FISSAC

Report on the contribution to the standardization System regarding FISSAC technologies

August 2017

WP 2, Task 2.5, Subtask 2.5.3

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Technical References

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[1] PU = Public
PP = Restricted to other programme participants (including the Commission Services)
RE = Restricted to a group specified by the consortium (including the Commission Services)
CO = Confidential, only for members of the consortium (including the Commission Services)

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1. Executive summary

The Spanish Association for Standardization (UNE), as a European Standardization Body, is a partner in the FISSAC project to provide support regarding the standardization tasks included in the project. The tasks that concern standardization matters are mainly under Work Packages WP2 & WP3, and deal with the precise state of the art of the current standardization works and technical committees related to the FISSAC project as well as the contribution to the standardization of the project results.

This first deliverable D 2.6 *"Report on the contribution to the standardization System regarding FISSAc technologies",* consists of two different parts:

a) an approximation and analysis of the relevant technical committees, published standards and works under development dealing with the secondary raw materials and products related to FISSAC project. This first part should provide FISSAC members basic information to help decide further steps in the standardization process of the project results.
b) the contribution to standardization, including strategy to follow, envisaged actions or taken and proposals to be made to promote and facilitate the inclusion of project results in standards as a way to disseminate project results within market stakeholders and industry concerned. The strategy for the communication with the corresponding TCs will be elaborated considering which of them can be the most relevant, to what extent the relationship should be established and an initial planning of activities. All these contribution activities will evolve as the project progresses and project results are obtained.

This deliverable will have proper continuity with deliverable D 3.4 “Report on the contribution to the Standardisation System regarding FISSAC products”. Due to the close relationship between standardization of raw materials and standardization of products under study within FISSAC project, both aspects have been taken into account when making this first analysis and conclusions will be valid for future phases and deliverables of the project, with regard to standardization.

This deliverable contains the fields considered of interest related to FISSAC project, that can be useful and relevant for the project activities. Furthermore, it can help to identify standardization gaps that will need to be addressed.

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2. Introduction and methodology

2.1 Project presentation overview

FISSAC project is co-funded by the European Union's Horizon 2020 research and innovation programme and started on 1st of September 2015; the project runs for four years and six months. It brings together 23 partners from 9 different European countries and Turkey. With regard to the range of partner core activities, the consortium includes five research institutions, seven large industries, seven SMEs, a non-profit European association and confederation, a public administration, and a standardization body. This composition ensures a broad background and expertise.

The overall objective of FISSAC project is to create a new model for industrial symbiosis towards a zero waste approach in the resource intensive industries of the construction value chain. This through synergetic optimization and sharing resource streams among sectors of steel, non-ferrous materials, ceramic and natural stone, glass, cement, engineering and construction. Overall goals of the project will be the prevention of waste through secondary raw material recovery and eco-design, improved waste management by direct recycling of industrial waste and urban mining of end of life products, establishment of an industrial symbiosis replicable model to move from a lineal economy to a circular economy through integrated systems.

FISSAC activities can be summarized as follows:

- WP1: From current models of industrial symbiosis to a new model
- WP2: Closed loop recycling processes to transform waste into secondary raw materials
- WP3: Product eco-design and certification
- WP4: Pre-industrial scale demonstration of the recycling processes and eco-innovative products
- WP5: Industrial production & real scale demonstration
- WP6: FISSAC model for industrial symbiosis
- WP7: Industrial symbiosis replicability and social issues
- WP8: Exploitation and business models for industrial symbiosis
- WP9: Dissemination
- WP10: Management

2.2 Methodology of the document

This document presents the standardization activity found relevant for the FISSAC project. In order to structure the research on related technical committees and associated work programme, deliverables 1.3 and 2.1 on *Inventory of raw materials, waste, and energy flows in industrial sectors* and D*efinition of technical requirements of secondary raw materials* have been taken as a basis. Therefore, as a starting point for the identification of standardization areas the following sectors/key words have been considered :

- Cement
- Concrete
- Ceramic
- Wood
- Plastic
- Aggregates
- Metallurgic
- Glass
- Natural stone

  ….

As well as other general areas that could be relevant given the purpose of the project:

- Dangerous substances
- Sustainability of construction works

  ….

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The standardization study covers European standardization developed by the European Committee for Standardization (CEN), although references to the ISO Committees and their works in specific fields will be mentioned when describing CEN technical committees activities.

The study has been focused firstly on the existing technical committees related to the aboved mentioned areas and the main standards and projects under development that could be of interest for the project. The relationship with the project for each of the identified areas is explained, as well as the relevant European Directives or Regulations.

For specific Technical Committees directly related to FISSAC products and raw materials, the identified needs, future perspective and potential actions are described.

However, it should be clear that the standardization landscape may vary during the project lifetime and therefore a more detailed roadmap for future standardization activities of the project (what, how, where, etc) will be assessed in due course during the project lifetime.

2.3 Short introduction about standardization

2.3.1 General

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.

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.

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. A summary of the characteristics of the different standardization documents could be found in the following table 1.

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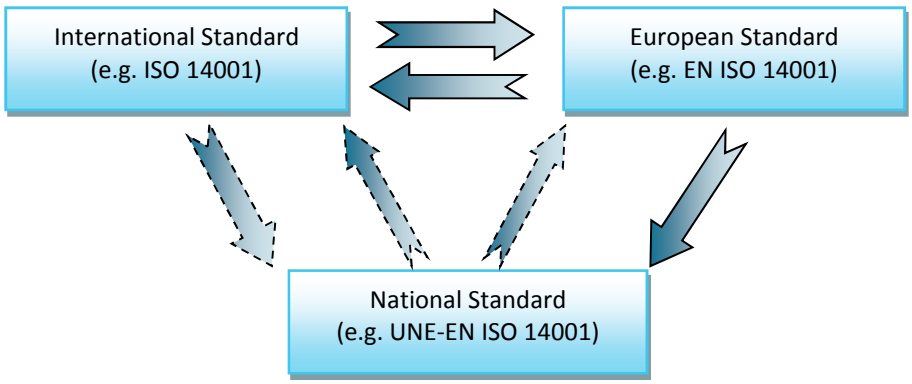
Table 1 – Characteristics of different standardization documents

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: less than 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) 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.

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:

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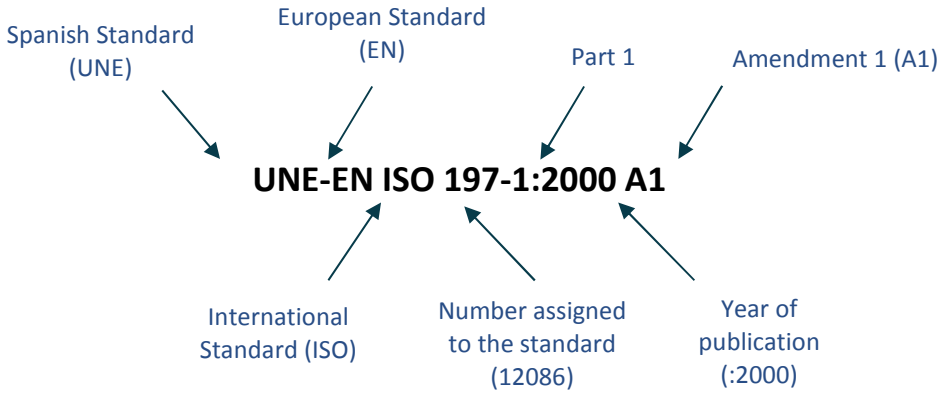
Figure 2 – Example of identification of elements in the code of a standard



2.3.2 Abbreviations and acronyms

In this document the following abbreviations and acronyms are used, and in this list they are indicated with its meaning:

UNE	*Spanish Association for Standardization*
CEN	*European Committee for Standardization*
CENELEC (CLC)	*European Committee for Standardization in the Electrical field*
CWA	*CEN or CENELEC Workshop Agreement*
EAD	*European Assessment Document*
EN	*European Standard*
EOTA	*European Organisation for Technical Assessment*
ESO	*European Standardisation Organisation*
ETAG	*European Technical Approval Guideline*
hEN	*Harmonised European Standard*
ISO	*International Organization for Standardization; International Standard*
IEC	*International Electrotechnical Commission*
NMC	*National Mirror Committee*
NSB	*National Standardization Body*
SC	*Subcommittee*
TC	*Technical Committee*
TR	*Technical Report*
TS	*Technical Specification*
WG	*Working Group*
WI	*Work Item*

2.3.3 European Union regulations, Directives and policies related to the project

In Europe a large number of products are affected by Directives and Regulations, and in particular most of the construction products related to FISSAC project are under the scope of the **Construction Products Regulation nº305/2011** (which supersedes the former Construction Products Directive 89/106/EEC), which establishes harmonised conditions for the marketing of construction products, defines criteria for assessing the performance of such products and the conditions of use for CE marking (and the associated Declaration of Performance). It ensures that reliable information is available to professionals, public authorities, and consumers, so they can compare the performance of products from different manufacturers in different countries.

The CPR establishes the basic requirements for construction works (Mechanical resistance and stability, Safety in case of fire, Hygiene, health and the environment, Safety and accessibility in use, Protection against noise, Energy economy and heat retention, Sustainable use of natural resources), which have direct influence in product characteristics (essential characteristics), defined in the corresponding harmonized technical specifications.

Within the context of the Construction Products Regulation nº305/2011, the harmonised technical specifications are the Harmonised standards and the European Assessment Documents (or European Technical Approval Guidelines).

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Harmonised European standards (hENs) are the harmonised technical specifications developed by CEN or CENELEC following the mandates given by the European Commission.

A Standardisation Request (Mandate) is a demand from the European Commission to the European standardisation organisations (ESOs), such as CEN or CENELEC, to draw up and adopt European standards in support of European policies and legislation, such as Directives and Regulations. Draft mandates are drawn up by the Commission services through a process of consultation with a wide group of interested parties (social partners, consumers, SMEs, relevant industry associations, etc.) taking into account existing legislation in Member States. A database of Standardization Requests may be found in the European Commission webpage

The Harmonised European standards are identified by the inclusion of an Annex ZA. Manufacturers, other economic operators, or conformity assessment bodies can use harmonised standards to demonstrate that products, services, or processes comply with relevant EU legislation. The references of harmonised standards must be published in the Official Journal of the European Union. The European standards, even developed under a mandate and for European legislation, remain voluntary in their use, excepting the case of the harmonised standards of construction products, which are compulsory to comply with the legislation.

In the field of construction harmonised standards serve the purpose of defining methods and assessment criteria for construction product performance. They refer to an intended use for the products covered by the standard and include the technical details necessary for the implementation of the system of assessment and verification of the constancy of performance.

The European Assessment Documents (EADs) (or former European Technical Approval Guidelines (ETAGs)) are harmonised technical specifications developed by the European Organisation for Technical Assessment (EOTA), and they constitute the basis for the assessment of products not covered or not fully covered by a harmonised standard and for which the performance in relation to its essential characteristics cannot be entirely assessed according to an existing harmonised standard. EADs are the basis for issuing European Technical Assessments by national Technical Assessment Bodies (TABs). It should be noticed that this organisation (EOTA) is not a standardization body and it does not issues standards, but their documents (EADs) are deemed important within the European construction sector for the assessment of the performances and marketing of construction products and systems.

Finally, according to the CPR, when a manufacturer decides to place a construction product on the market and that product is covered by a harmonised standard, it must complete a declaration of performance which contain information like the product reference, the systems of assessment and verification of constancy of performance of the product, the intended use or uses for the product and the declared performance. Once the declaration of performance has been drawn up, the manufacturer must affix CE marking to the product.

Other European Directives related to FISSAC project are the following (this list is an indicative list and shall not be considered as complete):

- **Waste Framework Directive**, or **Directive 2008/98/EC** of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives. This Directive repealed Directive 2006/12/EC on waste (the codified version of Directive 75/442/EEC as amended), hazardous waste Directive 91/689/EEC, and the Waste Oils Directive 75/439/EEC. It provides for a general framework of waste management requirements and sets the basic waste management definitions for the EU. It lays down waste management principles such as the "polluter pays principle" or the "waste hierarchy". Article 5 includes a definition of by-products and the main conditions which must be met by a substance or object to be classified as a by-product.

  According to Article 6 (1) and (2) of the Waste Framework Directive 2008/98/EC, certain specified waste shall cease to be waste when it has undergone a recovery (including recycling) operation and complies with specific criteria to be developed in line with certain legal conditions (the substance or object is commonly used for specific purposes; there is an existing market or demand for the substance or object; the use is lawful; the use will not lead to overall adverse environmental or human health impacts) . The Commission has prepared a set of end-of-waste criteria for:

  - **iron, steel and aluminium scrap** (see Council Regulation (EU) No 333/2011)
  - **glass cullet** (see Commission Regulation (EU) N° 1179/2012)

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- **copper scrap** (see Commission Regulation (EU) N° 715/2013)

- **Decision 2000/532/EC** establishing a **list of wastes**. This Decision establishes the classification system for wastes, including a distinction between hazardous and non-hazardous wastes. It is closely linked to the list of the main characteristics which render waste hazardous contained in Annex III to the Waste Framework Directive above.
From 1st of June 2015 there are some legislative changes concerning the list of waste and hazardousness properties:

  - Commission Decision (EU) No 2014/955/EU
  - Commission Regulation (EU) No 1357/2014

Special attention is drawn to the analysis carried out on the implications for some wastes from thermal processes, such as wastes from manufacture of ceramic goods, bricks, tiles, construction products, cement, lime and plaster and other products made from them.
(http://ec.europa.eu/environment/waste/framework/pdf/Charact_waste_thermal_processes.pdf)

Within the Circular Economy Package adopted by the Commission some revised legislative proposals on waste have been included to stimulate Europe's transition towards a circular economy which will boost global competitiveness, foster sustainable economic growth and generate new jobs.

The revised legislative proposal on waste sets clear targets for reduction of waste and establishes an ambitious and credible long-term path for waste management and recycling. To ensure effective implementation, the waste reduction targets in the new proposal are accompanied by concrete measures to address obstacles on the ground and the different situations across EU Member States. Among the key elements of the revised waste proposal, it can be cited the following:

- A common EU target for recycling 65% of municipal waste by 2030;
- A common EU target for recycling 75% of packaging waste by 2030;
- A binding landfill target to reduce landfill to maximum of 10% of municipal waste by 2030;
- A ban on landfilling of separately collected waste;
- Promotion of economic instruments to discourage landfilling ;
- Simplified and improved definitions and harmonised calculation methods for recycling rates throughout the EU;
- Concrete measures to **promote re-use and stimulate industrial symbiosis** –turning one industry's by-product into another industry's raw material;
- Economic incentives for producers to put **greener products on the market** and support recovery and recycling schemes (eg for packaging, batteries, electric and ele ctronic equipment, vehicles).

The Waste Directive is therefore under revision and some legislative related proposals have been adopted.

- **Circular Economy**: On 2 December 2015, the European Commission put forward a package to support the EU's transition to a circular economy. The aim of the circular economy is to minimize the waste and resource use. The EU Action Plan for the circular economy is composed of a set of both general and material-specific actions:
  - General measures:
    - Product design: Better product design is key to facilitating recycling and helping to make products that are easier to repair or more durable, thus saving precious resources. This links to the measures on ecodesign. Ecodesign Directive will be briefly explained bellow.
    - Production process: On the grounds that production processes can be improved to use resources more efficiently and produce less waste, practices such as industrial symbiosis (where the waste or by-products of one industry become the inputs for another one) or remanufacturing will be encouraged.
    - Consumption: Actions will be taken on clear and reliable labelling, improving reparability, upgradeability and durability of products.
    - From waste to resources (secondary raw materials): Secondary raw materials still account for only a small proportion of materials used in the EU. There are important barriers to their uptake in the economy, for example due to inadequate collection systems or the

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uncertainty of their sources, composition, quantity and quality. Measures will be taken concerning raw materials stocks and flows in the EU, transport of waste between EU countries, as well as development of end-of-waste rules and/or standards, actions aimed at building trust and enabling secondary raw materials to benefit from the internal market.

- Actions for specific materials and sectors: From the point of view that a number of materials and sectors face specific challenges in the context of the circular economy, specific actions will be taken on the following sectors: plastics, food value chain, critical raw materials, construction and demolition, biomass and bio.based products and fertilisers. It is estimated that around 100 million tonnes of food are wasted annually in the EU. Food is lost or wasted along the whole food supply chain: on the farm, in processing and manufacture, in shops, in restaurants and canteens, and in the home. Apart from the related economic and environmental impacts, food waste also has an important social angle – donation of surplus food should be facilitated so that safe, edible food can reach those who need it most..In September 2015, the United Nations General Assembly adopted Sustainable Development Goals for 2030 that included a target to halve per capita food waste at retail and consumer levels and reduce food losses along production and supply chains. The EU is committed to meeting this goal. The new waste legislative proposal calls on EU countries to reduce food waste at each stage of the food supplychain, monitor food waste levels and report back in order to facilitate exchange between actors on progress made.

