEC 30141:2018 Internet of Things (IoT) — Reference Architecture	This document provides a standardized IoT Reference Architecture using a common vocabulary, reusable designs and industry best practices.
189.	ISO/IEC 30147:2021 Information technology — Internet of things — Methodology for trustworthiness of IoT system/service	This document provides system life cycle processes to implement and maintain trustworthiness in an IoT system or service by applying and supplementing ISO/IEC/IEEE 15288:2015. The system life cycle processes

			are applicable to IoT systems and services common to a wide range of application areas.
190.		ISO/IEC AWI 30149 Internet of things (IoT) — Trustworthiness framework	No scope description available
191.		ISO/IEC AWI 30161:2020 Internet of Things (IoT) — Requirements of IoT data exchange platform for various IoT services	This document specifies requirements for an Internet of Things (IoT) data exchange platform for various services in the technology areas of: <ul style="list-style-type: none"> <li>- the middleware components of communication networks allowing the co-existence of IoT services with legacy services;</li> <li>- the end-points performance across the communication networks among the IoT and legacy services;</li> <li>- the IoT specific functions and functionalities allowing the efficient deployment of IoT services;</li> <li>- the IoT service communication networks' framework and infrastructure; and</li> <li>- the IoT service implementation guideline for the IoT data exchange platform.</li> </ul>
192.		ISO/IEC 30165:2021 Internet of Things (IoT) — Real-time IoT framework	This document specifies the framework of a real-time IoT (RT-IoT) system, including: <ul style="list-style-type: none"> <li>- RT-IoT system conceptual model based on domain-based IoT reference model defined in ISO/IEC 30141;</li> <li>- impacts of real-time parameters in terms of four viewpoints (time, communication, control and computation).</li> </ul>
193.	<b>ISO/IEC JTC 1/SC 42 Artificial intelligence</b>	ISO/IEC WD 5339 Information Technology — Artificial Intelligence — Guidelines for AI applications	No scope description available
194.		ISO/IEC WD 5392 Information technology — Artificial intelligence — Reference architecture of knowledge engineering	No scope description available
195.		ISO/IEC AWI TR 5469 Artificial intelligence — Functional safety and AI systems	No scope description available
196.		ISO/IEC 20546:2019 Information technology — Big data — Overview and vocabulary	This document provides a set of terms and definitions needed to promote improved communication and understanding of this area. It provides a terminological foundation for big data-related standards.
197.		ISO/IEC TR 20547-1:2020 Information technology — Big data reference	This document describes the framework of the big data reference architecture and the process for how a user of the document can apply it to their particular problem domain.

		architecture — Part 1: Framework and application process	
198.		ISO/IEC TR 20547-2:2018 Information technology — Big data reference architecture — Part 2: Use cases and derived requirements	ISO/IEC TR 20547-2:2018 provides examples of big data use cases with application domains and technical considerations derived from the contributed use cases.
199.		ISO/IEC 20547-3:2020 Information technology — Big data reference architecture — Part 3: Reference architecture	This document specifies the big data reference architecture (BDRA). The reference architecture includes concepts and architectural views.
200.		ISO/IEC TR 20547-5:2018 Information technology — Big data reference architecture — Part 5: Standards roadmap	ISO/IEC TR 20547-5:2018 describes big data relevant standards, both in existence and under development, along with priorities for future big data standards development based on gap analysis.
201.		ISO/IEC CD 22989 Artificial intelligence — Concepts and terminology	<p>This document establishes terminology for Artificial Intelligence (AI) and describes concepts in the field of AI.</p> <p>This document can be used in the development of other standards and in support of communications among diverse, interested parties/stakeholders.</p>
202.		ISO/IEC CD 23894.2 Information Technology — Artificial Intelligence — Risk Management	No scope description available
203.		ISO/IEC TR 24028:2020 Information technology — Artificial intelligence — Overview of trustworthiness in artificial intelligence	<p>This document surveys topics related to trustworthiness in AI systems, including the following:</p> <ul style="list-style-type: none"> <li>— approaches to establish trust in AI systems through transparency, explainability, controllability, etc.;</li> <li>— engineering pitfalls and typical associated threats and risks to AI systems, along with possible mitigation techniques and methods;</li> <li>— approaches to assess and achieve availability, resiliency, reliability, accuracy, safety, security and privacy of AI systems.</li> </ul>
204.		ISO/IEC CD TR 24030 Information technology — Artificial Intelligence (AI) — Use cases	This document provides a collection of representative use cases of AI applications in a variety of domains.
205.		ISO/IEC AWI TR 24368 Information technology — Artificial intelligence — Overview of ethical and societal concerns	No scope description available

206.		ISO/IEC AWI TR 24372 Information technology — Artificial intelligence (AI) — Overview of computational approaches for AI systems	No scope description available
207.		ISO/IEC CD 24668 Information technology — Artificial intelligence — Process management framework for Big data analytics	No scope description available
208.		ISO/IEC AWI 25059 Software engineering — Systems and software Quality Requirements and Evaluation (SQuaRE) — Quality model for AI-based systems	No scope description available
209.		ISO/IEC WD 42001 Information Technology — Artificial intelligence — Management system	No scope description available

## 4 Conclusion

This deliverable within the WP6 Task 6.5 provides an overview of existing standards and the ongoing standardisation work in a wide area of relevance to the PRECEPT project. In the analysis 209 standards were identified, among them 99 European standards developed by CEN or CEN and CENELEC and 109 are international standards developed by ISO or jointly ISO and IEC. Of them, 44 standards are currently in the drafting stage. It must be emphasized that despite the relatively large number of standards, relevant for various aspects of BEP, there is a lack of specific standards, particularly relevant for the PRECEPT project. However, adherence to the standards is of critical importance for the deployment and operation of proactive residential buildings, and development of such standard is of utmost importance to ensure their optimal performance and efficiency.

This overview provides a baseline for the next deliverables within the WP6, Task 6.5: D6.14 Report containing gap analysis of the existing standardization landscape vs the consortium needs, and D6.15 PRECEPT New Work Item Proposal (NWIP). While the list of identified standards is not exhaustive, this report is intended to serve as a reference on the key standards in BEP for the consortium members as well as for any expert working in the relevant area.