D7.1 - Report on the standardization landscape and applicable standards

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Table of Abbreviations and Acronyms

EU	European Union
ICT	Information and Communication Technologies
CEN	European Committee for Standardization
CENELEC (CLC)	European Committee for Electrotechnical Standardization
EN	European Standard
IEC	International Electrotechnical Commission
ISO	International Organization for Standardization; International Standard
PAS	Publicly Available Specification
SC	Subcommittee
TC	Technical Committee
TR	Technical Report
TS	Technical Specification
UNE	Spanish Association for Standardization
WG	Working Group
ESO	European Standardization Organizations
ETSI	European Telecommunications Standards Institute
CWA	CEN Workshop Agreement
IOT	Internet Of Things

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Executive summary

D7.1 "Report on the standardization landscape and applicable standards" collects the information on the state of the art in standardization relevant for ECOFACT. This analysis of the standardization landscape includes the information on the relevant standards (both, published and under-development) and the relevant standardization technical committees.

The objective of the deliverable is to provide the consortium with the proper knowledge of the standardization landscape at an early stage in order this information can be taken into account in the development of the different working packages as starting material, facilitating the use of existing knowledge and ensuring the compatibility and the interoperability of the results. It is based in the standardization fields of interest identified by ECOFACT and the subsequent identification and analysis of related standards and standardization technical committees.

D7.1 is the first deliverable of the Task 7.1 "Detailed analysis of applicable standardization, certification and regulatory frameworks" and will conform the basis for further steps towards the consideration of the results of ECOFACT in future standards contributing to the market acceptance of the developed solutions.

The Spanish Association for Standardization, UNE, as National Standardization Body (NSB), member of CEN-CENELEC and of ISO-IEC, is member of ECOFACT to provide support regarding the standardization tasks included in the project (WP7- Standardization, certification and regulation of energy efficient manufacturing practices).

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1 Introduction

1.1 Summary and scope

The purpose of this report D7.1 is to provide information on the standardization landscape and applicable standards relevant for the ECOFACT project. It pretends to provide starting information for the work packages to facilitate the use of the existing knowledge and to ensure compatibility and interoperability with already existing solutions by identifying the relevant standards at European and international levels as well as the relevant standardization technical committees in the fields of sustainable manufacturing and other key related topics

1.2 Project presentation overview

The EU manufacturing industry of the future is to be shaped by the decarbonization imperative as well as by those drivers of change leading the 4th Industrial Revolution, such as digitalization, new services, greater circularity and resource efficiency, which have a high impact on the energy and production systems. The international commitment to limit global warming below 2°C following the Paris Agreement puts a renewed emphasis on the need for Europe to accelerate the smart energy transition. To effectively contribute to the global climate target, the industry sector must undergo a deep transformation and become both smart and efficient

ECOFACT is a 48 months project which is structured in 10 work packages (WP) as seen in Figure 15. WP1, led by CAR, defines an initial reference framework to sustain and coordinate the developments and demonstrations of the whole ECOFACT project while enabling the whole methodology and tool suite. Then, WPs 2-3-4 constitute the 3 vertical axes of hardware (WP2) and software (WP3/WP4) development that will be integrated into a single holistic platform in WP5:

IPT is the leader of **WP2** to design and develop an innovative holistic monitoring and control network for the improved management of the use of energy and resources in manufacturing environments, based on the requirements defined in **WP1** and adapted for interoperable integration of smart sensors under IIoT premises. **WP2** will supply a bidirectional interface on the edge layer to the ECOFACT platform developed in WP5.

WP3 (led by ONE) has the objective of developing a prognosis-based Energy and Resource Management System (ERMS) for optimized use of the factory energy and material resources. Adequate energy- and material flow simulations (tailored for the ECOFACT demo cases – WP6) will aim to support predictions, and are to be integrated in a digital twin approach together with real data from field monitoring and other data sources (WP2).

PRE is the leader of **WP4** "Dynamic LCA/LCC software module" to feed the ECOFACT platform with environmental impact data that can be used for improved decision making along the supply chain. This will enrich the holistic Decision-Support System (DSS) to be developed in WP5 by taking into consideration environmental and economic criteria. PRE, CAR, CIRCE and CERTH will create the LCA models for the demo cases (ARÇ, AB, GUL, TOF), as well as they will provide transversal support to identify input data and boundary constraints.

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WP5 (led by LINKS) aims to design and develop the ECOFACT platform and the required ICT infrastructure. This platform is the cloud-based platform used to collect all the data coming from the distributed edge control layers (WP2) and to host all the components of the App&Services layer developed in WP3 and WP4.

WP6 is for Demonstration, where CERTH will coordinate the demonstration activities directly led and managed by pre-demo and demo site responsible partners (IWU, CIM, ARÇ, AB, TOF, GUL). The main objective of this WP6 is to conduct validation tests of ECOFACT in a pre-demonstration environment, and finally demonstrate and fully monitor the ECOFACT platform at the facilities of the four operational demos, thus evaluating ECOFACT results in environmental, economic, production performance improvements and social/behavioral terms.

WP7, WP8 and **WP9** have a transversal role. **WP7**, Standardization, certification and regulation of energy efficient manufacturing practices to leverage the best practices derived from ECOFACT definition, development and implementation tasks (WP1-WP6) in order to feed in existing and/or new standardization, certification and regulatory initiatives towards promotion of holistic sustainable manufacturing management in the EU industry. UNE will be WP7 leader. WP8, Replication and exploitation (led by RINA-C) to demonstrate the replicability of the proposed concept through the feasibility analysis of early adopters of ECOFACT tool and the elaboration of suitable business models to ensure the life-beyond-the-project of the developed innovations. WP9, Dissemination and Communication. To promote and disseminate the ECOFACT concept, platform and most relevant outcomes. Dissemination and Communication are crucial for the success of the project and for the sustainability of outputs in the long term. For this reason, the project aims to have a wide audience and seeks to maximize the impact. IMR will be WP9 leader. Finally, WP10, Project Management (led by CAR) aims to coordinate and supervise all project activities among the partners, to monitor quality and timing of project results and to carry out the overall administrative and financial management of the project.

Focusing on **WP7 (Standardization, certification and regulation of energy efficient manufacturing practices)**, which is the subject of this report, its main objective is to pave the way for the future inclusion of the project's principles in standard industry practice and provide recommendations for certification schemes and related policy measures.

WP7 is organized around the next 4 tasks:

- Task 7.1 *Detailed analysis of applicable standardization, certification and regulatory frameworks*.

  An initial analysis of standardization, certification and regulatory landscapes will be performed, starting from needs of other WPs about existing standards, certification schemes and regulatory instruments of current practice in EU manufacturing. Moreover, role and opportunities from interaction with relevant committees and organizations involved will be addressed.

- Task 7.2 *Contribution to ongoing and future standardization initiatives for sustainable manufacturing*

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This task will investigate the potential for standardisation in the field, which will allow the project to interact with related technical committees (TCs) to try to develop new standards on specific topics related to the project objectives.

- Task 7.3 *Recommendations for certification of sustainable manufacturing processes.*

  To provide recommendations for adequate certification schemes aligned with overall project approach and results, AENOR will develop a quality assurance scheme/ business model that collects how a manufacturing organization creates, delivers and captures value in economic, social or other context and evaluates and modifies organization's procedures to ensure they provide results in terms of energy-efficient and sustainable manufacturing management.

- Task 7.4 *Enhancing ECOFACT impact through policy instruments*

  This Task will study reasoning of industrial decision-makers and key aspects to promote policy instruments and recommendations which, will promote sustainable good practices into manufacturing.

The project is co-funded by the European Union's Horizon 2020 research and innovation programme, started on 1st of October 2020 and runs for four years. It brings together 19 partners from 7 different European countries. These include manufacturing companies, research centers, multiservice companies, consulting firms, a certification company and a Nacional standardization body.

1.3 Short introduction about standardization

This chapter is a general introduction to standardization for people not used to it and it is based on general information developed by the Standards Organizations. Therefore, it is also used in other similar deliverables produced by UNE in other Horizon 2020 projects.