- **Ecodesign:** The **Ecodesign Directive 2009/125/EC**, establishes a framework for the setting of ecodesign requirements for energy-related products provides consistent EU-wide rules for improving the environmental performance of products, such as household appliances, information and communication technologies or engineering. The Directive sets out minimum mandatory requirements for the energy efficiency of energy related products

The **Energy Labelling Directive 2010/30/EU** on the indication by labelling and standard product information of the consumption of energy and other resources by energy-related products complement those Ecodesign requirements with mandatory labelling requirements.

The Ecodesign Directive is implemented through product-specific Regulations, directly applicable in all EU countries.

Both Ecodesign and Energy Labelling Regulations are complemented by harmonised European standards. These technical specifications indicate that a product complies with the mandatory requirements. Only then can the manufacturer affix the CE marking and sell it in the EU.

- **Construction and demolition**: As commented before, improving waste management in this sector is crucial for the circular economy. That is why Commission envisage a series of actions in this field like ensuring improved recovery of valuable resources and adequate waste management in the construction and demolition sector, as well as developing pre-demolition guidelines to boost high-value recycling in the sector as well as voluntary recycling protocols aimed to improve quality of and build confidence in recycled construction materials. In the proposal for the revision of waste a requirement for better sorting of construction and demolition waste will be included.

CDW has been identified as a priority waste stream by the European Union. There is a high potential for recycling and re-use of CDW, since some of its components have a high resource value. In particular, there is a re-use market for aggregates derived from CDW waste in roads, drainage and other construction projects. Technology for the separation and recovery of construction and demolition waste is well established, readily accessible and in general inexpensive.

One of the objectives of the Waste Framework Directive (2008/98/EC) concerning CDW is to achieve that by 2020 a minimum of 70% (by weight) of non-hazardous construction and demolition waste excluding naturally occurring material defined in category 17 05 04 in the List of Wastes shall be prepared for re-use, recycled or undergo other material recovery" (including backfilling operations using waste to substitute other materials).

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A specific study on CDW, 'Resource Efficient Use of Mixed Waste', has being conducted on behalf of the European Commission. The study started in January 2015 until August 2016. The aim was to investigate the current CDW management situation in EU Member States, identifying obstacles to recycling and potential deficiencies that could lead to non-compliance with EU waste legislation. Good practices in terms of creating conditions for increasing CDW recycling and for improving the quality of recycling and recovery will be identified and a set of recommendations to address potential barriers will be formulated. In parallel, success stories of efficient CDW management will be showcased in 6 case studies, illustrating key elements for success, as well as the necessary preconditions. Finally, the reliability of official CDW statistics will be assessed, identifying the sources of inaccuracy and proposing measures for their improvement.

Construction and demolition waste protocol:

This Protocol fits within the Construction 2020 strategy, as well as the Communication on Resource Efficiency Opportunities in the Building Sector. It's also part of the European Commission's ambitious and more recently adopted Circular Economy Package. Its overall aim is to increase confidence in the Construction and Demolition waste management process and the trust in the quality of Construction and Demolition recycled materials. This will be achieved by:

- Improved waste identification, source separation and collection
- Improved waste logistics
- Improved waste processing
- Quality management
- Appropriate policy and framework conditions

This Protocol has been developed for application in all 28 EU countries and has the following target groups of stakeholders:

- Industry practitioners; construction sector (including renovation companies and demolition contractors), construction product manufacturers, waste treatment, transport and logistics as well as recycling companies
- Public authorities at local, regional, national and EU levels
- Quality certification bodies for buildings and infrastructure
- Clients of C&D recycled materials

The Construction and Demolition waste protocol includes good practices from across the EU that can be sources of inspiration for both policy makers and practitioners. It also includes an overview of definitions and a checklist for practitioners.

- **Raw materials**: In 2008, the Commission adopted the Raw Materials Initiative which set out a strategy for tackling the issue of access to raw materials in the EU. This strategy has three pillars which aim to ensure:

    - Fair and sustainable supply of raw materials from global markets;
    - Sustainable supply of raw materials within the EU;
    - Resource efficiency and supply of "secondary raw materials" through recycling

The strategy covers all raw materials used by European industry except materials from agricultural production and materials used as fuel.

The Commission also regularly publishes a list of critical raw materials in the EU.

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3. Standardization relevant for FISSAC project

3.1 Technical committees overview

The following is a list of the European (and international) committees which have been identified as technical bodies working on subjects related to FISSAC project. Some of them cover construction products and thus may be considered as "vertical committees", and others have a horizontal nature.

Table 2 – European and international committees related to FISSAC project

European and international committees related to FISSAC project	
Cements	CEN/TC 51 “Cement and building lime”
	ISO/TC 74 “ Cement and lime”
Concrete	CEN/TC 104 “Concrete and related products”
	CEN/TC 177 “Prefabricated reinforced components of autoclaved aerated concrete or light-weight aggregate concrete with open structure”
	ISO/TC 71 “Concrete, reinforced concrete and pre-stressed concrete”
Ceramics	CEN/TC 67 “Ceramic tiles”
	ISO/TC 189 “Ceramic tile”
Aggregates	CEN/TC 154 “Aggregates”
Plastics	CEN/TC 249 “Plastics”
	ISO/TC 61 “Plastics”
End-of life-Tyres	CEN/TC 266 “Materials obtained from End-of-Life Tyres (ELT)
Natural stones	CEN/TC 246 “Natural stones”
Aluminium	CEN/TC 132 “Aluminium and aluminium alloys”
	ISO/TC 79 “Light metals and their alloys”
Sustainability of construction works	CEN/TC 350 "Sustainability of construction works"
	ISO/TC 59/SC 17 "Sustainability in buildings and civil engineering works"
	ISO/TC 207/SC3 “Environmental labelling”
	ISO/TC 207/SC4 “Environmental performance evaluation”
	ISO/TC 207/SC5 “Life cycle assessment”
Dangerous substances	CEN/TC 351 “Construction products Assessment of release of dangerous substances”
Characterization of waste	CEN/TC 292 “Characterization of waste”
Other technical committees	

3.2 Cement

3.2.1 Introduction

European standards about *cement* have been developed by CEN/TC *51*, basically, under Mandate M /114 addressed by the Commission to CEN & CENELEC concerning the execution of standardisation work for harmonised standards on cement, building limes and other hydraulic binders, due to existing notified national regulations on the matter.

In general terms, this technical committee develops European standards related to the terminology, the test methods, the specifications and evaluation of conformity of the products under its scope (cements and limes used in building and civil engineering). Thus, they include very important aspects relevant not only for the industry but for users and public authorities.

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Cement is concerned by several European Directives and Regulations, the most relevant ones, from a product point of view perspective, being the Construction Products Regulation (CPR), Regulation (EU) No 305/2011 (which repealed the Construction Products Directive (CPD) 89/106/EEC), the REACH Regulation (Registration, Evaluation, Restriction,and Authorisation of Chemicals - Regulation (EC) No 1907/2006) and the CLP Regulation (Classification, Labelling and Packaging of substances and mixtures (Regulation (EC) No 1272/2008). It could also be mentioned the Commission Implementing Decision 2013/163/EU establishing the BAT conclusions on industrial emissions for the production of cement, lime and magnesium oxide, published in the Official Journal.

Therefore, the goal of TC/51 standards, apart from the elimination of technical barriers-to-trade by means of the application of the corresponding harmonised European standards, is to be a convenient support to European legislation (in particular CPR and REACH). They also serve as support to the activities of other European Technical Committees closely linked, as the ones for concrete or mansory.

At the international level, ISO/TC 74 "Cement and lime" is responsible for the standardization, including definitions, test methods and specifications, of various kinds of cement and lime used in building construction and engineering, either for binding together the construction materials or as a constituent part of all kinds of paste, mortar and concrete.

3.2.2 Structure

CEN/TC 51 technical committee consists of the following active working groups where the current work programme is developed and where the published standards were prepared and are monitored for possible revisions.

Table 3 – Structure CEN/TC 51 – Subcommittees and Working Groups

Structure CEN/TC 51 – Subcommittees and Working Groups	
Working Group	**Title**
CEN/TC 51/WG 6	Definitions and terminology of cement
CEN/TC 51/WG10	Masonry cement
CEN/TC 51/WG11	Building lime
CEN/TC 51/WG12	Special performance criteria
CEN/TC 51/WG13	Assessment of conformity
CEN/TC 51/WG14	Hydraulic binders for road bases
CEN/TC 51/WG 15	Revision of methods of testing cement
CEN/TC 51/WG 16	Artificial hydraulic lime

3.2.3 Published standards

Table 4 – Published standards relevant to cements (CEN/TC 51 & ISO/TC 74)

Published standards relevant to cements	
Reference	**Title**
CEN/TR 14245:2014	Cement - Guidelines for the application of EN 197-2 Conformity Evaluation
CEN/TR 15697:2008	Cement - Performance testing for sulfate resistance - State of the art report
CEN/TR 16632:2014	Isothermal Conduction Calorimetry (ICC) for the determination of heat of hydration of cement: State of Art Report and Recommendations
CEN/TR 196-4:2007	Methods of testing cement - Part 4: Quantitative determination of constituents
CEN/TR 16912:2016	Guidelines for a procedure to support the European standardization of cements

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EN 13282-1:2013	Hydraulic road binders - Part 1: Rapid hardening hydraulic road binders - Composition, specifications and conformity criteria
EN 13282-2:2015	Hydraulic road binders - Part 2: Normal hardening hydraulic road binders - Composition, specifications and conformity criteria
EN 13282-3:2015	Hydraulic road binders - Part 3: Conformity evaluation
EN 13639:2017	Determination of total organic carbon in limestone
EN 13639:2002/AC:2004	Determination of total organic carbon in limestone
EN 14216:2015	Cement - Composition, specifications and conformity criteria for very low heat special cements
EN 14647:2005	Calcium aluminate cement - Composition, specifications and conformity criteria
EN 14647:2005/AC:2006	Calcium aluminate cement - Composition, specifications and conformity criteria
EN 15368:2008+A1:2010	Hydraulic binder for non-structural applications - Definition, specifications and conformity criteria
EN 15743:2010+A1:2015	Supersulfated cement - Composition, specifications and conformity criteria
EN 196-10:2016	Methods of testing cement - Part 10: Determination of the water-soluble chromium (VI) content of cement
EN 196-1:2016	Methods of testing cement - Part 1: Determination of strength
EN 196-2:2013	Method of testing cement - Part 2: Chemical analysis of cement
EN 196-3:2016	Methods of testing cement – Part 3: Determination of setting times and soundness
EN 196-5:2011	Methods of testing cement – Part 5: Pozzolanicity test for pozzolanic cement
EN 196-6:2010	Methods of testing cement – Part 6: Determination of fineness
EN 196-7:2007	Methods of testing cement – Part 7: Methods of taking and preparing samples of cement
EN 196-8:2010	Methods of testing cement – Part 8: Heat of hydration – Solution method
EN 196-9:2010	Methods of testing cement – Part 9: Heat of hydration – Semi-adiabatic method
EN 197-1:2011	Cement – Part 1: Composition, specifications and conformity criteria for common cements
EN 197-2:2014	Cement – Part 2: Conformity evaluation
EN 16908:2017	Cement and building lime - Environmental product declarations - Product category rules complementary to EN 15804
CEN/TR 15177:2006	Testing the freeze-thaw resistance of concrete - Internal structural damage
CEN/TR 16142:2011	Concrete - A study of the characteristic leaching behaviour of hardened concrete for use in the natural environment
CEN/TS 12390-9:2016	Testing hardened concrete - Part 9: Freeze-thaw resistance with de-icing salts - Scaling
ISO 679:2009	Cement -- Test methods -- Determination of strength
ISO 863:2008	Cement -- Test methods -- Pozzolanicity test for pozzolanic cements
ISO 9597:2008	Cement -- Test methods -- Determination of setting time and soundness
ISO/TR 12389:2009	Methods of testing cement -- Report of a test programme -- Chemical analysis by x-ray fluorescence 60.60 91.100.10

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ISO 29581-1:2009	Cement -- Test methods -- Part 1: Analysis by wet chemistry
ISO 29581-2:2010	Cement -- Test methods -- Part 2: Chemical analysis by X-ray fluorescence
ISO 29582-1:2009	Methods of testing cement -- Determination of the heat of hydration -- Part 1: Solution method

Note:

- *Specific standards like lime standards or for masonry cements are excluded from the list.*
- *CEN/TR 15177, CEN/TR 16142 & CEN/TS 12390-9, although relating to concrete, have been included due to its possible relevance when assessing the eco-cement and its fitness for use.*

3.2.4 Work programme

Table 5 – Projects under development CEN/TC 51 & ISO/TC 74

Projects under development	
Reference	**Title**
prEN 196-6	Methods of testing cement - Part 6: Determination of fineness
prEN 196-11	Methods of testing cement - Part 11: Heat of hydration - Isothermal Conduction Calorimetry method
prEN 197-1	Cement - Part 1: Composition, specifications and conformity criteria for common cements

Note: Not included projects relevant for masonry currently under development.

3.2.5 Conclusions

The most relevant standard for cement product and its constituents is the European Standard EN-197-1. The current standard, which is now being revised, gives specifications for 27 common cements, 7 sulfate resistant cements, as well as 5 low early strength blast furnace cements. The definition of the cements include not only the proportions of the constituents (clinker, additions etc) used but the requirements of the latter. Mechanical, physical and chemical requirements to be met by standardized cements are also given.

As mentioned previously, EN 197-1 is now under revision. The main goal is to have a revised text aligned with the CPR (terminology, Annex ZA…), and the standardization of new types of ternary cements (CEM II/C-M) and CEM VI (composite cement with constituents like clinker, blastfurnace slag, limestone, silicious fly ash and natural puzzolana).

It is clear, therefore, that cement specifications will evolve towards new additions, especially coming from industrial waste and by-products and new cements resulting from that.

In this sense, it is worth mentioning the published CEN/TR 16912:2016 "*Guidelines for a procedure to support the European standardization of cements"*, a technical report which provides guidance for the procedure to be followed in order to support the European standardization of new cements that are not covered by the existing european standards. According to the terminology used in the technical report, the "new" cements are classified as follows:

- Category 1: cements from a new combination of traditional and well-tried constituents
- Category 2: cements corresponding to cement types defined in existing standards but containing one or more new constituents
- Category 3: cements differing substantially from the types defined in existing standards (new clinker…)

The steps to follow are explained in the TR as well as the assessments and approaches to be carried out when considering the standardization of these new cements.
FISSAC project will demonstrate the feasibility of producing eco-cement based mainly on the use of waste and sub-products at the clinker production stage (raw materials) and at the cement production stage (new additions). The wastes and sub-products assessed within the different stages are the following:

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- For clinker production: Electric arc furnace (EAF) slag, ladle furnace (LF) slag, glass waste, ceramic waste and aluminium saline slag.
- For cement production: ceramic waste, glass waste and EAF and LF slags.

The final result will be, on the one hand, a calcium sulpho-aluminate cement, which is a low carbon cement with particular characteristics differing from the ordinary Portland cement, with environmental savings, that is not covered by the current EN 197-1 (category 3 cement, according to the classification above) . And on the other hand, binary cements with new additions coming from the above mentioned wastes and sub-products (category 2 cements).

From the point of view of the raw materials to be incorporated to the kiln producing the clinker, no standards exist and no standards are expected. Producers are free to manage the raw materials used and the proportions, bearing in mind the final clinker to obtain and the facility emissions. The final product needs to be assessed concerning its properties and characteristics.

Furthermore, the eco-cement produced under FISSAC research, although evaluated and tested, in the first instance, against current published standards, it is not covered by any of them. Therefore, place for future standardization work has been detected, for both, the new sulpho-aluminate cement and for the new binary cements.

According to the mentioned CEN/TR 16912, a scheduled assessment of new cements proposals must be followed for proper consideration by CEN/TC 51 technical committee:

- Mechanical, physical and chemical performances (described in the document) as well as durability related characteristics should be assessed, taking into account the intended use of the cement.
- In addition to the above, potential environmental and health impacts of end-use construction products that incorporate the cement should be assessed to check the influence of the new product. This assessment should be based on standards produced by CEN/TC 351 on Dangerous substances and by CEN/TC 350 on Sustainability of construction works (EPDs), for example. REACH should also be taken into account.

These assessments should be followed for proper consideration of new binary cements and new sulpho-aluminate cement in standardization system. For the latter, additionally, practical experience needs to be shown for the assessment and demonstration of the fitness of the intended use.
In order to make a substantiated proposal, tests on the final product need to be carried out to be able to provide the necessary information to demonstrate the fitness for the intended use of the new cement. The compiled information resulting from the analysis will be the basis for future proposals within CEN/TC 51.