Standards are voluntary technical documents that set out requirements for a specific item, material, component, system or service, or describes in detail a particular method, procedure or best practice. Standards are developed and defined through a process of sharing knowledge and building consensus among technical experts nominated by interested parties and other stakeholders - including businesses, consumers and environmental groups, among others. These experts are organized in Technical Committees (TCs), which are subdivided in Subcommittees (SCs) or Working Groups (WGs). These TCs are included in the structure of the Standardization Organizations (National, European and International, with the respective mirror committees) and work following their internal regulations.

The standardization bodies operate at National (UNE, AFNOR, BSI, DIN, etc.), Regional (CEN, CENELEC, ETSI) or International (ISO, IEC, ITU) level. Sometimes there are different standardization bodies at the same level but covering different fields. This is the case of ISO (general), IEC (electrical) and ITU (telecommunications) at International level, or CEN, CENELEC and ETSI at European level in the same way. At European level, all the members of CEN and CENELEC shall adopt EN standards as national standards and have to withdraw any existing national standard which could conflict with them.

The formal definition of a standard is a "document, established by consensus and approved by a recognized body that provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context". These include requirements and/or recommendations in relation

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to products, systems, processes or services. European Standards (ENs) are documents that have been ratified by one of the three European Standardization Organizations (ESOs), CEN, CENELEC or ETSI; recognized as competent in the area of voluntary technical standardization as for the EU Regulation 1025/2012.

There are also different kinds of standardization documents. The most widespread is the standard, which has a different code depending on the organization under it was developed, e.g. EN for European Standards, ISO or IEC for International standards. Other types of documents are Technical Specifications (TS), Technical Reports (TR) and Workshop Agreements (CWA). Further Amendments to the standards are identified by adding A1, A2, etc. at the end of the standard code. A summary of the characteristics of the different standardization documents can be found in the following table 1.

Table 1 – Characteristics of different standardization documents

Type	International code	European code	National code	Main characteristics
Standard	ISO IEC	EN	UNE, NF, BS, DIN, etc. When adopting: UNE-EN, NF-EN, UNE-ISO, NF-ISO, etc.	Elaboration: 3 years 2 steps of member approval European: compulsory national adoption Revision: every 5 years
Technical Specification	ISO/TS IEC/TS	CEN/TS CLC/TS	When adopting: UNE-CEN/TS, NF-CEN/TS, UNE-ISO/TS, NF-ISO/TS, etc.	Elaboration: 21 months 1 step of member approval or internal approval in TC European: optional national adoption Revision: at 3 years (upgrading to EN or deletion)
Technical Report	ISO/TR IEC/TR	CEN/TR CLC/TR	When adopting: UNE-CEN/TR, NF-CEN/TR, UNE-ISO/TR, NF-ISO/TR, etc.	Elaboration: free timeframe Internal approval in TC European: optional national adoption No revision required
Workshop Agreement	IWA	CWA	Variable	Elaboration: free timeframe (usually few months) Internal approval in the Workshop European: optional national adoption Revision: at 3 years (upgrading to EN or deletion)

There is also an agreement established between European and International Organizations (e.g. CEN and ISO or CENLEC and IEC) in order to avoid duplication of efforts and promote global relevance of standards, which allows to adopt or develop in parallel each other's standards with the same content and code. National standards could also be proposed as a base for new European or International standards. The following figure 1 shows the tracks of the standards.

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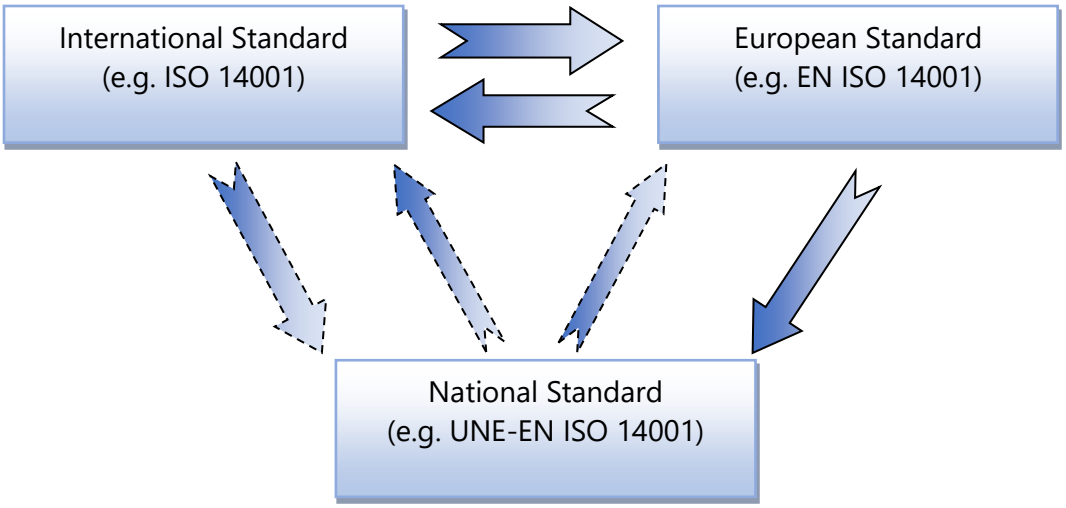

Figure 1: Possible tracks of standards adoption

Therefore, the code of any standard is the combination of the above mentioned issues, and could be explained as shown in figure 2:

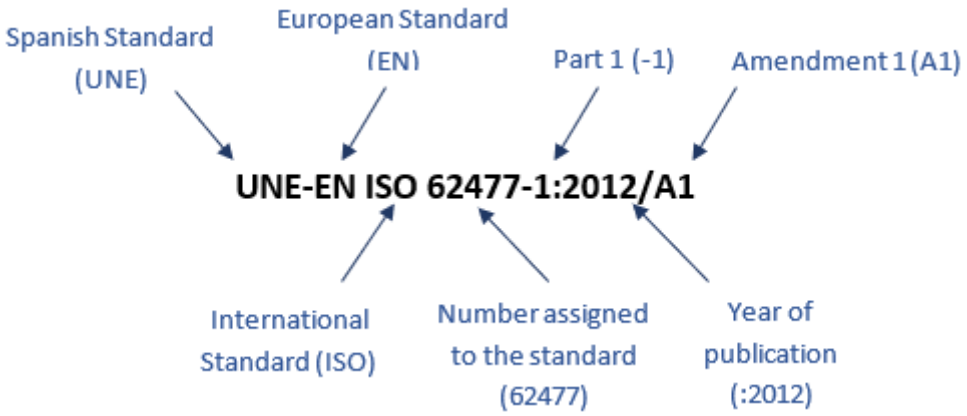

Figure 2: Example of identification of elements in the code of a standard

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2 Methodology

The standardization environment relevant for ECOFACT project has been identified following the sequence:

1. A list of key words for the standardization analysis was prepared by approaching the project with a broad focus in order to capture as many potentially relevant standardization areas as possible, not only focusing on sustainable manufacturing, but also including other topics that may have an impact on the overall project..
2. The list of potential key words was delivered to the ECOFACT partners for reviewing and validating which resulted in the following list of significant standardization key words:

   - Energy performance
   - Production systems
   - Energy efficiency
   - Energy Management
   - ICT technologies
   - Digital transformation
   - Interoperability
   - Sustainable energy
   - Environmental footprint
   - Manufacturing management
   - Simulation tools
   - Sustainable process/product design
   - Energy-aware manufacturing
   - Cybersecurity
   - Production planning algorithms
   - Energy disaggregation analytics/toolkit
   - Supply chain collaboration
   - Holistic management platform
   - Digital twin
   - Sensors
   - Life-cycle assessment
   - LifeCycle Analysis
   - Life-cycle costs
   - Smart Manufacturing
   - IoT (Internet of things)
   - IoT network toolkit
   - Industry 4.0
   - Sustainable Manufacturing
   - Control Plan Toolkit
   - Near Zero Carbon Manufacturing
   - Open Source Lifecycle analysis (LCA) Toolkit
   - Open Source Lifecycle Cost analysis (LCCA) Toolkit
   - Sustainable Design Systems Thinking
   - Factories of the Future
   - ECO-innovative Energy FACTory Management System
   - Resource-efficient manufacturing

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- Energy Performance Optimisation Toolkit
- Decentralized monitoring network toolkit
- Decision Making Toolkit
- Analytic Hierarchy Process Decision Making Algorithm
- Computer Integrated Manufacturing (CIM) toolkit
- Sustainable manufacturing certification
- Flexible Manufacturing
- Green Production
- Digital Engineering
- Digital Optimisation of Supply Chain
- Sustainable Production
- Smart Energy Management
- Data Analytics
- IoT Based Smart Data Collection
- Energy Consumption Prediction
- App&Services
- Decision support systems (DSS)

3. The full catalogues of standards of the relevant standardization technical committees in those key words were screened to obtain a filtered list of potentially relevant standards, including already-published and under-development standards.

The study was performed in a first stage over more than 500 standards leading to a first draft sent by UNE to the partners with 237 standards which ultimately resulted in the 186 standards included in this deliverable.

Table 2 – List of standardization TC identified as relevant for ECOFACT

Related TC	Key Words
Energy & Environment ISO/TC 207 ISO/TC 301 CEN/CLC/JTC 14	Energy performance Energy efficiency Energy Management Sustainable energy Environmental footprint Sustainable process/product design Energy-aware manufacturing Energy disaggregation analytics/toolkit Sustainable Manufacturing Near Zero Carbon Manufacturing Sustainable Design Systems Thinking ECO-innovative Energy FACTory Management System Energy Performance Optimisation Toolkit Green Production Sustainable Production Smart Energy Management Energy Consumption Prediction

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Related TC	Key Words
ICT technologies, Cybersecurity and Data Protection ISO/IEC JTC 1 CEN/TC 225 CEN/CLC/JTC 13	ICT technologies Digital transformation Dimulation tools Cybersecurity Production planning algorithms Holistic management platform Digital twin Sensors IoT (Internet of things) IoT network toolkit Decision Making Toolkit Decentralized monitoring network toolkit Analytic Hierarchy Process Decision Making Algorithm Computer Integrated Manufacturing (CIM) toolkit Digital Engineering Digital Optimisation of Supply Chain Data Analytics IoT Based Smart Data Collection App&Services Decision support systems (DSS)
Automation, integration & manufacturing systems ISO/TC 59 ISO/TC 69 ISO/TC 184	Interoperability Smart Manufacturing Flexible Manufacturing manufacturing management Control Plan Toolkit Resource-efficient manufacturing Production systems Supply chain collaboration Industry 4.0 Factories of the Future
life-cycle ISO/TC 323	Life-cycle assessment LifeCycle Analysis Life-cycle costs Open Source Lifecycle analysis (LCA) Toolkit Open Source Lifecycle Cost analysis (LCCA) Toolkit
Quality assurance & safety management ISO/TC 176 ISO/TC 283	Sustainable manufacturing certification

4. ECOFACT partners were asked to identify form this list the standards more closely related to their tasks and objectives in the project. Additional information about specific standards was provided. The result of this analysis is the content of chapter 3.

The standardization study covers both, the European (CENELEC and CEN) and international (IEC and ISO) standardization systems including amendments and corrigendum. The study is structured in standardization areas for which relevant published and under development standards and the pertinent standardization technical committees (TCs) are identified

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3 Relevant standardization landscape for ECOFACT

3.1 General considerations

For each topic the published and under-development standards are showed first and the responsible standardization technical committees secondly. The published and under-development standards showed come from a screening process of the whole list of standards of the responsible standardization committees. The scope of the standardization committees is included, as well as comments on their activity where applicable. The term "standard" covers standards, technical specifications, technical reports and workshop agreements despite they are different types of standardization documents as explained in Chapter 2.

In some of the topics is it possible to find subjects covered by international standards (from IEC and ISO), by European standards (coming from CENELEC and CEN) or both. Referring to this last case, if a subject is covered by a European and an international standard, those standards can be identical or not, depending on whether there is any specific European requirement on the subject. When a European and an international standard exist for a subject, the standard can be listed below in two different ways:

A "*" in the reference of the standard means that there are two standards for the subject, a European standard, and an international standard. Only the European standard is showed to avoid duplication.

A Standard containing "EN IEC" or "EN ISO" in its reference means that there is one standard applicable to both, European and international environments.

The status of the standards is provided for each reference allowing to acknowledge if the standard is:

Published:	the standards is published with no running work on it
Under revision:	the standard is published but related work (an amendment or a new version) is under development
Under development:	the standard is being developed, there is not an available finished document yet

ECOFACT is a very cross-cutting project. In this kind of projects, it is common that the current version of a standard coexists for some time with a former version to facilitate the transition to stakeholders. The information below refers to the latest versions of the standards.

3.2 Standardization on Energy and Environment

3.3 Relevant Standards

ISO/TC 207: Environmental management

The following standards are currently published:

Code	Title
ISO 14001:2015	Environmental management systems — Requirements with guidance for use

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Code	Title
ISO 14002-1:2019	Environmental management systems — Guidelines for using ISO 14001 to address environmental aspects and conditions within an environmental topic area — Part 1: General
ISO 14004:2016	Environmental management systems — General guidelines on implementation
ISO 14006:2020	Environmental management systems — Guidelines for incorporating ecodesign
ISO 14007:2019	Environmental management — Guidelines for determining environmental costs and benefits
ISO 14008:2019	Monetary valuation of environmental impacts and related environmental aspects
ISO 14009:2020	Environmental management systems — Guidelines for incorporating material circulation in design and development
ISO 14015:2001	Environmental management — Environmental assessment of sites and organizations (EASO)
ISO 14031:2013	Environmental management — Environmental performance evaluation — Guidelines
ISO 14033:2019	Environmental management — Quantitative environmental information — Guidelines and examples
ISO 14034:2016	Environmental management — Environmental technology verification (ETV)
ISO 14040:2006/AMD 1:2020	Environmental management — Life cycle assessment — Principles and framework — Amendment 1
ISO 14044:2006/AMD 2:2020	Environmental management — Life cycle assessment — Requirements and guidelines — Amendment 2
ISO 14045:2012	Environmental management — Eco-efficiency assessment of product systems — Principles, requirements and guidelines
ISO 14046:2014	Environmental management — Water footprint — Principles, requirements and guidelines
ISO/TR 14047:2012	Environmental management — Life cycle assessment — Illustrative examples on how to apply ISO 14044 to impact assessment situations
ISO/TS 14048:2002	Environmental management — Life cycle assessment — Data documentation format
ISO/TR 14049:2012	Environmental management — Life cycle assessment — Illustrative examples on how to apply ISO 14044 to goal and scope definition and inventory analysis
ISO/TS 14071:2014	Environmental management — Life cycle assessment — Critical review processes and reviewer competencies: Additional requirements and guidelines to ISO 14044:2006
ISO/TS 14072:2014	Environmental management — Life cycle assessment — Requirements and guidelines for organizational life cycle assessment
ISO/TR 14073:2017	Environmental management — Water footprint — Illustrative examples on how to apply ISO 14046
ISO 14064-1:2018	Greenhouse gases — Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals
ISO 14065:2020	General principles and requirements for bodies validating and verifying environmental information
ISO 14067:2018	Greenhouse gases — Carbon footprint of products — Requirements and guidelines for quantification

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Code	Title
ISO/TR 14069:2013	Greenhouse gases — Quantification and reporting of greenhouse gas emissions for organizations — Guidance for the application of ISO 14064-1
ISO 14080:2018	Greenhouse gas management and related activities — Framework and principles for methodologies on climate actions
ISO 14091: 2021	Adaptation to climate change — Guidelines on vulnerability, impacts and risk assessment

The following standards are under development:

Code	Title
ISO/WD 14002-2	Environmental management systems — Guidelines for using ISO 14001 to address environmental aspects and conditions within an environmental topic area — Part 2: Water
ISO/FDIS 14031	Environmental management — Environmental performance evaluation — Guidelines
ISO/WD TR 14055-2	Environmental management — Guidelines for establishing good practices for combatting land degradation and desertification — Part 2: Regional case studies
ISO/WD 14068	Greenhouse gas management and related activities — Carbon neutrality
ISO/CD TR 14069	Greenhouse gases — Quantification and reporting of greenhouse gas emissions for organizations — Guidance for the application of ISO 14064-1
ISO/WD TS 14074	Environmental management — Life cycle assessment — Principles, requirements and guidelines for normalization, weighting and interpretation
ISO/FDIS 14097	Greenhouse gas management and related activities — Framework including principles and requirements for assessing and reporting investments and financing activities related to climate change
ISO/FDIS 19694-1	Stationary source emissions — Determination of greenhouse gas emissions in energy-intensive industries — Part 1: General aspects

NOTE: In the standards or draft standard of this committee, for those that have several parts, it has been only included part 1, with the aim of not adding irrelevant information to the reader. Part 1 is usually the most general and therefore the most important part.