As stated in its business plan, CEN/TC 51 is using the best appropriate technical documents to start any standardisation work; it can be national standards but also technical documents developed in the frame of research projects by international organizations.

Generally speaking, the cement industry has proven to be a committed sector with the recovery and recycling of waste materials. It does not only aims to increase the use of alternative fuels, a field where the sector has gained broad experience in the last years. The cement sector is on a continuous innovation path through an increased use of by-products from the power sector (fly ash) and the steel sector (blastfurnace slag). In terms of product innovation, efforts in R&D focus on new constituents improving its properties and giving place to new applications.

Sector and, consequently, CEN/TC 51, is also facing new challenges related mainly to environmental performance of products. Requirements for products in contact with drinking water, regulated dangerous substances, sustainability including environmental (recycling, emissions reduction, environmental product declarations), social and economical aspects, as well as health and safety of workers of the industry, workers at the construction sites and occupants of the constructions are some of the sector concerns and standardization main goals.

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3.3 Concrete and related products

3.3.1 Introduction

CEN/TC 104 deals with the standardisation of provisions for concrete and related products, in particular with respect to properties and requirements for:

- fresh and hardened concrete;
- production and delivery of fresh concrete;
- constituent materials of concrete, e.g. mixing water, additions and admixtures;
- sheaths for prestressing tendons; grout for prestressing tendons;
- fibres for use in concrete;
- execution of concrete structures;
- production and execution of sprayed concrete;
- products for the protection and repair of concrete structures.

Additionally, relevant test methods and provisions for the assessment of conformity for the products and procedures mentioned above are standardized. Not covered by the scope of TC 104 are the constituent materials, aggregates (covered by CEN/TC 154), Pigments (covered by CEN/TC 298) and cement (covered by CEN/TC 51), the design of concrete structures and components (covered by CEN/TC 250/SC 2), precast concrete products (covered by CEN/TC 229) and prefabricated autoclave aerated and no-fines light weight concrete components (covered by CEN/TC 177).

Although concrete as a product is not covered by a harmonized standard, most of the constituent materials of concrete are covered by the mandate M128. Therefore, a great deal of the activities in CEN/TC 104 and its groups are aimed to provide product specifications to support the Construction Product Regulation.

Furthermore, CEN/TC 104 is involved in actions performed in the scope of the mandate M 136 "*Products in contact with drinking water*" and M 366 "*Development of horizontal standardized assessment method for harmonized approaches related to dangerous substances under the CPD*" to provide technical specifications for the support of these two mandates of the Commission.

CEN/TC 104 deals with a series of concrete constituents which are recycled products (e. g. mixing water, aggregate) or by-products from other industries (e. g. fly ash). The use of these products covers environmental aspects with respect to saving of raw materials and as well as minimizing the need of waste deposits.

At the international level, ISO/TC 71 " Concrete, reinforced concrete and pre-stressed concrete" is responsible for the standardization of the technology of concrete, of the design and construction of concrete, reinforced concrete and pre-stressed concrete structures, so as to ensure progressive development both in quality and in price reduction. Definitions and terms, as well as testing procedures, to facilitate international exchange of research work are also standardised in this technical committee.

3.3.2 Structure

CEN/TC 104 technical committee consists of the following active subcommittees and working groups where the current work programme is developed and where the published standards were prepared and are monitored for possible revisions.

Table 6 – Structure CEN/TC 104 – Subcommittees and Working Groups

Structure CEN/TC 104 – Subcommittees and Working Groups	
Subcommittee/Working Group	**Title**
CEN/TC 104/SC 1	Concrete - Specification, performance, production and conformity
CEN/TC 104/SC 1/WG1	Exposure Resistance Classes (RC)

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CEN/TC 104/SC 2	Execution of concrete structures
CEN/TC 104/SC 2/WG3	Concreting
CEN/TC 104/SC 3	Admixtures for concrete
CEN/TC 104/SC 3/WG3	Electrochemical test methods
CEN/TC 104/SC 8	Protection and repairs of concrete structures
CEN/TC 104/SC 8/WG1	Surface protection systems
CEN/TC 104/SC 8/WG2	Repair
CEN/TC 104/SC 8/WG4	Injection products
CEN/TC 104/SC 8/WG9	Site application of products and systems for the protection and repair of concrete structures
CEN/TC 104/WG 4	Fly ash for concrete
CEN/TC 104/WG 5	Mixing water for concrete
CEN/TC 104/WG 9	Silica fume for concrete
CEN/TC 104/WG 10	Sprayed concrete
CEN/TC 104/WG 11	Fibres for concrete
CEN/TC 104/WG 14	Concrete in contact with drinking water
CEN/TC 104/WG 15	Ground granulated blast furnace slag

3.3.3 Published standards

Table 7 – Published standards relevant to concrete

Published standards relevant to concrete and constituents	
Reference	**Title**
CEN/TR 15677:2008	Fly ash obtained from co-combustion - A report on the situation in Europe
CEN/TR 15868:2009	Survey of national requirements used in conjunction with EN 206-1:2000
CEN/TR 15840:2009	Evaluation of conformity of fly ash for concrete - Guidelines for the application of EN 450-2
CEN/TR 16349:2012	Framework for a specification on the avoidance of a damaging Alkali-Silica Reaction (ASR) in concrete
CEN/TR 16369:2012	Use of control charts in the production of concrete
CEN/TR 16443:2013	Backgrounds to the revision of EN 450-1:2005+A1:2007 - Fly ash for concrete
CEN/TR 16563:2013	Principles of the equivalent durability procedure
CEN/TR 16639:2014	Use of k-value concept, equivalent concrete performance concept and equivalent performance of combinations concept
CEN/TS 14754-1:2007	Curing compounds - Test methods - Part 1: Determination of water retention efficiency of common curing compounds
CR 13901:2000	The use of the concept of concrete families for the production and conformity control of concrete
CR 13902:2000	Test methods for determining the water/cement ratio of fresh concrete
CR 1901:1995	Regional Specifications and Recommendations for the avoidance of damaging

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	alkali silica reactions in concrete
EN 1008:2002	Mixing water for concrete - Specification for sampling, testing and assessing the suitability of water, including water recovered from processes in the concrete industry, as mixing water for concrete
EN 206:2013+A1	Concrete - Specification, performance, production and conformity
EN 12350-1:2009	Testing fresh concrete - Part 1: Sampling
EN 12350-2:2009	Testing fresh concrete - Part 2: Slump-test
EN 12350-3:2009	Testing fresh concrete - Part 3: Vebe test
EN 12350-4:2009	Testing fresh concrete - Part 4: Degree of compactability
EN 12350-5:2009	Testing fresh concrete - Part 5: Flow table test
EN 12350-6:2009	Testing fresh concrete - Part 6: Density
EN 12350-7:2009	Testing fresh concrete - Part 7: Air content - Pressure methods
EN 12350-8:2010	Testing fresh concrete - Part 8: Self-compacting concrete - Slump-flow test
EN 12350-9:2010	Testing fresh concrete - Part 9: Self-compacting concrete - V-funnel test
EN 12350-10:2010	Testing fresh concrete - Part 10: Self-compacting concrete - L box test
EN 12350-11:2010	Testing fresh concrete - Part 11: Self-compacting concrete - Sieve segregation test
EN 12350-12:2010	Testing fresh concrete - Part 12: Self-compacting concrete - J-ring test
EN 12390-1:2012	Testing hardened concrete - Part 1: Shape, dimensions and other requirements for specimens and moulds
EN 12390-2:2009	Testing hardened concrete - Part 2: Making and curing specimens for strength tests
EN 12390-3:2009	Testing hardened concrete - Part 3: Compressive strength of test specimens
EN 12390-4:2000	Testing hardened concrete - Part 4: Compressive strength - Specification for testing machines
EN 12390-5:2009	Testing hardened concrete - Part 5: Flexural strength of test specimens
EN 12390-6:2009	Testing hardened concrete - Part 6: Tensile splitting strength of test specimens
EN 12390-7:2009	Testing hardened concrete - Part 7: Density of hardened concrete
EN 12390-8:2009	Testing hardened concrete - Part 8: Depth of penetration of water under pressure
EN 12390-13:2013	Testing hardened concrete - Part 13: Determination of secant modulus of elasticity in compression
CEN/TS 12390-10:2007	Testing hardened concrete - Part 10: Determination of the relative carbonation resistance of concrete
EN 12390-11:2015	Testing hardened concrete - Part 11: Determination of the chloride resistance of concrete, unidirectional diffusion

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EN 12504-1:2009	Testing concrete in structures - Part 1: Cored specimens - Taking, examining and testing in compression
EN 12504-2:2012	Testing concrete in structures - Part 2: Non-destructive testing - Determination of rebound number
EN 12504-3:2005	Testing concrete in structures - Part 3: Determination of pull-out force
EN 12504-4:2004	Testing concrete - Part 4: Determination of ultrasonic pulse velocity
EN 13263-1:2005+A1:2009	Silica fume for concrete - Part 1: Definitions, requirements and conformity criteria
EN 13263-2:2005+A1:2009	Silica fume for concrete - Part 2: Conformity evaluation
EN 15167-1:2006	Ground granulated blast furnace slag for use in concrete, mortar and grout - Part 1: Definitions, specifications and conformity criteria
EN 15167-2:2006	Ground granulated blast furnace slag for use in concrete, mortar and grout - Part 2: Conformity evaluation
EN 450-1:2012	Fly ash for concrete - Part 1: Definition, specifications and conformity criteria
EN 450-2:2005	Fly ash for concrete - Part 2: Conformity evaluation
EN 451-1:2017	Method of testing fly ash - Part 1: Determination of free calcium oxide content
EN 451-2:2017	Method of testing fly ash - Part 2: Determination of fineness by wet sieving
EN 16622:2015	Silica-calcium fume for concrete - Definitions, requirements and conformity criteria
EN 934-1:2008	Admixtures for concrete, mortar and grout - Part 1: Common requirements
EN 934-2:2009+A1:2012	Admixtures for concrete, mortar and grout - Part 2: Concrete admixtures - Definitions, requirements, conformity, marking and labelling
EN 934-3:2009+A1:2012	Admixtures for concrete, mortar and grout - Part 3: Admixtures for masonry mortar - Definitions, requirements, conformity and marking and labelling
EN 934-4:2009	Admixtures for concrete, mortar and grout - Part 4: Admixtures for grout for prestressing tendons - Definitions, requirements, conformity, marking and labelling
EN 934-5:2007	Admixtures for concrete, mortar and grout - Part 5: Admixtures for sprayed concrete - Definitions, requirements, conformity, marking and labelling
EN 934-6:2001	Admixtures for concrete, mortar and grout - Part 6: Sampling, conformity control and evaluation of conformity
EN 934-6:2001/A1:2005	Admixtures for concrete, mortar and grout - Part 6: Sampling, conformity control and evaluation of conformity
EN 480-1:2014	Admixtures for concrete, mortar and grout - Test methods - Part 1: Reference concrete and reference mortar for testing
EN 480-2:2006	Admixtures for concrete, mortar and grout - Test methods - Part 2: Determination of setting time
EN 480-4:2005	Admixtures for concrete, mortar and grout - Test methods - Part 4: Determination

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	of bleeding of concrete
EN 480-5:2005	Admixtures for concrete, mortar and grout - Test methods - Part 5: Determination of capillary absorption
EN 480-6:2005	Admixtures for concrete, mortar and grout - Test methods - Part 6: Infrared analysis
EN 480-8:2012	Admixtures for concrete, mortar and grout - Test methods - Part 8: Determination of the conventional dry material content
EN 480-10:2009	Admixtures for concrete, mortar and grout - Test methods - Part 10: Determination of water soluble chloride content
EN 480-11:2005	Admixtures for concrete, mortar and grout - Test methods - Part 11: Determination of air void characteristics in hardened concrete
EN 480-12:2005	Admixtures for concrete, mortar and grout - Test methods - Part 12: Determination of the alkali content of admixtures
EN 480-13:2015	Admixtures for concrete, mortar and grout - Test methods - Part 13: Reference masonry mortar for testing mortar admixtures
EN 480-14:2006	Admixtures for concrete, mortar and grout - Test methods - Part 14: Determination of the effect on corrosion susceptibility of reinforcing steel by potentiostatic electro-chemical test
EN 480-15:2013	Admixtures for concrete, mortar and grout - Test methods - Part 15: Reference concrete and method for testing viscosity modifying admixtures
EN 13791:2007	Assessment of in-situ compressive strength in structures and precast concrete components
EN 13577:2007	Chemical attack on concrete - Determination of aggressive carbon dioxide content in water
EN 13670:2009	Execution of concrete structures
EN 16502:2014	Test method for the determination of the degree of soil acidity according to Baumann-Gully
ISO 1920-1:2004	Testing of concrete -- Part 1: Sampling of fresh concrete
ISO 1920-2:2005	Testing of concrete -- Part 2: Properties of fresh concrete
ISO 1920-3:2004	Testing of concrete -- Part 3: Making and curing test specimens
ISO 1920-4:2005	Testing of concrete -- Part 4: Strength of hardened concrete
ISO 1920-5:2004	Testing of concrete -- Part 5: Properties of hardened concrete other than strength
ISO 1920-6:2004	Testing of concrete-- Part 6: Sampling, preparing and testing of concrete cores
ISO 1920-7:2004	Testing of concrete -- Part 7: Non-destructive tests on hardened concrete
ISO 1920-8:2009	Testing of concrete -- Part 8: Determination of drying shrinkage of concrete for samples prepared in the field or in the laboratory
ISO 1920-9:2009	Testing of concrete -- Part 9: Determination of creep of concrete cylinders in

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	compression
ISO 1920-10:2010	Testing of concrete -- Part 10: Determination of static modulus of elasticity in compression
ISO 1920-11:2013	Testing of concrete -- Part 11: Determination of the chloride resistance of concrete, unidirectional diffusion
ISO 1920-12:2015	Testing of concrete -- Part 12: Determination of the carbonation resistance of concrete -- Accelerated carbonation method
ISO 17785-1:2016	Testing methods for pervious concrete -- Part 1: Infiltration rate
ISO 19596:2017	Admixtures for concrete
ISO 12439:2010	Mixing water for concrete
ISO 22965-1:2007	Concrete -- Part 1: Methods of specifying and guidance for the specifier
ISO 22965-2:2007	Concrete -- Part 2: Specification of constituent materials, production of concrete and compliance of concrete
ISO 13315-1:2012	Environmental management for concrete and concrete structures -- Part 1: General principles
ISO 13315-2:2014	Environmental management for concrete and concrete structures -- Part 2: System boundary and inventory data

Note: In order to keep the list focused on the specific issues relevant to the project and not to make it too extensive, some product standards have not been included in the list such as standards for "Products and systems for the protection and repair of concrete structures", standards on specifications and testing of sprayed concrete, or for fibres in concrete.