ISO/TC 301: Energy management and energy savings

The following standards are currently published:

Code	Title
ISO/IEC 13273-1:2015	Energy efficiency and renewable energy sources — Common international terminology — Part 1: Energy efficiency
ISO 17741:2016	General technical rules for measurement, calculation and verification of energy savings of projects
ISO 17742:2015	Energy efficiency and savings calculation for countries, regions and cities
ISO 17743:2016	Energy savings — Definition of a methodological framework applicable to calculation and reporting on energy savings
ISO 50001:2018	Energy management systems — Requirements with guidance for use
ISO 50004:2020	Energy management systems — Guidance for the implementation, maintenance and improvement of an ISO 50001 energy management system

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Code	Title
ISO 50006:2014	Energy management systems — Measuring energy performance using energy baselines (EnB) and energy performance indicators (EnPI) — General principles and guidance
ISO/TS 50008:2018	Energy management and energy savings — Building energy data management for energy performance — Guidance for a systemic data exchange approach
ISO 50015:2014	Energy management systems — Measurement and verification of energy performance of organizations — General principles and guidance
ISO 50021:2019	Energy management and energy savings — General guidelines for selecting energy savings evaluators
ISO/TS 50044:2019	Energy saving projects (EnSPs) — Guidelines for economic and financial evaluation
ISO 50045:2019	Technical guidelines for the evaluation of energy savings of thermal power plants
ISO 50046:2019	General methods for predicting energy savings
ISO 50047:2016	Energy savings — Determination of energy savings in organizations

The following standards are under development:

Code	Title
ISO/FDIS 50003	Energy management systems — Requirements for bodies providing audit and certification of energy management systems
ISO/DIS 50005	Energy management systems — Guidelines for a phased implementation
ISO/CD 50006.2	ISO 50006 Energy management systems — Evaluating Energy Performance using Energy Baselines and Energy Performance Indicators
ISO 50009	Energy management systems — Guidance for implementing a common energy management system in multiple organizations
ISO/AWI 50010	Energy management and energy savings - Guidance for zero net energy in operations
ISO/AWI 50011	Energy management system —Measurement of energy management progress

NOTE: In the standards or draft standard of this committee, for those that have several parts, it has been only included part 1, with the aim of not adding irrelevant information to the reader. Part 1 is usually the most general and therefore the most important part.

CEN/CLC/JTC 14: Energy management and energy efficiency in the framework of energy transition

The following standards are currently published:

Code	Title
EN 16212:2012	Energy Efficiency and Savings Calculation, Top-down and Bottom-up Methods
EN 16231:2012	Energy efficiency benchmarking methodology
EN 15900:2010	Energy efficiency services - Definitions and requirements
EN 16325:2013 +A1:2015	Guarantees of Origin related to energy - Guarantees of Origin for Electricity
EN 16247-1:2012	Energy audits - Part 1: General requirements

THIS PROYECT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S HORIZON 2020 RESEARCH AND INNOVARION PROGRAMME UNDER GRANT AGREEMENT NO 958373

The following standards are under development:

Code	Title
prEN 16247-1	Energy audits - Part 1: General requirements

NOTE: In the standards or draft standard of this committee, for those that have several parts, it has been only included part 1, with the aim of not adding irrelevant information to the reader. Part 1 is usually the most general and therefore the most important part.

3.3.1 Standardization technical committees

ISO/TC 207: Environmental management

Scope: "Standardization in the field of environmental management to address environmental and climate impacts, including related social and economic aspects, in support of sustainable development.

Excluded: test methods of pollutants, setting limit values and levels of environmental performance, and standardization of products.

NOTE: TC 207 is focused on environmental management systems, auditing, verification/validation and related investigations, environmental labelling, environmental performance evaluation, life cycle assessment, climate change and its mitigation and adaptation, ecodesign, material efficiency, environmental economics and environmental and climate finance.

ISO/TC subcommittees and WGs

SUBCOMMITTEES	
Code	**Title**
ISO/TC 207/SC 1	Environmental management systems
ISO/TC 207/SC 2	Environmental auditing and related environmental investigations
ISO/TC 207/SC 3	Environmental labelling
ISO/TC 207/SC 4	Environmental performance evaluation
ISO/TC 207/SC 5	Life cycle assessment
ISO/TC 207/SC 7	Greenhouse gas management and related activities

WORKING GROUPS	
Code	**Title**
ISO/TC 207/DCCG	Developing Countries Coordination Group
ISO/TC 207/SLG	Strategic Leadership Group
ISO/TC 207/STTF	Spanish translation task force
ISO/TC 207/TCG	Terminology Coordination Group
ISO/TC 207/TG 1	Sustainable Finance Coordination
ISO/TC 207/TG 2	Circular economy coordination

ISO/TC 301: Energy management and energy savings

Scope: "Standardization in the field of energy management and energy savings"

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ISO/TC subcommittees and WGs

SUBCOMMITTEES	
Code	**Title**
ISO/TC 301/AHG 3	Information on the Use, Challenges and Successes of the ISO 50000 series of standards
ISO/TC 301/AHG 4	Labor competence
ISO/TC 301/AHG 5	Measurement of energy management progress
ISO/TC 301/AHG 6	SBP (Sustainable Biomass program)
ISO/TC 301/AHG 7	Discussion of ISO 50002
ISO/TC 301/AHG 8	Technical review of 8 standards
ISO/TC 301/CAG	Chairman Advisory Group
ISO/TC 301/STTF 1	Spanish translation task force
ISO/TC 301/TG 2	Communication Task Group
ISO/TC 301/TG 3	Terminology Task group
ISO/TC 301/TG 4	Follow up of ISO/TMBG/JTCG-TF 14 work
ISO/TC 301/WG 1	Energy management
ISO/TC 301/WG 2	Metrics and measurement internal to the organization
ISO/TC 301/WG 8	Energy savings in regions
ISO/TC 301/WG 14	Multiple Organizations EnMS (Energy Management System)
ISO/TC 301/WG 15	IVP (Integrated Value based planning) – Revision of ISO 50003:2014
ISO/TC 301/WG 16	Zero Net Energy

ISO/TC 301 has no working groups currently active

CEN/CLC/JTC 14: Energy management and energy efficiency in the framework of energy transition

Scope: "Standardization in the field of energy management within the energy transition framework in close coordination with CEN/CENELEC sectorial strategy including, but not limited to, subjects such as: -Energy management systems -Energy audits -Energy efficiency and energy performance improvement -Energy and savings calculation methodologies -Energy efficiency improvement financing (For example: Valuation of Energy Related Investments, Energy Performance Contracting minimum requirements, etc.) -Energy services providers -Energy measurement and monitoring -Role of enabling technologies and RES within the energy management and energy efficiency framework Taking into account the horizontal role of JTC 14 and in order to avoid overlap with scopes of other TCs, the following fields are excluded from the scope: -Specific technologies or systems activities within the scope of other CEN, CENELEC or Joint CEN-CENELEC TCs, -Environmental issues."

CEN/CLC subcommittees and WGs

CEN/CLC/JTC 14 has no subcommittees currently active.