3.3.4 Work programme

Table 8 – Projects under development CEN/TC 104 & ISO/TC 71

Projects under development	
Reference	**Title**
prEN 206	Concrete - Specification, performance, production and conformity
prEN 12390-2	Testing hardened concrete - Part 2: Making and curing specimens for strength tests
prEN 12390-3	Testing hardened concrete - Part 3: Compressive strength of test specimens
prEN 12390-4	Testing hardened concrete - Part 4: Compressive strength - Specification for testing machines
prEN 12390-5	Testing hardened concrete - Part 5: Flexural strength of test specimens
prEN 12390-7	Testing hardened concrete - Part 7: Density of hardened concrete
prEN 12390-8	Testing hardened concrete - Part 8: Depth of penetration of water under pressure
prEN 12390-10	Testing hardened concrete — Part 10: Determination of the carbonation resistance of concrete at atmospheric levels of carbon dioxide
prEN 12390-12	Testing of hardened concrete - Part 12: Determination of the carbonation resistance of concrete - Accelerated carbonation method
prEN 12390-14	Testing hardened concrete - Part 14: Semi-adiabatic method for the determination of heat released by concrete during its hardening process
prEN 12390-15	Testing hardened concrete - Part 15: Adiabatic method for the determination of heat released by concrete during its hardening process

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prEN 12350-1	Testing fresh concrete - Part 1: Sampling
prEN 12350-2	Testing fresh concrete - Part 2: Slump-test
prEN 12350-3	Testing fresh concrete - Part 3: Vebe test
prEN 12350-4	Testing fresh concrete - Part 4: Degree of compactability
prEN 12350-5	Testing fresh concrete - Part 5: Flow table test
prEN 12350-6	Testing fresh concrete - Part 6: Density
prEN 12350-7	Testing fresh concrete - Part 7: Air content - Pressure methods
prEN 12350-8	Testing fresh concrete - Part 8: Self-compacting concrete - Slump-flow test
prEN 12504-1	Testing concrete in structures - Part 1: Cored specimens - Taking, examining and testing in compression
prEN 13791	Assessment of in-situ compressive strength in structures and precast concrete components
prEN 934-2	Admixtures for concrete, mortar and grout - Part 2: Concrete admixtures - Definitions, requirements, conformity, marking and labelling
prEN 934-6	Admixtures for concrete, mortar and grout - Part 6: Sampling, assessment and verification of the constancy of performance
CEN/TR 17172	Validation testing program on chloride penetration and carbonation standardized test methods
CEN/TR 17086	Further guidance on the application of EN 13791:2016 and background to the provisions
	Testing hardened concrete - Part xx: Determination of the shrinkage of concrete
	Testing hardened concrete - Part xy: Determination of creep of concrete in compression
	Carbonation and CO2-uptake in concrete
ISO/NP 1920-3	Testing of concrete -- Part 3: Making and curing test specimens
ISO/NP 1920-4	Testing of concrete -- Part 4: Strength of hardened concrete
ISO/DIS 1920-5	Testing of concrete -- Part 5: Properties of hardened concrete other than strength
ISO/NP 1920-6	Testing of concrete -- Part 6: Sampling, preparing and testing of concrete cores
ISO/DIS 1920-13	Testing of concrete -- Part 13: Properties of fresh self compacting concrete
ISO/NP 17785-2	Testing methods for pervious concrete -- Part 2: Density and void content
ISO/DIS 13315-8	Environmental management for concrete and concrete structures -- Part 8: Environmental labels and declarations of concrete

3.3.5 Conclusions

FISSAC project will develop and will assess a new green concrete containing alternative aggregates coming from treated EAF slag and glass waste, which will replace natural aggregates. Replacement of clinker by new mineral valorized by-products like ceramic waste, ladle furnace slag or glass waste will also be considered and studied.
Standards covering aggregates are listed in the corresponding subclause devoted to technical committee CEN/TC 154 of aggregates. Aggregates for concrete are covered by EN 12620, which specifies the applicable requirements to natural, artificial and recycled aggregates used in concrete. From this side, properties of new aggregates considered under FISSAC project will need to be assessed taking EN 12620 as a basis, although EAF are not considered in the

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current version of the standard. This standard is now under revision and proper consideration of these new subproducts is expected.

Furthermore, the core standard for concrete is EN 206 with a wide scope going from specifications for designers, producers and to users of concrete. The standard specifies requirements for concrete (mixed on site, ready mix or precast), as well as for constituents of concrete, with limitations for concrete composition or for properties of fresh and hardened concrete, among others.

It provides proper relationship with other standards related (cement, mixing water, aggregates for concrete, admixtures for concrete, additions (type I and type II (fly ash, silica fume and ground granulated blastfurnace slag) and those for testing of concrete.

Its annex E includes some recommendations for the use of aggregates, for example, normal or weight aggregates and also air-cooled blast furnace slag (conforming general standard for aggregates EN 12620), coarse recycled aggregates (conforming EN 12620), or lightweight aggregates according its corresponding product standard.

EN 206 considers the possibility of replacing cement by different additions. Tests under FISSAC project will be crucial for checking the suitability and compliance with standard.

In short, special attention should be paid to the content of this standard and to its successive revisions.

Attention is also drawn to specific standards on ground granulated blast furnace slags, defining specifications for these products when used as additions in the production of concrete, mortars and grouts, as well as standards about silica fume and fly ash, that must be analyzed when considering having mineral additions to the concrete coming from ceramic and glass waste.

Moreover, and to conclude, the activity of this Technical Committee CEN/TC 104 is influenced by the new sector challenges mainly related to new environmental society demands.

Although the production of concrete and the erection of concrete structures is a rather experienced technique with long-term tradition in various countries, a permanent development with respect to concrete technology, advanced production methods and the use of modern and refined constituent materials is taking place.

Although well experienced sector, one of its peculiarities is that it is governed by different economical, legal, technical properties, which often depend on local or regional sources and requires very detailed and often flexible systems of technical specifications and measurements in composition, production and control procedures to meet the required performance for each application.

The existence of national technical rules in the field of concrete has led in many occasions to difficult and long-term negotiations within the technical committee to reach the proper and necessary consensus to draft the corresponding standards.

3.4 Prefabricated components of autoclaved aerated concrete

3.4.1 Introduction

Technical Committee CEN/TC 177 *Prefabricated reinforced components of autoclaved aerated concrete or light-weight aggregate concrete with open structure* produces standards for prefabricated reinforced components of autoclaved aerated concrete or lightweight aggregate concrete with open structure (expanded clay, pumice, etc.) which harmonize the product and design requirements of prefabricated reinforced products for the intended uses structural and non-structural function in construction works.

The works are governed by mandate M/100 issued by the Commission, which provides performance characteristics needed to comply with the Essential Requirements of construction works laid down by the former Construction Product Directive, replaced by Construction Product Regulation.

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Product standards (with design annexes) cover the whole product family of prefabricated elements, e.g. walls, floors, roofs, etc. Tests method standards are also produced, which serve for the determination of important properties (performance characteristics given in the mandate M/100).

3.4.2 Structure

CEN/TC 177 technical committee consists of the following active working groups where the current work programme is developed and where the published standards were prepared and are monitored for possible revisions.

Table 9 – Structure CEN/TC 177– Subcommittees and Working Groups

Structure CEN/TC 177 – Subcommittees and Working Groups	
Working Group	
CEN/TC 177/WG 1	Prefabricated Reinforced Components of AAC
CEN/TC 177/WG 2	Non-fines lightweight concrete components
CEN/TC 177/WG 3	Test methods

3.4.3 Published standards

Table 10 – Published standards relevant to autoclaved aerated concrete

Published standards relevant to autoclaved aerated concrete and lightweight aggregate concrete	
Reference	Title
CR 13962:2000	Guidelines for the application of LAC-components in structures
EN 12269-1:2000	Determination of the bond behaviour between reinforcing steel and autoclaved aerated concrete by the "beam test" - Part 1: Short term test
EN 12269-2:2010	Determination of the bond behaviour between reinforcing steel and autoclaved aerated concrete by the beam test - Part 2: Long term test
EN 12602:2016	Prefabricated reinforced components of autoclaved aerated concrete
EN 1351:1997	Determination of flexural strength of autoclaved aerated concrete
EN 1352:1996	Determination of static modulus of elasticity under compression of autoclaved aerated concrete or lightweight aggregate concrete with open structure
EN 1353:1996	Determination of moisture content of autoclaved aerated concrete
EN 1354:2005	Determination of compressive strength of lightweight aggregate concrete with open structure
EN 1355:1996	Determination of creep strains under compression of autoclaved aerated concrete or lightweight aggregate concrete with open structure
EN 1356:1996	Performance test for prefabricated reinforced components of autoclaved aerated concrete or lightweight aggregate concrete with open structure under transverse load
EN 1520:2011	Prefabricated reinforced components of lightweight aggregate concrete with open structure with structural or non-structural reinforcement
EN 1521:1996	Determination of flexural strength of lightweight aggregate concrete with open structure
EN 15304:2010	Determination of the freeze-thaw resistance of autoclaved aerated concrete
EN 15361:2007	Determination of the influence of the corrosion protection coating on the anchorage capacity of the transverse anchorage bars in prefabricated reinforced components of autoclaved aerated concrete
EN 1737:1998	Determination of shear strength of welded joints of reinforcement mats or cages for prefabricated components made of autoclaved aerated concrete or lightweight aggregate concrete with open structure

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EN 1738:1998	Determination of steel stresses in unloaded reinforced components made of autoclaved aerated concrete
EN 1739:2007	Determination of shear strength for in-plane forces of joints between prefabricated components of autoclaved aerated concrete or lightweight aggregate concrete with open structure
EN 1740:1998	Performance test for prefabricated reinforced components made of autoclaved aerated concrete or lightweight aggregate concrete with open structure under predominantly longitudinal load (vertical components)
EN 1741:1998	Determination of shear strength for out-of-plane forces of joints between prefabricated components made of autoclaved aerated concrete or lightweight aggregate concrete with open structure
EN 1742:1998	Determination of shear strength between different layers of multilayer components made of autoclaved aerated concrete or lightweight aggregate concrete with open structure
EN 678:1993	Determination of the dry density of autoclaved aerated concrete
EN 679:2005	Determination of the compressive strength of autoclaved aerated concrete
EN 680:2005	Determination of the drying shrinkage of autoclaved aerated concrete
EN 989:1995	Determination of the bond behaviour between reinforcing bars and autoclaved aerated concrete by the the "Push-Out" test
EN 990:2002	Test methods for verification of corrosion protection of reinforcement in autoclaved aerated concrete and lightweight aggregate concrete with open structure
EN 991:1995	Determination of the dimension of prefabricated reinforced components made of autoclaved aerated concrete or lightweight aggregate concrete with open structure
EN 992:1995	Determination of the dry density of lightweight aggregate concrete with open structure

3.4.4 Work programme

There are no active work items under work programme of CEN/TC 177 at the time of preparation of this document.

3.4.5 Conclusions

Due to a permanent technical development and its great flexibility of mechanical and physical properties (e. g. thermal insulation, fire resistance) AAC is applied for structural and non-structural purpose from housing to factory halls.The production of prefabricated reinforced elements made of autoclaved aerated concrete (AAC) and lightweight aggregate concrete with open structure (LAC) covers an important part of the entire market in the construction field.

For this reason, standards under CEN/TC 177 include processes, techniques and materials that can help to control, reduce or avoid negative environmental impacts, also involving material reuse, recycling and recovery at end-of-life.

Consideration has been taken to this technical committee because one of the demonstrators based on secondary raw materials in concrete will be autoclaved and aerated concrete blocks.

3.5 Ceramic tiles

3.5.1 Introduction

CEN/TC 67 is the European technical committee devoted to the standardization of ceramic tiles concerning terminology, technical characteristics, dimensional characteristics and tolerances, test and control methods, design and installation aspects.

As far as legal factors influencing the market are concerned, the Construction Products Regulation 305/2011 (CPR) is the main regulation that must be taken into consideration. CEN/TC 67 is one of several CEN technical committees involved in the preparation of technical specifications supporting the CPR, under mandates M 119 & M 121.

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CEN/TC 67 has developed a significant amount of standards dealing with test methods for ceramic tiles in close cooperation with ISO/TC 189 (Ceramic tiles), via the Vienna Agreement between CEN and ISO.

Finally, it should be mentioned that CEN/TC 67 is working in strict collaboration with CEN/TC 350 "*Sustainability of construction works"* and CEN/TC 351 "*Construction Products - Assessment of release of dangerous substances"* due to the direct influence of their activities in the current works of the Committee.

At the international level, ISO/TC 189 " *Ceramic tile*" is responsible for the standardization of ceramic tiles generally used for floor coverings and wall facings.

3.5.2 Structure

CEN/TC 67 technical committee consists of the following active working groups where the current work programme is developed and where the published standards were prepared and are monitored for possible revisions.

Table 11 – Structure CEN/TC 67 – Subcommittees and Working Groups

Structure CEN/TC 67 – Subcommittees and Working Groups	
Working Group	**Title**
CEN/TC 67/WG 1	Test methods
CEN/TC 67/WG 2	Specifications
CEN/TC 67/WG 3	Adhesives and grouts for tiles
CEN/TC 67/WG 5	Product category rules for ceramic tiles and installation products for ceramic tiling

3.5.3 Published standards

Table 12 – Published standards relevant to tiles

Published standards relevant to tiles	
Reference	Title
EN 14411:2016	Ceramic tiles - Definitions, classification, characteristics, evaluation of conformity and marking
EN ISO 10545-1:2014	Ceramic tiles - Part 1: Sampling and basis for acceptance
EN ISO 10545-2:1997	Ceramic tiles - Part 2: Determination of dimensions and surface quality
EN ISO 10545-3:1997	Ceramic tiles - Part 3: Determination of water absorption, apparent porosity, apparent relative density and bulk density
EN ISO 10545-4:2014	Ceramic tiles - Part 4: Determination of modulus of rupture and breaking strength
EN ISO 10545-5:1997	Ceramic tiles - Part 5: Determination of impact resistance by measurement of coefficient of restitution
EN ISO 10545-6:2012	Ceramic tiles - Part 6: Determination of resistance to deep abrasion for unglazed tiles
EN ISO 10545-7:1998	Ceramic tiles - Part 7: Determination of resistance to surface abrasion for glazed tiles
EN ISO 10545-7:1998/AC:1999	Ceramic tiles - Part 7: Determination of resistance to surface abrasion for glazed tiles
EN ISO 10545-8:2014	Ceramic tiles - Part 8: Determination of linear thermal expansion
EN ISO 10545-9:2013	Ceramic tiles - Part 9: Determination of resistance to thermal shock (ISO 10545-9:2013)
EN ISO 10545-10:1997	Ceramic tiles - Part 10: Determination of moisture expansion
EN ISO 10545-11:1996	Ceramic tiles - Part 11: Determination of crazing resistance for glazed tiles

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EN ISO 10545-12:1997	Ceramic tiles - Part 12: Determination of frost resistance
EN ISO 10545-13:2016	Ceramic tiles - Part 13: Determination of chemical resistance
EN ISO 10545-14:2015	Ceramic tiles - Part 14: Determination of resistance to stains
EN ISO 10545-15:1997	Ceramic tiles - Part 15: Determination of lead and cadmium given off by glazed tiles
EN ISO 10545-16:2012	Ceramic tiles - Part 16: Determination of small colour differences
ISO 13006:2012	Ceramic tiles -- Definitions, classification, characteristics and marking

Note: Apart from the standards in the list, other products relevant for the installation of tiles are standardized in CEN/TC 67 (as well as in the ISO Committee) such as adhesives or grouts.

3.5.4 Work programme

Table 13 – Projects under development in CEN/TC 67 & ISO/TC 189

Projects under development	
Reference	**Title**
prEN ISO 10545-2	Ceramic tiles - Part 2: Determination of dimensions and surface quality
prEN ISO 10545-3	Ceramic tiles - Part 3: Determination of water absorption, apparent porosity, apparent relative density and bulk density
prEN ISO 10545-4	Ceramic tiles - Part 4: Determination of modulus of rupture and breaking strength
prEN ISO 10545-10	Ceramic tiles - Part 10: Determination of moisture expansion
prEN ISO 10545-15	Ceramic tiles - Part 15: Determination of lead and cadmium given off by glazed tiles
prEN 17160	Product category rules for ceramic tiles
ISO/DIS 13006	Ceramic tiles -- Definitions, classification, characteristics and marking
ISO/WD 17889	Sustainability for ceramic tiling systems

Note: There are other active work items related to adhesives for tiles not included in the list.

3.5.5 Conclusions

The core standard of this Technical Committee is EN 14411, which specifies particular characteristics and relevant requirements for ceramic tiles produced by extrusion or dry-pressing techniques, used for floorings and walls. The standard provides quite a complete classification of tiles and the corresponding requirements for each group. The complete set of standards is comprised of the specification product standard and the test methods standards for assessing the relevant characteristics, some of them under revision as shown in the work programme.

FISSAC project is assessing the feasibility of partially substituting clay minerals and calcium carbonate by an aluminium salt slag produced in the aluminium recycling process and marble slurry from the natural stone sector, i.e replacing some raw materials used in the manufacturing process with waste from stone sector and sub-product from aluminium industry. In this sense, the applicable standards to the final product obtained (two specific type of tiles) are the above mentioned: product standard EN 14411 and serie EN 10545 for test methods. As stated before, EN 14411 provides proper classification of tiles and the corresponding composition and technical requirements to be meet by each group defined. There are no standards for raw materials, and to this respect, no need for them has been identified.

Concerning ceramic waste, is mainly obtained from two different sources: waste from the manufacturing of ceramic tiles, produced in different production stages, and that cannot be reused or recycled in the current production processes (which represents a significant amount of waste), and demolition. This ceramic waste will be used, under FISSAC approach, as cement raw material and additions for cement manufacture, as well as addition for concrete. The standardization needs related are analysed within 3.2 & 3.3 (Cement and concrete).

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It should be noted that EN 14411 is an harmonised standard applicable for CE marking purposes under CPR 305/2011, although at the moment of writing of this document, the 2016 version has not been cited yet in the Official Journal and therefore the previous version remains in force for legal effects.

From the environmental point of view, worthy of mention is the standardization initiative on product category rules for ceramic tiles, aiming at facilitating and obtaining environmental product declarations, this being a key tool for the environmental assessment of products and the sustainability concept (see also information on the matter within CEN/TC 350, where wide developments are also taking place).

3.6 Aggregates

3.6.1 Introduction

CEN/TC 154 is devoted to the standardization, in the field of natural and synthetic aggregates, of performance requirements, sampling and test methods.

Concerning its work programme, the activity of CEN/TC 154 is clearly impacted by the legal framework of the Construction Product Regulation and the mandated requirements of the European Commission through Mandate M/125. Thus, most of the published standards are product specifications (harmonized standards) and supporting test methods addressing mandated requirements and enabling products to be CE marked.

Sources of aggregates covered by standards are of different nature. Usually aggregates are produced from natural sources extracted from quarries and gravel pits (and in some cases from sea-dredged materials (marine aggregates)). These are processed as defined in European standards. Secondary or manufactured aggregates are usually by-products from other industrial processes, like blast or electric furnace slags or china clay residues. They are, as defined by TC 154 standards, aggregates resulting from industrial processes involving thermal or other modifications. Recycled aggregates derive from reprocessing materials previously used in construction, including construction and demolition residues. This material is selected and cleaned throughout the supply chain and by strict acceptance procedures of recycling companies. The inert material is finally processed in crushing plants where prior to crushing residual disturbing materials are removed by sieving, windsifting and magnetic separation. Crushed material can be sieved to produce any size according to market specifications. These aggregates need to comply also with the corresponding European standards and CE-marking requirements, being the most important features to comply with the geometrical, mechanical and physical ones, irrespective of their final application. Usually producers use specific equipment to provide recycled aggregates with the required physical features.

At international level, ISO standards on aggregates are developed within ISO/TC 71 "*Concrete*", already described in the clause related to concrete.

3.6.2 Structure

CEN/TC 154 technical committee consists of the following subcommittees and working groups where the current work programme is developed and where the published standards were prepared and are monitored for possible revisions.

Table 14 – Structure CEN/TC 154 – Subcommittees and Working Groups

Structure CEN/TC 154 – Subcommittees and Working Groups	
Subcommittee/Working Group	**Title**
CEN/TC 154/SC 1	Aggregates for mortars
CEN/TC 154/SC 2	Aggregates for concrete, including those for use in roads and pavements
CEN/TC 154/SC 3	Bituminous bound aggregates
CEN/TC 154/SC 4	Hydraulic bound and unbound aggregates
CEN/TC 154/SC 5	Lightweight aggregates
CEN/TC 154/SC 6	Test methods

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CEN/TC 154/WG 10	Armourstone
CEN/TC 154/WG 11	Railway ballast
CEN/TC 154/WG 12	Aggregates from secondary source
CEN/TC 154/WG 13	Dangerous substances

3.6.3 Published standards

Table 15 – Published standards relevant to aggregates

Published standards relevant to aggregates	
Reference	**Title**
EN 12620:2002+A1:2008	Aggregates for concrete
EN 13043:2002	Aggregates for bituminous mixtures and surface treatments for roads, airfields and other trafficked areas
EN 13139:2002	Aggregates for mortar
EN 13242:2002+A1:2007	Aggregates for unbound and hydraulically bound materials for use in civil engineering work and road construction
EN 13383-1:2002	Armourstone - Part 1: Specification
EN 13383-2:2002	Armourstone, Part 2: Test methods
EN 13450:2002	Aggregates for railway ballast
EN 13055:2016	Lightweight aggregates
EN 932-1:1996	Tests for general properties of aggregates - Part 1: Methods for sampling
EN 932-2:1999	Tests for general properties of aggregates - Part 2: Methods for reducing laboratory samples
EN 932-3:1996	Tests for general properties of aggregates - Part 3: Procedure and terminology for simplified petrographic description
EN 932-3:1996/A1:2003	Tests for general properties of aggregates - Part 3: Procedure and terminology for simplified petrographic description
EN 932-5:2012	Tests for general properties of aggregates - Part 5: Common equipment and calibration
EN 932-6:1999	Tests for general properties of aggregates - Part 6: Definitions of repeatability and reproducibility
EN 933-1:2012	Tests for geometrical properties of aggregates - Part 1: Determination of particle size distribution - Sieving method
EN 933-2:1995	Tests for geometrical properties of aggregates - Part 2: Determination of particle size distribution - Test sieves, nominal size of apertures
EN 933-3:2012	Tests for geometrical properties of aggregates - Part 3: Determination of particle shape - Flakiness index
EN 933-4:2008	Tests for geometrical properties of aggregates - Part 4: Determination of particle shape - Shape index
EN 933-5:1998	Tests for geometrical properties of aggregates - Part 5: Determination of percentage of crushed and broken surfaces in coarse aggregate particles
EN 933-5:1998/A1:2004	Tests for geometrical properties of aggregates - Part 5: Determination of percentage of crushed and broken surfaces in coarse aggregate particles
EN 933-6:2014	Tests for geometrical properties of aggregates - Part 6: Assessment of surface characteristics - Flow coefficient of aggregates
EN 933-7:1998	Tests for geometrical properties of aggregates - Part 7: Determination of shell content - Percentage of shells in coarse aggregates
EN 933-8:2012+A1:2015	Tests for geometrical properties of aggregates - Part 8: Assessment of fines - Sand equivalent test
EN 933-9:2009+A1:2013	Tests for geometrical properties of aggregates - Part 9: Assessment of fines - Methylene blue test

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EN 933-10:2009	Tests for geometrical properties of aggregates - Part 10: Assessment of fines - Grading of filler aggregates (air jet sieving)
EN 933-11:2009	Tests for geometrical properties of aggregates - Part 11: Classification test for the constituents of coarse recycled aggregate
EN 1097-1:2011	Tests for mechanical and physical properties of aggregates - Part 1: Determination of the resistance to wear (micro-Deval)
EN 1097-2:2010	Tests for mechanical and physical properties of aggregates - Part 2: Methods for the determination of resistance to fragmentation
EN 1097-3:1998	Tests for mechanical and physical properties of aggregates - Part 3: Determination of loose bulk density and voids
EN 1097-4:2008	Tests for mechanical and physical properties of aggregates - Part 4: Determination of the voids of dry compacted filler
EN 1097-5:2008	Tests for mechanical and physical properties of aggregates - Part 5: Determination of the water content by drying in a ventilated oven
EN 1097-6:2013	Tests for mechanical and physical properties of aggregates - Part 6: Determination of particle density and water absorption
EN 1097-7:2008	Tests for mechanical and physical properties of aggregates - Part 7: Determination of the particle density of filler - Pyknometer method
EN 1097-8:2009	Tests for mechanical and physical properties of aggregates - Part 8: Determination of the polished stone value
EN 1097-9:2014	Tests for mechanical and physical properties of aggregates - Part 9: Determination of the resistance to wear by abrasion from studded tyres - Nordic test
EN 1097-10:2014	Tests for mechanical and physical properties of aggregates - Part 10: Determination of water suction height
EN 1097-11:2013	Tests for mechanical and physical properties of aggregates - Part 11: Determination of compressibility and confined compressive strength of lightweight aggregates
EN 1367-1:2007	Tests for thermal and weathering properties of aggregates - Part 1: Determination of resistance to freezing and thawing
EN 1367-2:2009	Tests for thermal and weathering properties of aggregates - Part 2: Magnesium sulfate test
EN 1367-3:2001	Tests for thermal and weathering properties of aggregates - Part 3 : Boiling test for "Sonnenbrand basalt"
EN 1367-4:2008	Tests for thermal and weathering properties of aggregates - Part 4: Determination of drying shrinkage
EN 1367-5:2011	Tests for thermal and weathering properties of aggregates - Part 5: Determination of resistance to thermal shock
EN 1367-6:2008	Tests for thermal and weathering properties of aggregates - Part 6: Determination of resistance to freezing and thawing in the presence of salt (NaCl)
EN 1367-7:2014	Tests for thermal and weathering properties of aggregates - Part 7: Determination of resistance to freezing and thawing of Lightweight aggregates
EN 1367-8:2014	Tests for thermal and weathering properties of aggregates - Part 8: Determination of resistance to disintegration of Lightweight Aggregates
EN 1744-1:2009+A1:2012	Tests for chemical properties of aggregates - Part 1: Chemical analysis
EN 1744-3:2002	Tests for chemical properties of aggregates - Part 3: Preparation of eluates by leaching of aggregates
EN 1744-4:2005	Tests for chemical properties of aggregates - Part 4: Determination of water susceptibility of fillers for bituminous mixtures
EN 1744-5:2006	Tests for chemical properties of aggregates - Part 5: Determination of acid soluble chloride salts
EN 1744-6:2006	Tests for chemical properties of aggregates - Part 6: Determination of the influence of recycled aggregate extract on the initial setting time of cement
EN 1744-7:2012	Tests for chemical properties of aggregates - Part 7: Determination of loss of ignition of Municipal Incinerator Bottom Ash Aggregate (MIBA Aggregate)
EN 1744-8:2012	Tests for chemical properties of aggregates - Part 8: Sorting test to determine metal content of Municipal Incinerator Bottom Ash (MIBA) Aggregates
EN 13179-1:2013	Tests for filler aggregate used in bituminous mixtures - Part 1: Delta ring and ball test

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EN 13179-2:2000	Tests for filler aggregate used in bituminous mixtures - Part 2: Bitumen number
ISO 6274:1982	Concrete -- Sieve analysis of aggregates
ISO 6782:1982	Aggregates for concrete -- Determination of bulk density
ISO 6783:1982	Coarse aggregates for concrete -- Determination of particle density and water absorption -- Hydrostatic balance method
ISO 7033:1987	Fine and coarse aggregates for concrete -- Determination of the particle mass-per-volume and water absorption -- Pycnometer method
ISO 19595:2017	Natural aggregates for concrete

3.6.4 Work programme

Table 16 – Projects under development

Projects under development	
Reference	**Title**
prEN 12620	Aggregates for concrete
prEN 13043	Aggregates for bituminous mixtures and surface treatments for roads, airfields and other trafficked areas
prEN 13139	Aggregates for mortar
prEN 13242	Aggregates for unbound and hydraulically bound materials for use in civil engineering work and road construction
prEN 13383-1	Armourstone - Part 1: Specification
prEN 13383-2	Armourstone, Part 2: Test methods
prEN 13450	Aggregates for railway ballast
prEN 16236	Evaluation of conformity of aggregates - Initial Type Testing and Factory Production Control

3.6.5 Conclusions

CEN/TC 154 decided to formulate product standards based on the different end uses of aggregates, sharing common test methods. From this point of view, and for FISSAC interest, attention should be focused in EN 12620, where requirements for natural, manufactured and recycled aggregates for use in concrete are stablished. Worthy of mention is the note in the scope of the cited standard informing that all aggregates used in construction should comply with this standard, including recycled aggregates and materials from new and unfamiliar sources.

It should be noted that different product standards (EN 12620, EN 13043, EN 13055, 13139, EN 13242, EN 13450 & EN 13383) contain specifications for recycled aggregates, and new test methods are being developed for them. However, standardization on unfamiliar materials and from secondary sources is at a slower pace.

Many of the test method standards are referenced and supporting standards of the above harmonized standard, and therefore relevant for FISSAC project.

Concerning the use of EAF steel slag and glass waste as manufactured aggregates in concrete, the above mentioned standards and its revisions are of the most importance.

All product standards are under revision. Indeed they were all revised and newly published in 2013, although due to some errors in the standards, it was decided to withdraw the 2013 approved standards reactivating the 2002 versions. The process started again and a deeper revision than the expected at that very moment is taken place. The draft standards were expected to be published by 2017/2018 although some problems have arisen concerning

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amendments made (that would prevent the standards to be cited in the Official Journal) that need to be solved prior publication.

Standardization activities in the aggregates field are therefore focussed in the finalization of the above mentioned standards, the implementation of the CPR, and the incorporation of aspects like the release of dangerous substances or the Environmental Products Declarations.

In conclusion, with regard to the use of recycled aggregates from unfamiliar source, it is necessary to say that the existence of regulatory questions and other issues may restrict the extraction of aggregates in traditional areas thus creating greater demand for recycled aggregates and aggregates from currently unfamiliar sources. This, together with the political framework encouraging the use of secondary raw materials and the efficient use of natural resources within a context of circular economy promotion, has led to an increased awareness and necessity of definition of characteristics, via standardization, of these recycled and secondary aggregates. Recycling is a key issue in resource efficiency, an important aspect of sustainable construction, which is also part of the EU policies.

The aggregates industry is producing a growing percentage of secondary materials (including recycled, re-used and manufactured aggregates), demonstrating its commitment to the circular economy.

3.7 Plastics

3.7.1 Introduction

The scope of CEN/TC 249 is the standardization of terminology, test methods and specifications in the field of plastics and plastics-based materials, semi-finished products and products (thermoplastics, thermosets, cellular plastics, degradable plastics, thermoplastics elastomers, composites and reinforcement products for plastics) as well as plastics recycling. Rubber is excluded from the scope. Specific end-product related items are also excluded if they are covered by the scope of another existing product TC.

Several sectors are subject to regulatory compliance such as construction, packaging, food contact materials, electrotechnical devices, waste management. Considering the scope of this technical committee as well as other ones, CEN/TC 249 is principally concerned with the Construction Products Regulation (Regulation (EU) N°305/2011 of the European Parliament and of the Council of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC). There is no particular regulatory requirement as far as the technical standards related to test methods are concerned.

As standards under the scope of CEN/TC 249 do not deal with the chemical composition of plastics, REACH is only considered as guidelines in a responsible approach and sustainability of materials and products covered by the TC. Harmonised standards in the context of the CPR will need to address the release of dangerous substances, according to testing procedures set up by CEN/TC 351.

CEN/TC 249 develops its own documents (EN, CEN/TS and CEN/TR) and equally adopts standards developed by ISO/TC 61 (Plastics), thanks to an intensive usage of the Vienna Agreement in those fields where an added value for Europe has been identified.

It should be highlighted the activity of CEN/TC 249/WG13, specifically responsible for the standardization of wood plastics composites (WPC), and therefore of particular interest for FISSAC project.

At international level ISO/TC 61 "*Plastics*" is in charge of the standardization of nomenclature, methods of test, and specifications applicable to materials and products in the field of plastics. Equally, to note the activity of ISO/TC 61/SC11/WG11, where some projects on WPC are being developed.

3.7.2 Structure

CEN/TC 249 technical committee consists of the following active working groups where the current work programme is developed and where the published standards were prepared and are monitored for possible revisions.

Table 17 – Structure CEN/TC 249 – Subcommittees and Working Groups

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Structure CEN/TC 249 – Subcommittees and Working Groups	
Working Group	**Title**
CEN/TC 249/WG 11	Plastics recycling
CEN/TC 249/WG 12	Plastics jacketing
CEN/TC 249/WG 13	Wood Plastics Composites (WPC)
CEN/TC 249/WG 14	PVC-P swimming pool liners
CEN/TC 249/WG 15	Fibre-reinforced composites
CEN/TC 249/WG 16	Welding of thermoplastics
CEN/TC 249/WG 17	Biopolymers
CEN/TC 249/WG 19	Light exposure
CEN/TC 249/WG 20	Analytical methods for contaminants in recycled plastics
CEN/TC 249/WG 21	Profiles for windows and doors
CEN/TC 249/WG 22	Wallcovering panels for building applications
CEN/TC 249/WG 23	Fibre-reinforced composites - Pultruded rods
CEN/TC 249/WG 4	Decorative laminated sheets based on thermosetting resins
CEN/TC 249/WG 5	Thermoplastic profiles for building applications
CEN/TC 249/WG 7	Thermoplastic films for use in agriculture
CEN/TC 249/WG 8	Cellular plastics
CEN/TC 249/WG 9	Characterisation of degradability

The structure of ISO Committee is shown for information: SC1, Terminology; SC2 Mechanical behavior; SC4: Burning behavior; SC 5: Physical-chemical properties; SC6: Ageing, chemical and environmental resistance; SC9: Thermoplastics materials; SC10: Cellular plastics; SC11: Products; SC12: Thermosetting materials; SC 13: Composites and reinforcement fibres.

To note the standardization activities of ISO/TC 61/SC11/WG11 on Wood Plastics Composites.