WORKING GROUPS	
Code	**Title**
CEN/CLC/JTC 14/WG 1	Energy audits
CEN/CLC/JTC 14/WG 4	Energy financial aspects
CEN/CLC/JTC 14/WG 5	Guarantees of Origin related to energy

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3.4 Standardization on ICT technologies, Cybersecurity and Data Protection

3.4.1 Relevant Standards

ISO/IEC JTC 1: Information technology

The following standards are currently published:

Code	Title
ISO 8000	Data quality
ISO/IEC TR 10032	Information technology — Reference Model of Data Management
ISO/IEC 17203:2017	Information technology — Open Virtualization Format (OVF) specification
ISO/IEC 17788:2014	Information technology — Cloud computing — Overview and vocabulary
ISO/IEC 17789:2014	Information technology — Cloud computing — Reference architecture
ISO/IEC 17963:2013	Web Services for Management (WS-Management) Specification
ISO/IEC 18384-1:2016	Information technology — Reference Architecture for Service Oriented Architecture (SOA RA) — Part 1: Terminology and concepts for SOA
ISO/IEC 19086-1:2016	Information technology — Cloud computing — Service level agreement (SLA) framework — Part 1: Overview and concepts
ISO/IEC 19762-1:2008	Information technology - Automatic identification and data capture (AIDC) techniques - Harmonized vocabulary - Part 1: General terms relating to AIDC
ISO/IEC 19941:2017	Information technology — Cloud computing — Interoperability and portability
ISO/IEC 19944-1:2020	Cloud computing and distributed platforms — Data flow, data categories and data use — Part 1: Fundamentals
ISO/IEC 20547	Information technology — Big data reference
ISO/IEC 22624:2020	Information technology — Cloud computing — Taxonomy based data handling for cloud services
ISO/IEC TR 22678:2019	Information technology — Cloud computing — Guidance for policy development
ISO/IEC TS 23167:2020	Information technology — Cloud computing — Common technologies and techniques
ISO/IEC TR 23186:2018	Information technology — Cloud computing — Framework of trust for processing of multi-sourced data
ISO/IEC TR 23187:2020	Information technology — Cloud computing — Interacting with cloud service partners (CSNs)
ISO/IEC TR 23188:2020	Information technology — Cloud computing — Edge computing landscape
ISO/IEC TR 23613:2020	Information technology — Cloud computing — Cloud service metering elements and billing modes
ISO/IEC TR 23951:2020	Information technology — Cloud computing — Guidance for using the cloud SLA metric model
ISO/IEC 25012	Software engineering — Software product Quality Requirements and Evaluation (SQuaRE) — Data quality model
ISO/IEC 25024:2015	Systems and software engineering — Systems and software Quality Requirements and Evaluation (SQuaRE) — Measurement of data quality
ISO/IEC TR 30102:2012	Information technology — Distributed Application Platforms and Services (DAPS) — General technical principles of Service Oriented Architecture
ISO/IEC 38505	Information technology — Governance of IT — Governance of data
ISO/IEC 20546:2019	Information technology — Big data — Overview and vocabulary

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Code	Title
ISO/IEC TR 24028:2020	Information technology — Artificial intelligence — Overview of trustworthiness in artificial intelligence
ISO/IEC 27000:2018	Information technology - Security techniques - Information security management systems - Overview and vocabulary
ISO/IEC 27011:2016	Information technology - Security techniques - Code of practice for Information security controls based on ISO/IEC 27002 for telecommunications organizations
ISO/IEC 15408-1:2009	Information technology - Security techniques - Evaluation criteria for IT security - Part 1: Introduction and general model
ISO/IEC 18045:2008	Information technology - Security techniques - Methodology for IT security evaluation
ISO/IEC 15408-2:2008	Information technology - Security techniques - Evaluation criteria for IT security - Part 2: Security functional components
ISO/IEC 29134:2017	Information technology - Security techniques - Guidelines for privacy impact assessment
ISO/IEC 27019:2017 (Corrected version 2019-08)	Information technology - Security techniques - Information security controls for the energy utility industry
ISO/IEC 29100:2011	Information technology - Security techniques - Privacy framework
ISO/IEC 30111:2019	Information technology - Security techniques - Vulnerability handling processes
ISO/IEC 27001:2013 (including Cor 1:2014 and Cor 2:2015)	Information technology - Security techniques - Information security management systems - Requirements
ISO/IEC 27002:2017 (including Cor 1:2014 and Cor 2:2015)	Information technology - Security techniques - Code of practice for information security controls
ISO/IEC 27006:2015 (including Amd 1:2020)	Information technology - Security techniques - Requirements for bodies providing audit and certification of information security management systems (ISO/IEC 27006:2015, including Amd 1:2020)
ISO/IEC 27007:2020	Information security, cybersecurity and privacy protection — Guidelines for information security management systems auditing
ISO/IEC 27017:2015	Information technology - Security techniques - Code of practice for information security controls based on ISO/IEC 27002 for cloud services
ISO/IEC 27018:2019	Information technology - Security techniques - Code of practice for protection of personally identifiable information (PII) in public clouds acting as PII processors
ISO/IEC 27701:2019	Security techniques — Extension to ISO/IEC 27001 and ISO/IEC 27002 for privacy information management — Requirements and guideline
ISO/IEC 20005:2013	Information technology — Sensor networks — Services and interfaces supporting collaborative information processing in intelligent sensor networks
ISO/IEC 21823-1:2019	Internet of things (IoT) — Interoperability for IoT systems — Part 1: Framework
ISO/IEC 29182-1:2013	Information technology — Sensor networks: Sensor Network Reference Architecture (SNRA) — Part 1: General overview and requirements
ISO/IEC TR 30164:2020	Internet of things (IoT) — Edge computing
ISO/IEC TR 30166:2020	Internet of things (IoT) — Industrial IoT

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Code	Title
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

The following standards are under development:

Code	Title
ISO/IEC WD 5140	Information technology — Cloud computing — Concepts for multi-cloud and other interoperation of multiple cloud services
ISO/IEC AWI TS 5928	Information technology — Cloud computing and distributed platforms — Modern platforms taxonomy
ISO/IEC CD 19944-2	Cloud computing and distributed platforms — Data flow, data categories and data use — Part 2: Guidance on application and extensibility
ISO/IEC 22123-1	Information technology — Cloud computing — Part 1: Vocabulary
ISO/IEC CD 23751	Information technology — Cloud computing and distributed platforms — Data sharing agreement (DSA) framework
ISO/IEC WD TS 4213	Information technology — Artificial Intelligence — Assessment of machine learning classification performance
ISO/IEC WD 5259-1	Data quality for analytics and ML — Part 1: Overview, terminology, and examples
ISO/IEC WD 5338	Information technology — Artificial intelligence — AI system life cycle processes
ISO/IEC WD 5339	Information Technology — Artificial Intelligence — Guidelines for AI applications
ISO/IEC WD 5392	Information technology — Artificial intelligence — Reference architecture of knowledge engineering
ISO/IEC AWI TR 5469	Artificial intelligence — Functional safety and AI systems
ISO/IEC CD 22989.2	Artificial intelligence — Concepts and terminology
ISO/IEC CD 23053.2	Framework for Artificial Intelligence (AI) Systems Using Machine Learning (ML)
ISO/IEC CD 23894	Information Technology — Artificial Intelligence — Risk Management
ISO/IEC DTR 24027	Information technology — Artificial Intelligence (AI) — Bias in AI systems and AI aided decision making
ISO/IEC TR 24029-1	Artificial Intelligence (AI) — Assessment of the robustness of neural networks — Part 1: Overview
ISO/IEC CD TR 24030	Information technology — Artificial Intelligence (AI) — Use cases
ISO/IEC AWI TR 24368	Information technology — Artificial intelligence — Overview of ethical and societal concerns
ISO/IEC DTR 24372	Information technology — Artificial intelligence (AI) — Overview of computational approaches for AI systems
ISO/IEC CD 24668	Information technology — Artificial intelligence —Process management framework for Big data analytics
ISO/IEC AWI 25059	Software engineering — Systems and software Quality Requirements and Evaluation (SQuaRE) — Quality model for AI-based systems
ISO/IEC AWI 42001	Information Technology — Artificial intelligence — Management system
ISO/IEC AWI 30165	Internet of Things (IoT) — Real-time IoT framework

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NOTE: In the standards or draft standard of this committee, for those that have several parts, it has been only included part 1, with the aim of not adding irrelevant information to the reader. Part 1 is usually the most general and therefore the most important part.