3.7.3 Published standards

Table 18 – Published standards relevant to plastics

Published standards relevant to plastics (only from WGs 9, 11, 13, 15)	
Reference	**Title**
EN ISO 14851:2004	Determination of the ultimate aerobic biodegradability of plastic materials in an aqueous medium - Method by measuring the oxygen demand in a closed respirometer (ISO 14851:1999)
EN ISO 14852:2004	Determination of the ultimate aerobic biodegradability of plastic materials in an aqueous medium - Method by analysis of evolved carbon dioxide (ISO 14852:1999)
EN ISO 14855-1:2012	Determination of the ultimate aerobic biodegradability of plastic materials under controlled composting conditions - Method by analysis of evolved carbon dioxide - Part 1: General method (ISO 14855-1:2012)

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EN ISO 14855-2:2009	Determination of the ultimate aerobic biodegradability of plastic materials under controlled composting conditions - Method by analysis of evolved carbon dioxide - Part 2: Gravimetric measurement of carbon dioxide evolved in a laboratory-scale test (ISO 14855-2:2007, including Cor 1:2009)
EN ISO 17556:2012	Plastics - Determination of the ultimate aerobic biodegradability of plastic materials in soil by measuring the oxygen demand in a respirometer or the amount of carbon dioxide evolved (ISO 17556:2012)
TC 249/WG9	
EN 14995:2006	Plastics - Evaluation of compostability - Test scheme and specifications
EN 14987:2006	Plastics - Evaluation of disposability in waste water treatment plants - Test scheme for final acceptance and specifications
CEN/TR 15351:2006	Plastics - Guide for vocabulary in the field of degradable and biodegradable polymers and plastic items
CEN/TR 15822:2009	Plastics - Biodegradable plastics in or on soil - Recovery, disposal and related environmental issues
TC 249/WG11	
EN 15342:2007	Plastics - Recycled Plastics - Characterization of polystyrene (PS) recyclates
EN 15343:2007	Plastics - Recycled Plastics - Plastics recycling traceability and assessment of conformity and recycled content
EN 15344:2007	Plastics - Recycled Plastics - Characterisation of Polyethylene (PE) recyclates
EN 15345:2007	Plastics - Recycled Plastics - Characterisation of Polypropylene (PP) recyclates
EN 15346:2014	Plastics - Recycled plastics - Characterization of poly(vinyl chloride) (PVC) recyclates
EN 15347:2007	Plastics - Recycled Plastics - Characterisation of plastics wastes
EN 15348:2014	Plastics - Recycled plastics - Characterization of poly(ethylene terephthalate) (PET) recyclates
CEN/TR 15353:2007	Plastics - Recycled plastics - Guidelines for the development of standards for recycled plastics
CEN/TS 16010:2013	Plastics - Recycled plastics - Sampling procedures for testing plastics waste and recyclates
CEN/TS 16011:2013	Plastics - Recycled plastics - Sample preparation
TC 249/WG 13	
EN 15534-1:2014	Composites made from cellulose-based materials and thermoplastics (usually called wood-polymer composites (WPC) or natural fibre composites (NFC)) - Part 1: Test methods for characterisation of compounds and products
EN 15534-4:2014	Composites made from cellulose-based materials and thermoplastics (usually called wood-polymer composites (WPC) or natural fibre composites (NFC)) - Part 4: Specifications for decking profiles and tiles
EN 15534-5:2014	Composites made from cellulose-based materials and thermoplastics (usually called wood-polymer composites (WPC) or natural fibre composites (NFC)) - Part 5: Specifications for cladding profiles and tiles
EN 15534-6:2015	Composites made from cellulose-based materials and thermoplastics (usually called wood-polymer composites (WPC) or natural fibre composites (NFC)) - Part 6: Specifications for fencing profiles and elements

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TC 249/WG 15	
EN 16245-1:2013	Fibre-reinforced plastic composites - Declaration of raw material characteristics - Part 1: General requirements
EN 16245-2:2013	Fibre-reinforced plastic composites - Declaration of raw material characteristics - Part 2: Specific requirements for resin, curing systems, additives and modifiers
EN 16245-3:2013	Fibre-reinforced plastic composites - Declaration of raw material characteristics - Part 3: Specific requirements for fibre
EN 16245-4:2013	Fibre-reinforced plastic composites - Declaration of raw material characteristics - Part 4: Specific requirements for fabrics
EN 16245-5:2013	Fibre-reinforced plastic composites - Declaration of raw material characteristics - Part 5: Specific requirements for core materials

The published catalogue of this technical committee is very extensive and therefore only a selected number of published standards is shown in the above list. The selection has been made on the basis of its relation to the project and bearing in mind the workings groups considered of main interest for FISSAC project and where the listed standards have been developed.

At international level the catalogue on plastics is also very large, although no standards for WPC are published to date.

3.7.4 Work programme

Table 19 – Projects under development

Projects under development	
Reference	**Title**
TC249/WG 13	
EN 15534-1:2014/prA1	Composites made from cellulose-based materials and thermoplastics (usually called wood-polymer composites (WPC) or natural fibre composites (NFC)) - Part 1: Test methods for characterisation of compounds and products
EN 15534-6:2015/prA1	Composites made from cellulose-based materials and thermoplastics (usually called wood-polymer composites (WPC) or natural fibre composites (NFC)) - Part 6: Specifications for fencing profiles and elements
FprCEN/TS 17158	Composites made from cellulose based materials and thermoplastics (usually called wood polymer composites (WPC) or natural fibre composites (NFC)) - Determination of particle size of lignocellosic material
CEN/TC 249/WG9	
prEN ISO 14855-2 rev	Determination of the ultimate aerobic biodegradability of plastic materials under controlled composting conditions - Method by analysis of evolved carbon dioxide - Part 2: Gravimetric measurement of carbon dioxide evolved in a laboratory-scale test

As indicated for the published standards, the work programme included relates to the working groups mainly connected and linked to the project.

3.7.5 Conclusions

A significant part of the work programme addresses items having a direct link with the environment, in terms of waste management and saving of resources: characterisation of degradability, in particular biodegradability, recycling of plastics, bio-based polymers, composite materials…

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Bearing in mind the continuous evolution and improvement of polymers and plastics, for example better intrinsic properties achieved by the production of new technologies, better mechanical or environmental performances by plastic-based composites, lower carbon footprint thanks to recycling, extended shelf-life, it is expected that adequate and economical test methods are necessary to assess relevant properties in relation to the target applications. Therefore, new standards addressing these needs are envisaged.

Among its strategy, and generally speaking, CEN/TC 249 is open to start any discussion about new areas for standardisation in the field of plastics, which can constitute an opportunity to new products not yet standardized in the field of wood plastics composites.

As stated before, for FISSAC project, worthy to note the activities of CEN/TC 249/WG13 on Wood Plastics Composites (WPC). FISSAC member, ECODEK, is participating in the WG through its National Standardization Body (BSI). As it has been shown in published standards list, 4 standards are published on the matter and some projects are now underway.

- EN 15534-1:2014/prA1 : After CEN Enquiry process, publication is expected soon.
- EN 15534-6:2014/prA1 : After CEN Enquiry process, publication is expected soon.
- FprCEN/TS 17158: Final approval vote will take place from August 2017 till November 2017.
- EN 15534-2 (on characterisation of compounds): although not registered in the work programme, revision of current standard is envisaged. Prenormative tests and round robin tests need to carried out.
- EN 15534-5 (on cladding profiles): actions are being taken for its conversion in an harmonized standard through the proper modification of the answer to the corresponding mandate.

At ISO level, it is worth stressing ISO/DIS 20819 project on product specification for wood plastic recycled composites, under vote until 2017-07-26.

3.8 Materials obtained from End-of-Life Tyres (ELT)

3.8.1 Introduction

The aim of CEN/TC 366 is the standardisation of the materials produced from end-of-life tyre treatment (e.g. cuts, shreds, chips, granulates, powders, steels, textiles) including developing standards for certain physical characteristics of the materials produced from ELTs, developing standards for certain composition characteristics of the materials produced from ELTs as well as determination of general properties of whole tyres as required for subsequent ELTs processing.

3.8.2 Structure

CEN/TC 366 technical committee consists of the following active working groups where the current work programme is developed and where the published standards were prepared and are monitored for possible revisions.

Table 20 – Structure CEN/TC 366 – Subcommittees and Working Groups

Structure CEN/TC 366 – Subcommittees and Working Groups	
Working Group	**Title**
CEN/TC 366/WG 1	Validation of CEN/TS 14243
CEN/TC 366/WG 2	Physical characteristics
CEN/TC 366/WG 3	Composition characteristics
CEN/TC 366/WG 4	General properties of whole ELTs

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3.8.3 Published standards

Table 21 – Published standards

Published standards relevant rubber tyres	
Reference	**Title**
CEN/TS 14243:2010	Materials produced from end of life tyres - Specification of categories based on their dimension(s) and impurities and methods for determining their dimension(s) and impurities
CEN/TS 16916:2016	Materials obtained from End of Life Tyres - Determination of specific requirements for sampling and determination of moisture content using the oven-dry method
CEN/TS 17045:2017	Materials obtained from end of life tyres - Quality criteria for the selection of whole tyres, for recovery and recycling processes

3.8.4 Work programme

Table 22 – Projects under development

Projects under development	
Reference	**Title**
	Materials obtained from end of life tyres - Sampling method for granulates and powders stored in big-bags
prEN 14243-1	Materials obtained from end of life tyres - Part 1 - General definitions related to the methods for determining their dimension(s) and impurities
prEN 14243-2	Materials obtained from end of life tyres - Part 2 - Granulates and powders - Methods for determining their dimension(s) and impurities, including free steel and free textile content
prEN 14243-3	Materials obtained from end of life tyres - Part 3: Shreds, cuts and chips - Methods for determining their dimension(s) including protruding filaments dimensions.
	Material derived from End-of-Life tyres — Granulate and powders — Elastomers identification: Gas-chromatography and mass-spectrometric detection of pyrolysis products in solution
	Materials obtained from end of life tyres (ELTs) - Determination of the true density of granulates - Method based on water pycnometry
	Materials obtained from End of Life Tyres — Steel wires – Determination of the non-metallic content

3.8.5 Conclusions

The so called end-of-life tyres is a kind of waste that is being used and valorized through different applications. Not only as alternative fuel in intensive industries like cement plants or energy generating stations, but as alternative material in bituminous mixtures, some types of pavements made of ceramics, embankments or some linings and geotextiles…are some examples.

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The use of this waste is the subject of many ongoing research projects, trying to demonstrate the validity of this product in different applications, as in wood plastics composites.

3.9 Natural Stones

3.9.1 Introduction

The aim of CEN/TC 246 is the standardization of definitions, requirements and test methods for natural stones relating to rough blocks, slabs, semi-finished and finished products intended for use in building and for monuments with the exception of items in the field of work covered by other Technical Committees. One of its groups (the WG 4 - JWG 229/246) covers the agglomerated stones for floor coverings, wall coverings and ancillary uses, for interior and exterior use, with resin or cement binders or a combination of the two and does not cover pressed tiles such as terrazzo tiles or natural stone which are the territory of other groups.

As in some other cases, legal context governing the market and the TC 246 activities is the Construction Product Regulation (CPR). TC 246 being one of several CEN technical committees involved in the preparation of standards technical specifications supporting the cited regulation.

At international level, the ISO related committee is inactive.

3.9.2 Structure

CEN/TC 246 technical committee consists of the following active working groups where the current work programme is developed and where the published standards were prepared and are monitored for possible revisions

Table 23 – Structure CEN/TC 246 – Subcommittees and Working Groups

Structure CEN/TC 246 – Subcommittees and Working Groups	
Working Group	**Title**
CEN/TC 246/WG 1	Terminology, classification and characteristics
CEN/TC 246/WG 2	Test methods
CEN/TC 246/WG 3	Product specifications
CEN/TC 246/WG 4	Agglomerated stones (JWG 229/246)

The organisation of the work of TC 246 has been established following a simple criterion: WG1 was given the task of preparing standards on terminology, classification and characteristics of natural stones; WG2 was charged with test methods and WG 3 has published 6 product standards and is currently revising those 3 standards dealing with CE marking.

3.9.3 Published standards

As stated in the introduction, where the scope of this technical committee is described, activities of this group are devoted to the standardization of semi and finished products of natural stone (and agglomerated as well), particularly related to requirements and test methods for the determination of the several characteristics: flexural strength, frost resistance, geometric characteristics, water absorption, slip resistance, abrasion resistance…are only some of the properties determined.
From the point of view of FISSAC interest, standards published are not considered relevant for its purpose.

3.9.4 Work programme

Projects under development cover the ongoing reviews of some of the published standards (e.g petrographic examination, terminology, determination of abrasion resistance, geometric characteristics, linear thermal expansion coefficient etc). As commented before, they are not considered relevant for FISSAC objectives.

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3.9.5 Conclusions

Within this technical committee CEN/TC 246 there is a general strategy related to environmental aspects that take notice of the social and market concerns on recycling etc.

Therefore, the technical committee is committed to work to promote the sustainable use of natural stones understanding the environmental impact of entire life-cycle. Construction works must be designed and built in such a way that they will satisfy also the basic requirement of sustainability. In this way, TC246 and JWC 229/246, as stated in its business plan, will work in order to provide a common tool for environmental policies and business decision taking into account the following:

- Quarry life cycle. Sustainable development must be integrated in the design and management over the life cycle of quarry from exploration to post closure.

- Asset life cycle. Optimization in terms of sustainable development performance of the manufacturing facility.

- Product life cycle. The product's full life cycle, from the extraction of resources, through production, use, and recycling, up to the disposal of remaining waste and consequences of products on economies, environment and social systems.

The latter, may constitute a logical connection between the TC 246 activities and possible proposals coming from FISSAC project related to waste or recycling of natural stone products (resulting from manufacturing processes…).

3.10 Aluminium

3.10.1 Introduction

The scope of CEN/TC 132 is the standardization in the field of unwrought, wrought and cast products made from aluminium and aluminium alloys, particularly questions related to designations, terms and definitions, material specifications, technical conditions of delivery, dimensions and tolerances and methods of testing specific to aluminium.

The works of CEN/TC 132 support the removement of technical barriers to trade and open markets thoughout Europe by providing requirements, material specifications, technical data and test procedures.

The development of European standards also remove national barriers based on national standards. It also supports the European regulations in the different sectors where aluminium and its alloys are applied.

Standards on aluminium provides support to the following Directives:

- Pressure Equipement Directive 97/23/EC (P.E.D.);
- Construction Products Regulation 305/2011 C.P.R.).

At international level, the ISO/TC 79 " *Light metals and their alloys*" standardize in the field of aluminium and its alloys and aluminium ores.

3.10.2 Structure

CEN/TC 132 technical committee consists of the following active working groups where the current work programme is developed and where the published standards were prepared and are monitored for possible revisions

Table 24 – Structure CEN/TC 132 – Subcommittees and Working Groups

Structure CEN/TC 132 – Subcommittees and Working Groups	
Working Group	**Title**

Project funded by the European Union's Horizon 2020 research and innovation programme under grant agreement Nº 642154.