CEN/TC 225: AIDC technologies

The following standards are currently published:

Code	Title
CEN/TR 16669:2014	Information technology - Device interface to support ISO/IEC 18000-3
EN 17071:2019	Information technology - Automatic identification and data capture techniques - Electronic identification plate

CEN/CLC/JTC 13: Cybersecurity and Data Protection

The following standards are under development:

Code	Title
CEN/CLC/prTR	Privacy management in products and services - Biometric access control products and services
prEN 17529	Data protection and privacy by design and by default
prEN 17640	Fixed time cybersecurity evaluation methodology for ICT products
prEN XXXXX	Personal data protection requirements for processing operations

3.4.2 Standardization technical committees

ISO/IEC JTC 1: Information technology

Scope: "Standardization in the field of information technology"

ISO/TC subcommittees and WGs

SUBCOMMITTEES	
Code	**Title**
ISO/IEC JTC 1/SC 2	Coded character sets
ISO/IEC JTC 1/SC 6	Telecommunications and information exchange between systems
ISO/IEC JTC 1/SC 7	Software and systems engineering
ISO/IEC JTC 1/SC 17	Cards and security devices for personal identification
ISO/IEC JTC 1/SC 22	Programming languages, their environments and system software interfaces
ISO/IEC JTC 1/SC 23	Digitally recorded media for information interchange and storage
ISO/IEC JTC 1/SC 24	Computer graphics, image processing and environmental data representation
ISO/IEC JTC 1/SC 25	Interconnection of information technology equipment
ISO/IEC JTC 1/SC 27	Information security, cybersecurity and privacy protection
ISO/IEC JTC 1/SC 28	Office equipment
ISO/IEC JTC 1/SC 29	Coding of audio, picture, multimedia and hypermedia information
ISO/IEC JTC 1/SC 31	Automatic identification and data capture techniques
ISO/IEC JTC 1/SC 32	Data management and interchange
ISO/IEC JTC 1/SC 34	Document description and processing languages
ISO/IEC JTC 1/SC 35	User interfaces
ISO/IEC JTC 1/SC 36	Information technology for learning, education and training

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SUBCOMMITTEES	
Code	**Title**
ISO/IEC JTC 1/SC 37	Biometrics
ISO/IEC JTC 1/SC 38	Cloud computing and distributed platforms
ISO/IEC JTC 1/SC 39	Sustainability, IT and data centres
ISO/IEC JTC 1/SC 40	IT service management and IT governance
ISO/IEC JTC 1/SC 41	Internet of things and digital twin
ISO/IEC JTC 1/SC 42	Artificial intelligence

WORKING GROUPS	
Code	**Title**
ISO/IEC JTC 1/AG 1	Advisory Group on Communications
ISO/IEC JTC 1/AG 2	Advisory Group on JTC 1 Emerging Technology and Innovation (JETI)
ISO/IEC JTC 1/AG 6	Autonomous and Data Rich Vehicles
ISO/IEC JTC 1/AG 8	Meta Reference Architecture and Reference Architecture for Systems Integration
ISO/IEC JTC 1/AG 10	Outreach
ISO/IEC JTC 1/AG 12	Technical Corrigenda
ISO/IEC JTC 1/AG 13	Use Cases for VR and AR based ICT Integration Systems
ISO/IEC JTC 1/AG 14	Systems Integration Facilitation (SIF)
ISO/IEC JTC 1/AG 15	Standards and Regulations
ISO/IEC JTC 1/AG 16	Brain-computer interface
ISO/IEC JTC 1/AG 17	Meeting guidelines - SD 19
ISO/IEC JTC 1/AG 18	Vocabulary
ISO/IEC JTC 1/JAG	JTC 1 Advisory Group
ISO/IEC JTC 1/WG 11	Smart cities
ISO/IEC JTC 1/WG 12	3D Printing and scanning
ISO/IEC JTC 1/WG 13	Trustworthiness
ISO/IEC JTC 1/WG 14	Quantum Computing

CEN/TC 225: AIDC technologies

Scope "Standardization of data carriers for automatic identification and data capture, of the data element architecture therefore, of the necessary test specifications and of technical features for the harmonization of cross-sector applications. Establishment of an appropriate system of registration authorities, and of means to ensure the necessary maintenance of standards."

CEN/TC subcommittees and WGs

CEN/TC 225 has no subcommittees currently active.

WORKING GROUPS	
Code	**Title**
CEN/TC 225/WG 4	Automatic ID applications

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CEN/CLC/JTC 13: Cybersecurity and Data Protection

Scope "Development of standards for cybersecurity and data protection covering all aspects of the evolving information society including but not limited to: - Management systems, frameworks, methodologies - Data protection and privacy - Services and products evaluation standards suitable for security assessment for large companies and small and medium enterprises (SMEs) - Competence requirements for cybersecurity and data protection - Security requirements, services, techniques and guidelines for ICT systems, services, networks and devices, including smart objects and distributed computing devices Included in the scope is the identification and possible adoption of documents already published or under development by ISO/IEC JTC and other SDOs and international bodies such as ISO, IEC, ITU-T, and industrial fora. Where not being developed by other SDO's (Standards Developing Organizations), the development of cybersecurity and data protection CEN/CENELEC publications for safeguarding information such as organizational frameworks, management systems, techniques, guidelines, and products and services, including those in support of the EU Digital Single Market"

CEN/CLC subcommittees and WGs

CEN/CLC/JTC 13 has no subcommittees currently active.

WORKING GROUPS	
Code	**Title**
CEN/CLC/JTC 13/WG 1	Chairman advisory group
CEN/CLC/JTC 13/WG 2	Management systems and controls sets
CEN/CLC/JTC 13/WG 3	Security evaluation and assessment
CEN/CLC/JTC 13/WG 4	Cybersecurity services
CEN/CLC/JTC 13/WG 5	Data Protection, Privacy and Identity Management
CEN/CLC/JTC 13/WG 6	Product security

3.5 Standardization on Automation, Integration and Manufacturing systems

3.5.1 Relevant Standards

ISO/TC 59: Buildings and civil engineering works

The following standards are currently published:

Code	**Title**
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

NOTE: In the standard of this committee, which has several parts, it has been only included part 1, with the aim of not adding irrelevant information to the reader. Part 1 is usually the most general and therefore the most important part.

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ISO/TC 69: Applications of statistical methods

The following standards are currently published:

Code	Title
ISO 11462-1:2001	Guidelines for implementation of Statistical Process Control (SPC) — Part 1: Elements of SPC
ISO 11462-2:2010	Guidelines for implementation of statistical process control (SPC) — Part 2: Catalogue of tools and techniques
ISO 22514-1:2014	Statistical methods in process management — Capability and performance — Part 1: General principles and concepts
ISO 24153:2009	Random sampling and randomization procedures
ISO 5725-1:1994	Accuracy (trueness and precision) of measurement methods and results — Part 1: General principles and definitions
ISO 5725-1:1994/COR 1:1998	Accuracy (trueness and precision) of measurement methods and results — Part 1: General principles and definitions — Technical Corrigendum 1
ISO 10576-1:2003	Statistical methods — Guidelines for the evaluation of conformity with specified requirements — Part 1: General principles
ISO 10725:2000	Acceptance sampling plans and procedures for the inspection of bulk materials
ISO 11095:1996	Linear calibration using reference materials
ISO 11648-2:2001	Statistical aspects of sampling from bulk materials — Part 2: Sampling of particulate materials
ISO 11843-1:1997	Capability of detection — Part 1: Terms and definitions
ISO 13528:2015	Statistical methods for use in proficiency testing by interlaboratory comparison
ISO/TR 13587:2012	Three statistical approaches for the assessment and interpretation of measurement uncertainty
ISO/TS 17503:2015	Statistical methods of uncertainty evaluation — Guidance on evaluation of uncertainty using two-factor crossed designs
ISO 21748:2017	Guidance for the use of repeatability, reproducibility and trueness estimates in measurement uncertainty evaluation
ISO/TS 21749:2005	Measurement uncertainty for metrological applications — Repeated measurements and nested experiments
ISO/TR 22971:2005	Accuracy (trueness and precision) of measurement methods and results — Practical guidance for the use of ISO 5725-2:1994 in designing, implementing and statistically analysing interlaboratory repeatability and reproducibility results
ISO/TS 28037:2010	Determination and use of straight-line calibration functions
ISO 16336:2014	Applications of statistical and related methods to new technology and product development process — Robust parameter design (RPD)
ISO 16355-1:2015	Application of statistical and related methods to new technology and product development process — Part 1: General principles and perspectives of Quality Function Deployment (QFD)

The following standards are under development:

Code	Title
ISO/AWI TR 11462-4	Guidelines for implementation of statistical process control (SPC) — Part 4: Reference data sets for measurement process analysis software validation
ISO/AWI TR 11462-5	Guidelines for implementation of statistical process control (SPC) — Part 5: Quality data exchange format for SPC software

THIS PROYECT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S HORIZON 2020 RESEARCH AND INNOVARION PROGRAMME UNDER GRANT AGREEMENT NO 958373

Code	Title
ISO/DIS 22514-7	Statistical methods in process management — Capability and performance — Part 7: Capability of measurement processes
ISO/CD TR 22514-9	Statistical methods in process management — Capability and performance — Part 9: Process capability statistics for characteristics defined by geometrical specifications
ISO/WD TS 23471	Experimental designs for evaluation of uncertainty — Use of factorial designs for determining uncertainty functions
ISO/CD 24185	The evaluation of the uncertainty of measurements from an autocorrelated process
ISO/AWI 24153	Random sampling and randomization procedures
ISO/WD 5725-3	Accuracy (trueness and precision) of measurement methods and results — Part 3: Intermediate precision and alternative designs for collaborative studies
ISO/CD 10576-1	Statistical methods — Guidelines for the evaluation of conformity with specified requirements — Part 1
ISO/DTR 11843-8	Capability of detection — Part 8: Guidance for the implementation of ISO 11843 series
ISO/DIS 13528	Statistical methods for use in proficiency testing by inter-laboratory comparison
ISO/WD TS 23471	Experimental designs for evaluation of uncertainty — Use of factorial designs for determining uncertainty functions
ISO/CD 24185	The evaluation of the uncertainty of measurements from an autocorrelated process
ISO/DTR 27877	Precision of binary data
ISO/FDIS 16337	Application of statistical and related methods to new technology and product development process — Robust tolerance design (RTD)
ISO/FDIS 16355-1	Application of statistical and related methods to new technology and product development process — Part 1: General principles and perspectives of Quality Function Deployment (QFD)
ISO/TS 16355-6:2019	Applications of statistical and related methods to new technology and product development process — Part 6: Guidance for QFD-related approaches to optimization
ISO/WD 16355-7	Applications of statistical and related methods to new technology and product development process — Part 7: Part 7: Guidelines for developing digitalized products and services
ISO/TR 16355-8:2017	Applications of statistical and related methods to new technology and product development process — Part 8: Guidelines for commercialization and life cycle

NOTE: In the standards or draft standard of this committee, for those that have several parts, it has been only included part 1, with the aim of not adding irrelevant information to the reader. Part 1 is usually the most general and therefore the most important part.

ISO/TC 184: Automation systems and integration

The following standards are currently published:

Code	Title
ISO 11354-1:2011	Advanced automation technologies and their applications - Requirements for establishing manufacturing enterprise process interoperability - Part 1: Framework for enterprise interoperability

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NOTE: In the standard of this committee, which has several parts, it has been only included part 1, with the aim of not adding irrelevant information to the reader. Part 1 is usually the most general and therefore the most important part.

The following standards are under development:

Code	Title
IEC/DTR 63319	A meta-modelling analysis approach to smart manufacturing reference models
IEC/AWI 65815	Unified reference model for smart manufacturing

3.5.2 Standardization technical committees

ISO/TC 59: Buildings and civil engineering works

Scope: "Standardization in the field of buildings and civil engineering works, of: general terminology; organization of information in the processes of design, manufacture and construction; general geometric requirements for buildings, building elements and components including modular coordination and its basic principles, general rules for joints, tolerances and fits, performance and test standards for sealants; general rules for other performance requirements, including functional and user requirements related to service life, sustainability, accessibility and usability; general rules and guidelines for addressing the economic, environmental and social impacts and aspects related to sustainable development; geometric and performance requirements for components that are not in the scope of separate ISO technical committees; procurement processes, methods and procedures.

Excluded:

standardization and coordination of technical product documentation (ISO/TC 10);

acoustic requirements (ISO / TC 43); bases for design of concrete structures (ISO/TC 71/SC 4); fire tests and fire safety engineering related to building materials, components and structures (ISO/TC 92); bases for design of structures (ISO / TC 98);

construction machinery (ISO/TC 127 and ISO/TC 195); performance requirements for glass in buildings (ISO/TC 160); performance requirements for doors, door sets and windows (ISO/TC 162); calculation of thermal properties (ISO / TC 163); bases for design of timber structures (ISO/TC 165); bases for design of steel and aluminium structures (ISO/TC 167); geotechnical aspects and soil quality (ISO/TC 182 and ISO/TC 190); standardization in the design and retrofit buildings regarding acceptable indoor environment and practicable energy use (ISO/TC 205)"

ISO/TC subcommittees and WGs

SUBCOMMITTEES	
Code	**Title**
ISO/TC 59/SC 2	Terminology and harmonization of languages
ISO/TC 59/SC 8	Sealants
ISO/TC 59/SC 13	Organization and digitization of information about buildings and civil engineering works, including Building Information Modelling (BIM)

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ISO/TC 59/SC 14	Design life
ISO/TC 59/SC 15	Framework for the description of housing performance
ISO/TC 59/SC 16	Accessibility and usability of the built environment
ISO/TC 59/SC 17	Sustainability in buildings and civil engineering works
ISO/TC 59/SC 18	Construction procurement

WORKING GROUPS	
Code	**Title**
ISO/TC 59/AG 1	Advisory Group
ISO/TC 59/AG 2	Climate change adaptation
ISO/TC 59/WG 4	Resilience of buildings and civil engineering works
ISO/TC 59/WG 5	Security in the built environment

ISO/TC 69: Applications of statistical methods

Scope: "Standardization in the application of statistical methods, including generation, collection (planning and design), analysis, presentation and interpretation of data."

ISO/TC subcommittees and WGs

SUBCOMMITTEES	
Code	**Title**
ISO/TC 69/SC 4	Applications of statistical methods in product and process management
ISO/TC 69/SC 5	Acceptance sampling
ISO/TC 69/SC 6	Measurement methods and results
ISO/TC 69/SC 7	Applications of statistical and related techniques for the implementation of Six Sigma
ISO/TC 69/SC 8	Application of statistical and related methodology for new technology and product development

WORKING GROUPS	
Code	**Title**
ISO/TC 69/CAG	Chairman Advisory Group
ISO/TC 69/WG 3	Statistical interpretation of data
ISO/TC 69/WG 12	Big data analytics
ISO/TC 69/WG 13	Terminology and symbols

ISO/TC 184: Automation systems and integration

Scope: "Standardization in the field of automation systems and their integration for design, sourcing, manufacturing, production and delivery, support, maintenance and disposal of products and their associated services. Areas of standardization include information systems, automation and control systems and integration technologies."

ISO/TC subcommittees and WGs

SUBCOMMITTEES	
Code	**Title**
ISO/TC 184/SC 1	Physical device control

THIS PROYECT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S HORIZON 2020 RESEARCH AND INNOVARION PROGRAMME UNDER GRANT AGREEMENT NO 958373

ISO/TC 184/SC 4	Industrial data
ISO/TC 184/SC 5	Interoperability, integration, and architectures for enterprise systems and automation applications

WORKING GROUPS	
Code	**Title**
ISO/TC 184/AG 2	Digital Twin
ISO/TC 184/AHG 1	Support for smart manufacturing reference model
ISO/TC 184/AHG 3	Liaison review
ISO/TC 184/CAG	Chairman Advisory Group
ISO/TC 184/JWG 21	Joint ISO/TC 184 - IEC/TC 65/JWG 21 - Smart Manufacturing Reference Model(s) linked to ISO/TC 184
ISO/TC 184/TF 2	Supermeeting organization
ISO/TC 184/WG 6	Asset intensive industry interoperability

3.6 Standardization on Life-Cycle

3.6.1 Relevant Standards

ISO/TC 323: Circular economy

The following standards are under development:

Code	Title
ISO/WD 59004	Circular economy — Framework and principles for implementation
ISO/WD 59020	Measuring circularity framework
ISO/CD TR 59031	Circular economy – Performance-based approach – Analysis of cases studies

3.6.2 Standardization technical committees

ISO/TC 323: Circular economy

Scope: "Standardization in the field of Circular Economy to develop frameworks, guidance, supporting tools and requirements for the implementation of activities of all involved organizations, to maximize the contribution to Sustainable Development."