CEN/TC 132/WG 14	General support
CEN/TC 132/WG 16	Aluminium alloys for marine applications (shipbuilding, marine and offshore structure)
CEN/TC 132/WG 22	Revision of EN 1559-4:1999
CEN/TC 132/WG 23	Revision of EN 1676 and EN 1706
CEN/TC 132/WG 5	Extruded and drawn products
CEN/TC 132/WG 7	Sheets, strips and plates
CEN/TC 132/WG 9	Aluminium and aluminium alloys cast and wrought products in contact with food

3.10.3 Published standards

Table 25 – Published standards relevant to aluminium

Published standards relevant to aluminium and aluminium alloys	
Reference	**Title**
EN 12258-1:2012	Aluminium and aluminium alloys - Terms and definitions - Part 1: General terms
EN 12258-2:2004	Aluminium and aluminium alloys - Terms and definitions - Part 2: Chemical analysis
EN 12258-3:2003	Aluminium and aluminium alloys - Terms and definitions - Part 3: Scrap
EN 12258-4:2004	Aluminium and aluminium alloys - Terms and definitions - Part 4: Residues of the aluminium industry
EN 13920-1:2003	Aluminium and aluminium alloys - Scrap - Part 1: General requirements, sampling and tests
EN 13920-2:2003	Aluminium and aluminium alloys - Scrap - Part 2: Unalloyed aluminium scrap
EN 13920-3:2003	Aluminium and aluminium alloys - Scrap - Part 3: Wire and cable scrap
EN 13920-4:2003	Aluminium and aluminium alloys - Scrap - Part 4: Scrap consisting of one single wrought alloy
EN 13920-5:2003	Aluminium and aluminium alloys - Scrap - Part 5: Scrap consisting of two or more wrought alloys of the same series
EN 13920-6:2003	Aluminium and aluminium alloys - Scrap - Part 6: Scrap consisting of two or more wrought alloys
EN 13920-7:2003	Aluminium and aluminium alloys - Scrap - Part 7: Scrap consisting of castings
EN 13920-8:2003	Aluminium and aluminium alloys - Scrap - Part 8: Scrap consisting of non-ferrous materials from shredding processes destined to aluminium separation processes
EN 13920-9:2003	Aluminium and aluminium alloys - Scrap - Part 9: Scrap from aluminium separation processes of non-ferrous shredded materials
EN 13920-10:2003	Aluminium and aluminium alloys - Scrap - Part 10: Scrap consisting of used aluminium beverage cans
EN 13920-11:2003	Aluminium and aluminium alloys - Scrap - Part 11: Scrap consisting of aluminium-copper radiators
EN 13920-12:2003	Aluminium and aluminium alloys - Scrap - Part 12: Turnings consisting of one single alloy
EN 13920-13:2003	Aluminium and aluminium alloys - Scrap - Part 13: Mixed turnings consisting of two or more alloys
EN 13920-14:2003	Aluminium and aluminium alloys - Scrap - Part 14: Scrap from post-consumer aluminium packagings
EN 13920-15:2003	Aluminium and aluminium alloys - Scrap - Part 15: Decoated aluminium scrap from post-consumer aluminium packagings
EN 13920-16:2003	Aluminium and aluminium alloys - Scrap - Part 16: Scrap consisting of skimmings, drosses, spills and metallics

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EN 14242:2004	Aluminium and aluminium alloys - Chemical analysis - Inductively coupled plasma optical emission spectral analysis
EN 14361:2004	Aluminium and aluminium alloys - Chemical analysis - Sampling from metal melts
EN 14726:2005	Aluminium and aluminium alloys - Chemical analysis - Guideline for spark optical emission spectrometric analysis
EN 15530:2008	Aluminium and aluminium alloys - Environmental aspects of aluminium products - General guidelines for their inclusion in standards
EN 1676:2010	Aluminium and aluminium alloys - Alloyed ingots for remelting - Specifications
EN 1706:2010	Aluminium and aluminium alloys - Castings - Chemical composition and mechanical properties
EN 1780-1:2002	Aluminium and aluminium alloys - Designation of alloyed aluminium ingots for remelting, master alloys and castings - Part 1: Numerical designation system
EN 1780-2:2002	Aluminium and aluminium alloys - Designation of alloyed aluminium ingots for remelting, master alloys and castings - Part 2: Chemical symbol based designation system
EN 1780-3:2002	Aluminium and aluminium alloys - Designation of alloyed aluminium ingots for remelting, master alloys and castings - Part 3: Writing rules for chemical composition
EN 575:1995	Aluminium and aluminium alloys - Master alloys produced by melting - Specifications
EN 576:2003	Aluminium and aluminium alloys - Unalloyed aluminium ingots for remelting - Specifications
EN 577:1995	Aluminium and aluminium alloys - Liquid metal - Specifications
ISO 115:2003	Unalloyed aluminium ingots for remelting -- Classification and composition
ISO 6361-5:2011	Wrought aluminium and aluminium alloys -- Sheets, strips and plates -- Part 5: Chemical composition
ISO 6362-7:2014	Wrought aluminium and aluminium alloys -- Extruded rods/bars, tubes and profiles -- Part 7: Chemical composition
ISO 3522:2007	Aluminium and aluminium alloys -- Castings -- Chemical composition and mechanical properties
ISO 17615	Aluminium and aluminium alloys -- Alloyed ingots for remelting -- Specifications

The list above refers to standards considered relevant or of interest for FISSAC project, although the whole pack of standards developed by TC 132 (and ISO/TC 79) include several specifications defining issues for particular aluminium applications such as requirements of wrought and products for pressure equipment, drawn wire, for marine applications, for extruded tubes, for sheet and strips, for products intended in structural railway applications, products for packaging, for use in contact with foodstuff, for forging and anodizing of aluminium and its alloys, among others. These particular standards are not included in the above list.

3.10.4 Work programme

Projects under development cover aspects not related to FISSAC scope (structural products for construction works, anodizing of aluminium and its alloys, mechanical properties od sheets, strips and plates…), and therefore they are not listed.

3.10.5 Conclusions

As explained in some other FISSAC deliverables, aluminium oxides materials from aluminium recovering and recycling processes, are capable of being used as raw material for industries like cement, ceramics, mineral wool, abrasives, plastic or glass. For FISSAC objectives, aluminium oxides recovered from salt slags will be utilized as a source of raw material for cement kilns, and also as a source of alumina in ceramics industry.

Since 1988, more than 130 standards of CEN/TC 132 have been published. Although CEN/TC 132 is mainly devoted to the maintenance of these standards rather than to the creation of new standards, needs of the market and new products and new applications of aluminium products may be of interest of CEN/TC 132.

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No need for standardization has been detected for the time being.

3.11 Sustainability of construction works

3.11.1 Introduction

European standards on "Sustainability in building works" have been developed by CEN/TC 350 "*Sustainability of construction works*" under the Mandate of the European Commission M/350 "Development of horizontal standardised methods for the assessment of the integrated environmental performance of buildings". This committee is responsible for the development of voluntary horizontal standardised methods for the assessment of the sustainability aspects of new and existing construction works and for standards for the environmental product declaration of construction products. Its standards will be generally applicable (horizontal) and relevant for the assessment of integrated performance of buildings and construction works over its life cycle.

Related to this sustainability concept, the construction sector, and the performance of the assets it creates, will play a key role in the effective delivery many of the European Commission's policies, these include, among others:

• COM(2012) 433 Strategy for the sustainable competitiveness of the construction sector and its enterprises.

• COM(2012) 582 A Stronger European Industry for Growth and Economic Recovery.

• COM(2011) 571 Roadmap to a resource-efficient Europe.

• COM(2011) 855 Energy Roadmap 2050.

• COM(2011) 112 Roadmap for moving to a competitive low carbon economy 2050.

• COM(2013) 196 (EC Proposal for) Building the Single Market for Green Products - Facilitating better information on the environmental performance of products and organizations.

At the international level, ISO/TC 59/SC 17 "*Sustainability in buildings and civil engineering works*" is responsible for the Standardization in the field of buildings and civil engineering works of general rules for performance requirements, including functional and user requirements related to service life, sustainability, accessibility and usability, as well as general rules and guidelines for addressing the economic, environmental and social impacts and aspects related to sustainable development.

Another ISO/TC related is ISO/TC 207 on *Environmental management*, in charge of the standardization in the field of environmental management systems and tools in support of sustainable development. The most interesting subcommittees considering FISSAC purpose are SC3, on environmental labelling, SC4 on environmental performance evaluation, and SC5 on life cycle assessment. Relevant standards are listed in the corresponding tables.

3.11.2 Structure

CEN/TC 350 technical committee consists of the following active working groups where the current work programme is developed and where the published standards were prepared and are monitored for possible revisions.

Table 26 – Structure CEN/TC 350 – Subcommittees and Working Groups

Structure CEN/TC 350 – Subcommittees and Working Groups	
Working Group	**Title**
CEN/TC 350/WG 1	Environmental performance of buildings
CEN/TC 350/WG 3	Products Level
CEN/TC 350/WG 5	Social performance assessment of building
CEN/TC 350/WG 6	Civil Engineering works
CEN/TC 350/WG 7	Framework and Coordination
CEN/TC 350/WG 8	Sustainable refurbishment

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3.11.3 Published standards

Table 27 – Published standards relevant to sustainability

Published standards relevant to sustainability	
Reference	**Title**
CEN/TC350	
EN 15643-1:2010	Sustainability of construction works - Sustainability assessment of buildings - Part 1: General framework
EN 15643-2:2011	Sustainability of construction works - Assessment of buildings - Part 2: Framework for the assessment of environmental performance
EN 15643-3:2012	Sustainability of construction works - Assessment of buildings - Part 3: Framework for the assessment of social performance
EN 15643-4:2012	Sustainability of construction works - Assessment of buildings - Part 4: Framework for the assessment of economic performance
EN 15978:2011	Sustainability of construction works - Assessment of environmental performance of buildings - Calculation method
EN 16627:2015	Sustainability of construction works - Assessment of economic performance of buildings - Calculation methods
CEN/TR 15941:2010	Sustainability of construction works - Environmental product declarations - Methodology for selection and use of generic data
EN 15804:2012+A1:2013	Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
CEN/TR 16970:2016	Sustainability of construction works - Guidance for the implementation of EN 15804
CEN/TR 17005:2016	Sustainability of construction works - Additional environmental impact categories and indicators - Background information and possibilities - Evaluation of the possibility of adding environmental impact categories and related indicators and calculation methods for the assessment of the environmental performance of buildings
EN 16309:2014+A1:2014	Sustainability of construction works - Assessment of social performance of buildings - Calculation methodology
ISO/TC 59/SC17	
ISO/TS 12720:2014	Sustainability in buildings and civil engineering works – Guidelines on the application of the general principles in ISO 15392
ISO 15392:2008	Sustainability in building construction – General principles
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
ISO 16745-2:2017	Sustainability in buildings and civil engineering works -- Carbon metric of an existing building during use stage -- Part 2: Verification
ISO 21929-1:2011	Sustainability in building construction – Sustainability indicators – Part 1: Framework for the development of indicators and a core set of indicators for buildings
ISO/TS 21929-2:2015	Sustainability in building construction – Sustainability indicators – Part 2: Framework for the development of indicators for civil engineering works
ISO 21930:2017	Sustainability in buildings and civil engineering works -- Core rules for environmental product declarations of construction products and services
ISO 21931-1:2010	Sustainability in building construction – Framework for methods of assessment of the environmental performance of construction works – Part 1: Buildings
ISO/TR 21932:2013	Sustainability in buildings and civil engineering works – A review of terminology
ISO/TC 207/SC3	
ISO 14020:2000	Environmental labels and declarations -- General principles

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ISO 14021:2016	Environmental labels and declarations -- Self-declared environmental claims (Type II environmental labelling)
ISO 14024:1999	Environmental labels and declarations -- Type I environmental labelling -- Principles and procedures
ISO 14025:2006	Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures
ISO/TS 14027:2017	Environmental labels and declarations -- Development of product category rules
ISO/TC 207/SC4	
ISO 14031:2013	Environmental management -- Environmental performance evaluation -- Guidelines
ISO/TS 14033:2012	Environmental management -- Quantitative environmental information -- Guidelines and examples
ISO 14034:2016	Environmental management -- Environmental technology verification (ETV)
ISO 14063:2006	Environmental management -- Environmental communication -- Guidelines and examples
ISO/TC 207/SC5	
ISO 14040:2006	Environmental management -- Life cycle assessment -- Principles and framework
ISO 14044:2006	Environmental management -- Life cycle assessment -- Requirements and guidelines
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

3.11.4 Work programme

Table 28 – Projects under development

Projects under development	
Reference	**Title**
CEN/TC 350	
prEN 15643-5	Sustainability of construction works - Sustainability assessment of buildings and civil engineering works - Part 5: Framework for the assessment of sustainability performance of civil engineering works
EN 15804:2012+A1:2013/prA2	Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
ISO/TC 59/SC17	
ISO/CD 15392	Sustainability in building construction -- General principles
ISO/CD 20887	Design for Disassembly and Adaptability of Buildings

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ISO/NP 21678	Sustainability in buildings and civil engineering works -- Methodological principles for the development of benchmarks for sustainable buildings
ISO/WD TS 21929-2	Sustainability in building construction -- Sustainability indicators -- Part 2: Framework for the development of indicators for civil engineering works
ISO/DIS 21931-2	Sustainability in building construction -- Framework for methods of assessment of the environmental performance of construction works -- Part 2: Civil engineering works
ISO/TC 207/SC3	
ISO/DIS 14024	Environmental labels and declarations -- Type I environmental labelling -- Principles and procedures
ISO/FDIS 14026	Environmental labels and declarations -- Principles and procedures for communication of footprint information
ISO/TC 207/SC4	
ISO/AWI 14033	Environmental management -- Quantitative environmental information -- Guidelines and examples
ISO/CD 14063	Environmental management -- Environmental communication -- Guidelines and examples
ISO/TC 207/SC5	
ISO 14044:2006/D Amd 1	Environmental management -- Life cycle assessment -- Requirements and guidelines

3.11.5 Conclusions

Although the overall objective of the CEN/TC 350 is to develop common rules for the assessment of sustainability performance of buildings and civil engineering works in the environmental, social and economic performance enabling the use of consistent information in the assessments in order to have robust and reliable results, the first step was to develop common rules for the development of Environmental Product Declarations for the product category of construction products and at the same time for the assessment of the environmental performance of new and existing buildings within the framework of integrated performance of buildings.

Therefore, general objectives of this technical committee, concerning construction products, can be summarized as follows:

- provide structured format for the product information and the methodology so that it can be applied to the assessment of construction works;
- provide quantified information supporting industry in its process development, product development and innovation;
- provide guidance to industry in the communication across the supply chain;
- allow industry to demonstrate compliance with emerging regulations and policies;
- provide consistent information applicable in software developments, e.g. Building Information Model, BIM;

The published standard of this technical committee more relevant for construction products could be EN 15804:2012 *Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.* This European standard provides core product category rules (PCR) for Type III environmental declarations for any construction product and construction service. The core PCR defines the horizontal rules for calculating the Life Cycle Inventory and the Life Cycle Impact Assessment underlying the EPD, including the specification of the data quality to be applied and the horizontal rules for the development of scenarios and processes to be included in the life cycle stages. The core PCR also defines the parameters to be declared (environmental indicators) and the way in which they are collated and reported.

Other product related standards/projects are the following:

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- CEN/TR 16970 *Sustainability of construction works - Guidance for the implementation of EN 15804.* . It provides guidance for the use of EN 15804 when the CEN product committees are developing PCR documents for specific product groups and it gives guidance for the EPD program operators.

- EN 15942 *Sustainability of construction works – Environmental product declarations – Communication format business-to-business* . It specifies and describes the communication format for the information defined in EN 15804 for business-to-business communication to ensure a common understanding through consistent communication of information.

- CEN/TR 15941 *Sustainability of construction works – Environmental product declarations – Methodology and selection for use of generic data*. This technical report describes the sources and methodology to be used when preparing generic data for environmental product declarations.

- WI XXXXXX (Expected)- *Sustainability of construction works – Environmental product declarations – Communication format business-to-consumer*. It specifies and describes the communication format for the information defined in EN 15804 for business-to-consumer communication to ensure a common understanding through consistent communication of information.

The original mandate issued by the Commission has been amended, with the purpose to align the work developed by CEN under mandate M/350 and the methodological requirements included in the Product Environmental Footprint method as foreseen to be developed by the Commission with Recommendation (2013/179/EU) on 9 April 2013 and evaluated in pilot projects for certain construction products in 2014-2016.

To this respect, CEN/TC 350 is working on the amendment of EN 15804 (see work programme above) to include necessary amendments in the standard.

3.12 Assessment of release of dangerous substances

3.12.1 Introduction

CEN/TC 351 is an horizontal technical committee devoted to the development of horizontal standardized assessment methods for harmonized approaches relating to the release (and/or the content when this is practicable or legally required solution) of regulated dangerous substances under the Construction Products Regulation (CPR) taking into account the intended conditions of use of the product. It addresses emission to indoor air, and release to soil, surface water and ground water.

3.12.2 Structure

CEN/TC 351 technical committee consists of the following active working groups where the current work programme is developed and where the published standards were prepared and are monitored for possible revisions.