ISO/TC subcommittees and WGs

SUBCOMMITTEES	
Code	**Title**
ISO/TC 323/CAG	Chairman's Advisory Group
ISO/TC 323/WG 1	Framework, principles, terminology, and management system standard
ISO/TC 323/WG 2	Guidance for implementation and sectoral applications
ISO/TC 323/WG 3	Measuring circularity
ISO/TC 323/WG 4	Specific issues of circular economy

ISO/TC 323 has no working groups currently active

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3.7 Standardization on Quality assurance & safety management

3.7.1 Relevant Standards

ISO/TC 176: Quality management and quality assurance

The following standard is currently published:

Code	Title
ISO 9001:2015	Quality management systems — Requirements

ISO/TC 283: Occupational health and safety management

The following standard is currently published:

Code	Title
ISO 45001:2018	Occupational health and safety management systems — Requirements with guidance for use

3.7.2 Standardization technical committees

ISO/TC 176: Quality management and quality assurance

Scope: "Standardization in the field of quality management (generic quality management systems and supporting technologies), as well as quality management standardization in specific sectors at the request of the affected sector and the ISO Technical Management Board"

ISO/TC subcommittees and WGs

SUBCOMMITTEES	
Code	**Title**
ISO/TC 176/SC 1	Concepts and terminology
ISO/TC 176/SC 2	Quality systems
ISO/TC 176/SC 3	Supporting technologies

WORKING GROUPS	
Code	**Title**
ISO/TC 176/CSAG	Chair's Strategic Advisory Group
ISO/TC 176/STTF	Spanish translation task force
ISO/TC 176/TF	ISO 9001 Auditing Practices Group
ISO/TC 176/TF 3	Document archive
ISO/TC 176/TF 4	Future concepts in quality management
ISO/TC 176/TG 1	Communications and product support
ISO/TC 176/TG 2	ISO 9001 Brand Integrity

ISO/TC 283: Occupational health and safety management

Scope: "Standardization in the field of occupational health and safety management to enable an organization to control its OH&S risks and improve its OH&S performance."

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ISO/TC subcommittees and WGs

SUBCOMMITTEES	
Code	**Title**
ISO/TC 283/CAG 1	Chair's Advisory Group
ISO/TC 283/DCCG	Developing countries co-ordination group
ISO/TC 283/STTF 1	Spanish translation task force
ISO/TC 283/TG 1	Communications
ISO/TC 283/TG 2	Terminology
ISO/TC 283/TG 3	Revision of Annex SL
ISO/TC 283/TG 4	Emerging themes in OH&S management
ISO/TC 283/WG 2	Psychological health and safety in the workplace
ISO/TC 283/WG 3	Implementation
ISO/TC 283/WG 4	Performance evaluation
ISO/TC 283/WG 5	Safe working in a pandemic

ISO/TC 283 has no working groups currently active.

3.8 Other Committees of interest

There are other CEN committees that must be included in this report due to their proximity to the ECOFACT project. These committees are:

- CEN/SS S26: Environmental management

As of today (March. 2021), CEN SS/S26 has developed and published 35 standards, technical specifications (TS) and technical reports (TR). 35 of these documents (all of them) have been developed together with ISO/TC 207 or were subsequently added to the list of CEN SS/S26 standards. That´s because CEN SS/S26 is a committee without its own standards. They are all standards adopted from ISO under the Vienna agreement. If relevant for ECOFACT, these documents are only given in the context of ISO/TC 207 to avoid duplication.

Nowadays, this TC has 6 ISO standards in the work programme, waiting for adoption as European standards.

- CEN/TC 467: Climate Change

Scope: "The TC addresses standardization in the field of climate change, including related social and economic aspects, at the organization and product level. The goal is the development of frameworks, requirements and guidance to support the EU policies on climate change, also in the perspective of a full implementation of the EU Green Deal".

This is a committee with no current activity

- CEN/SS F23: Energy

Considering the title of this TC, it is initially thought to be of great interest for the ECOFACT project. However, it turns out that it does not have scope available on CEN webpage. It also does not have current activity.

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4 Conclusion

As a result of the study of the standardization landscape through the methodology explained above, the following conclusion may be drawn:

There is a large number of European and international technical committees, as well as of standards and draft standards related to ECOFACT project that may be useful for its development and also for its future dissemination. Despite has not been found a specific standardization technical committee which activity impacts directly in the ECOFACT project, specific tasks to be addressed in the project, are related with standardization works. Depending on the assessment by ECOFACT partners of the impact of the identified standardization committees on their tasks and the level of contribution that their results can represent for these committees and for the development of Deliverable D7.4 (Report on the contribution to the standardization system), several actions can be performed, for example:

- the follow up of the standardization activity through updates reported by UNE;
- the follow up through the joining of one or more ECOFACT representatives to this standardization committees. Standardization is an open activity and all interested parties may participate in a CEN/CENELEC/ISO/IEC technical committee through its National Mirror Committee and National Standardization Body;
- the dissemination of the ECOFACT project progress by delivering reports to the relevant TCs Secretaries or by attending relevant technical committees meetings.

Next steps in Task 7.2 "Contribution to ongoing and future standardization initiatives for sustainable manufacturing" are aiming to contribute to the dissemination of the results of ECOFACT and to transfer those results to future standards. With respect the mencioned dissemination activities, despite all the technical committees of this report have some relation to ECOFACT project, probably the most relevant are those related to Sustainability; Energy Performance; ICT technologies, Cybersecurity and Data Protection; Automation, integration & manufacturing systems; life-cycle and Quality assurance & safety management, which are summarised in the following table:

Subject	**Technical committee**
Environmental sustainability	ISO/TC 207 " Environmental management "
	CEN/CLC/JTC 14 "Energy management and energy efficiency in the framework of energy transition"
Energy Performance	ISO/TC 301 " Energy management and energy savings "
ICT technologies, Cybersecurity and Data Protection	ISO/IEC JTC 1 "Information technology"
	CEN/TC 225 "AIDC technologies"
	CEN/CLC/JTC 13 "Cybersecurity and Data Protection"
Automation, integration & manufacturing systems	ISO/TC 59 "Buildings and civil engineering works"
	ISO/TC 69 "Applications of statistical methods"
	ISO/TC 184 "Automation systems and integration"
Life-cycle	ISO/TC 323 "Circular economy"
Quality assurance & safety management	ISO/TC 176 "Quality management and quality assurance"
	ISO/TC 283 "Occupational health and safety management"

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To achieve these objectives, further assessments will be performed by the partners to determine the type of interaction to be established with the identified standardization technical committees. The ways of interaction of the project with the standardization committees could include:

- The participation of one or more ECOFACT partners in the standardization technical committees. Standardization is an open activity and all interested parties may participate in a CEN/CENELEC, ISO/IEC technical committee through the designation of National Standardization Bodies/National Mirror Committee. Some of the partners are already participating in some of the identified standardization committees;
- The participation through the formal liaison of the ECOFACT project with European standardization committees to participate directly as liaison organization which intends to make technical contributions to their works. This option would be further analysed since in several of the identified topics there is not a formal standardization activity at European level;
- The dissemination of the ECOFACT project progress by delivering reports to the relevant standardization technical committees or by attending relevant technical committees meetings;
- Feeding the standardization committees with standardization proposals coming from identified gaps and needs.

Additionally, the activity of the standardization committees required will be periodically reported by UNE.

Following the present deliverable, above options will be analysed with the partners to determine the most suitable way to contribute to future standards with the results and approach of the project. In addition, it will be decided which standardization committees will be addressed and how for disseminating the results. These will be the first steps towards D7.4 "Report on the contribution to standardization" to be delivered in M48 which will contain the steps and progress of the interaction with the standardization system.

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5 References

For the elaboration of this report, the following sources have been consulted:

- IEC Website (www.iec.ch)
- CENELEC Website (www.cenelec.eu)
- CEN/CENELEC Projex Online database (projex.cen.eu) (restricted to authorized users)
- CEN Website (www.cen.eu)
- ISO Website (www.iso.org)
- ISO Project Portal (isotc.iso.org) (restricted to authorized users)
- Perinorm application (https:www.perinorm.com) (restricted to authorized users)

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