Table 29 – Structure CEN/TC 351 – Subcommittees and Working Groups

Structure CEN/TC 351 – Subcommittees and Working Groups	
Working Group	**Title**
CEN/TC 351/WG 1	Release from construction products into soil, ground water and surface water
CEN/TC 351/WG 2	Emissions from construction products into indoor air
CEN/TC 351/WG 3	Radiation from construction products
CEN/TC 351/WG 4	Terminology
CEN/TC 351/WG 5	Content and eluate analysis in construction products

3.12.3 Published standards

Table 30 – Published standards relevant to release of dangerous substances

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Published standards relevant to release of dangerous substances	
Reference	**Title**
CEN/TR 15858:2009	Construction products - Assessment of the release of regulated dangerous substances from construction products based on the WT, WFT/FT procedures
CEN/TR 15855:2009	Construction products - Assessment of release of dangerous substances - Barriers to trade
CEN/TR 16098:2010	Construction products: Assessment of release of dangerous substances - Concept of horizontal testing procedures in support of requirements under the CPD
CEN/TR 16496:2013	Construction Products - Assessment of release of dangerous substances - Use of harmonised horizontal assessment methods
CEN/TS 16516:2013	Construction products - Assessment of release of dangerous substances - Determination of emissions into indoor air
CEN/TR 16045:2010	Construction Products - Assessment of release of dangerous substances - Content of regulated dangerous substances - Selection of analytical methods
CEN/TS 16637-1:2014	Construction products - Assessment of release of dangerous substances - Part 1: Guidance for the determination of leaching tests and additional testing steps
CEN/TS 16637-2:2014	Construction products - Assessment of release of dangerous substances - Part 2: Horizontal dynamic surface leaching test
CEN/TS 16637-3:2016	Construction products - Assessment of release of dangerous substances - Part 3: Horizontal up-flow percolation test
CEN/TR 16220:2011	Construction products - Assessment of release of dangerous substances - Complement to sampling
EN 16687:2015	Construction products - Assessment of release of dangerous substances - Terminology
CEN/TR 16410:2012	Construction products - Assessment of release of dangerous substances - Barriers to use - Extension to CEN/TR 15855 Barriers to trade
CEN/TR 16797-1:2015	Construction products: Assessment of release of dangerous substances - Guidance on the statistical assessment of declared values - Part 1: Principles and rules of application
CEN/TR 16797-2:2015	Construction products: Assessment of release of dangerous substances - Guidance on the statistical assessment of declared values - Part 2: Technical and statistical background
CEN/TR 17105:2017	Construction products - Assessment of release of dangerous substances - Guidance on the use of ecotoxicity tests applied to construction products
EN 16516:2017	Construction products: Assessment of release of dangerous substances - Determination of emissions into indoor air

3.12.4 Work programme

Table 31 – Projects under development

Projects under development	
Reference	**Title**
	Construction products - Assessment of release of dangerous substances - Guidance on evaluation of conformity
	Construction products - Assessment of release of dangerous substances - Determination of the activity concentrations of 226Ra, 232Th and 40K using gamma-ray spectrometry

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prCEN/TS	Construction Products - Assessment of release of dangerous substances - Analysis of inorganic substances in eluates
prCEN/TS	Construction products - Assessment of release of dangerous substances - Digestion of construction products by aqua regia
prCEN/TS	Construction products - Assessment of release of dangerous substances - Analysis of inorganic substances in digests and eluates - Part 1: Analysis by Inductive Coupled Plasma - Optical Emission Spectrometry (ICP-OES)
prCEN/TS	Construction products - Assessment of release of dangerous substances - Analysis of major, minor and trace elements in digests and eluates by Inductively Coupled Plasma - Mass Spectrometry (ICP-MS)
prCEN/TR 17113	Construction products - Assessment of release of dangerous substances - Determination of dose assessment and classification for emitted gamma radiation
prCEN/TS	Construction products - Assessment of release of dangerous substances - Analysis of content of inorganic substances
prCEN/TS	Construction products - Assessment of release of dangerous substances - Content of non-volatile organic substances - Methods for extraction and analysis
prCEN/TS	Construction products - Assessment of release of dangerous substances - Analysis of non-volatile organic substances in eluates
prEN 17087	Construction products - Assessment of release of dangerous substances - Preparation of test portions from the laboratory sample for testing of release and analysis of content
prCEN/TS 16637-1 rev	Construction products: Assessment of release of dangerous substances - Part 1: Guidance for the determination of leaching tests and additional testing steps
	Construction products: Assessment of release of dangerous substances - Determination of emissions of ammonia from cellulose insulation products at 90% RH

3.12.5 Conclusions

Several substances are classified as dangerous to the environment and human health. Moreover, from a viewpoint of precaution, some national legislations require thorough studies before new materials or products that contain these substances are introduced in the market. A database with national regulations is available indicating the banned and regulated dangerous substances that have priority in respect of ER3 of the CPR. From this point of view, the work of CEN/TC 351 is dependent on the European Commission deciding on a list of priority substances and parameters.

The release of dangerous substances from construction products in their working life needs to be quantified. And this is the work of CEN/TC 351, which under the premises of M 366 from the Commission, is developing common harmonized language between stakeholders in the field of emission and release of dangerous substances.

Many of the product standards include, or will do in the future revisions, clauses related to dangerous substances based on TC 351 standards.Therefore, special attention is needed on TC 351 activities.

3.13 Characterization of waste

3.13.1 Introduction

The general scope of CEN/TC 292 is to develop and provide standards that describe procedures to determine the characteristics of waste, including raw wastes and waste behaviour. This includes sampling, pretreatment, leaching properties, determination of total content of species, determination of sum parameters, assessment of ecotoxicity, proposition of test reports and subsequent terminology. Setting of limit values, specification of products and processes, radioactive waste, exhaust gases, waste water, explosives and animal carcasses are excluded from the

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scope of CEN/TC 292, since this is a responsibility of member governments.

The activities in CEN/TC 292 have to a large extent been driven by requirements for harmonized approaches in light of EU-legislation in the field of waste. In this sense, CEN/TC 292 supports European waste legislation by developing standards in relation to the Landfill Directive (EC Mandate M/326) and the Mining waste Directive (EC mandate M/395).

3.13.2 Structure

CEN/TC 292 technical committee consists of the following active working groups where the current work programme is developed and where the published standards were prepared and are monitored for possible revisions.

Table 32 – Structure CEN/TC 292 – Subcommittees and Working Groups

Structure CEN/TC292– Subcommittees and Working Groups	
Subcommittee/Working Group	**Title**
CEN/TC 292/WG 1	Sampling techniques for waste
CEN/TC 292/WG 2	Leaching test procedures
CEN/TC 292/WG 3	Analysis and digestion methods
CEN/TC 292/WG 4	Terminology
CEN/TC 292/WG 5	Analysis of waste. Selected groups parameters
CEN/TC 292/WG 6	Leaching tests
CEN/TC 292/WG 7	Characterization of waste - Ecotoxicological properties
CEN/TC 292/WG 8	Wastes from the extractive industry

Note: All these WGs are disbanded at present.

3.13.3 Published standards

Table 33 – Published standards

Published standards relevant to characterization of waste	
Reference	**Title**
EN 14899:2005	Characterization of waste - Sampling of waste materials - Framework for the preparation and application of a Sampling Plan
CEN/TR 15310-1:2006	Characterization of waste - Sampling of waste materials - Part 1: Guidance on selection and application of criteria for sampling under various conditions
CEN/TR 15310-2:2006	Characterization of waste - Sampling of waste materials - Part 2: Guidance on sampling techniques
CEN/TR 15310-3:2006	Characterization of waste - Sampling of waste materials - Part 3: Guidance on procedures for sub-sampling in the field
CEN/TR 15310-4:2006	Characterization of waste - Sampling of waste materials - Part 4: Guidance on procedures for sample packaging, storage, preservation, transport and delivery
CEN/TR 15310-5:2006	Characterization of waste - Sampling of waste materials - Part 5: Guidance on the process of defining the sampling plan

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EN 16457:2014	Characterization of waste - Framework for the preparation and application of a testing programme - Objectives, planning and report
EN 15875:2011	Characterization of waste - Static test for determination of acid potential and neutralisation potential of sulfidic waste
CEN/TR 16130:2011	Characterization of waste - On-site verification
CEN/TR 16363:2012	Characterization of waste - Kinetic testing for assessing acid generation potential of sulfidic waste from extractive industries
CEN/TR 16376:2012	Characterization of waste - Overall guidance document for characterization of waste from the extractive industries
CEN/TS 16229:2011	Characterization of waste - Sampling and analysis of weak acid dissociable cyanide discharged into tailings ponds
CEN/TR 16365:2012	Characterization of waste - Sampling of waste from extractive industries
EN 13965-2:2010	Characterization of waste - Terminology - Part 2: Management related terms and definitions
EN 15875:2011/AC:2012	Characterization of waste - Static test for determination of acid potential and neutralisation potential of sulfidic waste

3.13.4 Work programme

There are no active work items registered at the moment of preparing this document.

3.13.5 Conclusions

Standards under this committee include the relevant standardized terminology as well as standardized and validated test methods to characterize the wastes under consideration. Standards are developed underlying legal requirements as well as commercial interests. This includes characterisation of wastes that may become secondary raw materials. The test results should enable European parties to verify that the considered waste satisfies the criteria of the envisaged (final) destination of the waste, which may be treatment, re-use, incineration or landfill.

Since 2002, the activities of CEN/TC 292 have been directed to the third principle of improving final disposal and monitoring. In this context the EU follows the approach that waste that cannot be recycled or reused should be safely incinerated, and landfilling should only be applied as a last resort.

CEN/TC 292 has developed multiple standards to aid implementation of Landfill Directive.

3.14 Other Technical Committees

In the preceding clauses, a description of the state of art in standardization has been shown corcerning the technical committees considered relevant and most closely related to FISSAC project. However, there are some fields missing from the previous relation, that although clearly related, the standards and works under development have been considered out of the scope of the project and of no interest for FISSAC project purposes. This is the case of the following areas:

- **Wood**: there are some technical committees devoted to the standardization in this field. At CEN and ISO level the following can be quoted:
  - CEN/TC 38 “Durability of wood and wood-based products”
  - CEN/TC 112 “Wood-based panels”
  - CEN/TC 124 “Timber structures”
  - CEN/TC 134 “Resilient, textile and laminate floor coverings”
  - CEN/TC 175 “Round and sawn timber”
  - ISO/TC 89 “Wood-based panels”
  - ISO/TC 136 “Furniture”
  - ISO/TC 162 “Doors and windows”

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- ISO/TC 165 “Timber structures”
- ISO/TC 218 “Timber”
- ISO/TC 219 “Floor coverings”
- ISO/TC 296 “Bamboo and rattan”

Perhaps, the most relevant standards that could be of some interest for FISSAC partners are the standards developed within ISO/TC 218, where test methods for wood have been produced. Likewise, the following project is under development, although it is at a very preliminary stage.

ISO/NP 17300-1 *Wood residue and post consumer wood -- Classification -- Part 1: Basic terms and definitions*

- **Steel:** The following technical committees conduct standardization activities in the steel field:

  - ECISS/TC 101 “Test methods for steel (other than chemical analysis)”
  - ECISS/TC 102 “Methods of chemical analysis for iron and steel”
  - ECISS/TC 103 “Structural steels other than reinforcements”
  - ECISS/TC 104 “Concrete reinforcing and prestressing steels”
  - ECISS/TC 105 “Steels for heat treatment, alloy steels, free-cutting steels and stainless steels”
  - ECISS/TC 106 “Wire rod and wires”
  - ECISS/TC 107 “Steels for pressure purposes”
  - ECISS/TC 108 “Steel sheet and strip for electrical applications”
  - ECISS/TC 109 “Coated and uncoated flat products to be used for cold forming”
  - ECISS/TC 110 “Steel tubes, and iron and steel fittings”
  - ECISS/TC 111 “Steel castings and forgings”
  - ISO/TC 17 “Steel”

  Many of the standards developed by these committees are product orientated, and therefore not considered relevant for FISSAC project. Some of the standards concerning chemical analysis of steel (within TC 102) could be of interest for FISSAC partners.

- **Glass**: The following technical committees conduct standardization activities in the glass field:

  - CEN/TC 129 “Glass in building”
  - ISO/TC 161 “Glass in building”

  The above mentioned technical committees work in the standardization of glass used in building, defining all types of glass products, describing their characteristics and the test methods for their assessment, as well as calculation methods, classifications and requirements of the products.
  As commented before, the product orientated standards have not been considered of relevance for FISSAC project.

3.15 Other standardization initiatives

3.15.1 Creation of a CEN-CENELEC Technical Committee ‘Energy-related products - Material Efficiency Aspects for Ecodesign’

Commission issued an standardisation request to the European standardisation organisations as regards ecodesign requirements on material efficiency aspects for energy-related products in support of the implementation of Directive 2009/125/EC. The final standardization request was issued to CEN and CENELEC as M/543.

M/543 requests CEN and CENELEC to develop, by March 2019, one or several horizontal (non-sector-specific, non-product-specific) European Standards giving the basic principles to take account of when addressing aspects such as:

- extending product lifetime;
- ability to re-use components or recycle materials from products at end-of-life;
- the use of re-used components and/or recycled materials in products.

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The resulting standards can be used and referenced in any future product-specific harmonized standards in case material efficiency aspects are introduced in the relevant ecodesign standardization requests.

After some previous studies and analysis within CEN/CNL, and the corresponding managements to create a new standardization group, last 28-09-2016 it was constituted a new Joint working group to cover standardization in the mentioned area. This JWG has evolved to a technical committee (CEN/CNL TC 10), with the following structure:

- CEN/CLC/TC 10/WG 1 Terminology
- CEN/CLC/TC 10/WG 2 Durability
- CEN/CLC/TC 10/WG 3 Upgradability, Ability to repair, Facilitate Re-Use , Use or re-used components
- CEN/CLC/TC 10/WG 4 Ability to re-manufacture
- CEN/CLC/TC 10/WG 5 Recyclability, recoverability, RRR index, Recycling , Use of recycled materials
- CEN/CLC/TC 10/WG 6 Documentation and/or marking regarding information relating to material efficiency of the product
- CEN/CLC/TC 10/WG 7 Chairman's Advisory Group

No standards are published at present.

3.15.2 Creation of a new CEN-CLC/BTWG 11 "Circular Economy -- Draft Ancillary Action on Sustainable Chemicals from secondary raw materials"-

In a circular economy recycled materials can be reused as a raw material. By this the availability and delivery security of these substances is increased. These "secondary raw materials" shall be traded, akin to the original raw materials, from traditional sources. Within the current European market, only a small part of the raw materials is actually secondary. The challenge is to increase the share of secondary raw materials

One of the main barriers for the introduction of these secondary raw materials is expressed by potential users of secondary raw materials concerning the uncertainty regarding quality. The development of standards can therefore contribute to the growth of the market for secondary raw materials and recycled materials.

In view of the above, a project has been launched between CEN and the Comission on the subject with the overall objective of mapping, identifying and prioritising standardisation needs in support of (sustainable) chemicals from primary and secondary raw materials by mapping existing or ongoing standardisation work including work by industry and other organisations in this area at national, European and International levels. For the purpose of this activity the concept of "sustainable chemicals" shall refer to the full lifecycle of chemicals. Joint Working Group (CEN-CLC/BTWG 11) has been established in 2017 for completing this task.

4. Interaction with the standardisation system. Conclusions

4.1 General

Once having analysed the existing technical committees, standards and projects under development more relevant for FISSAC, hereafter a description is done on the possible interaction of FISSAC project consortium with those technical committees identified as being critical for the future incorporation of some of the project results in the standards.
The referred interaction should be based on the outcomes from previous stages of the project, demonstrating the need for new or modified standards which would allow the marketing of the products in development within FISSAC project.

The technical committees whose activity has been described previously cover both final products as being considered in the project (cement, concrete, tiles and composites) as well as intermediate and raw products (and by products) used as components (aggregates, additions, plastics…) or other related committees dedicated to the standardisation of horizontal issues as sustainability or dangerous substances.

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Although the approach to standardization of products is carried out under task 3.4 of the project, attention is drawn to the fact that the standardization of secondary raw materials is widely associated with the product technical committees themselves, as in many cases the used components requirements are included in the product standards. For this reason, results from product tests and the evaluation of new products formulations that are being carried out under task 3.3 of the project are crucial for supporting the standardization proposals.

Hereafter it seems necessary to define a strategy allowing the foreseen interaction with the standardisation technical committees being the most effective, efficient and fruitful as possible, through the definition of several activities and a schedule to implement them.

4.2 Committees to be contacted

Given the analysis done through previous tasks of FISSAC project, certain issues have been identified concerning standardization needs although many questions remain unresolved and to be determined in subsequent stages and demonstrations of the project.

When deciding on the specific technical committees to be contacted, and taking into consideration the list of committees related to FISSAC project, it seems to be advisable to make different approaches to them. In some cases, it will be sufficient to have updated information on the works under development, and in other cases a more direct contact and participation will be required in order to channel the proposals considered necessary.

Following a first analysis, the critical technical committees for FISSAC project, and that would probably be subject of a possible impact, are the following:

- CEN/TC 51 "*Cements*"
- CEN/TC 104 "*Concrete and related products*"
- CEN/TC 154 "*Aggregates*"
- CEN/TC 177 "*Prefabricated reinforced components of autoclaved aerated concrete or light-weight aggregate concrete with open structure*"
- CEN/TC 67 "*Ceramic tiles*"
- CEN/TC 249/WG13 "*Wood Plastics Composites*" *(WPC)*

Although many of other technical committees included in previous clauses are of relevance for FISSAC due to the horizontal nature of the standards covered by them (dangerous substances, sustainability…)

Notwithstanding the above, not all these "critical" committees will need to be contacted. As stated in the corresponding subclause, in some areas, no needs for standardization have been identified (e.g ceramic tiles), and therefore no interaction is envisaged.

At the present time, clear gaps and place for standardization activities have been detected in cement field and wood plastic composites. Dissemination activities of FISSAC objectives and works are also advisable within concrete committees.

4.3 Actions to be done

4.3.1 Implication in technical committees

With respect the specific actions to be carried out for the subsequent development of standardization activities, first of all it should be analysed if participating in a technical committee could be interesting for FISSAC project and partners, and the grade of implication. Different options exist:

a) The follow up of the standardisation activity through updates reported by UNE. This could be the case for technical committees of horizontal nature or the ones with no direct impact from project results.

b) The follow up through the joining and participation of one or more FISSAC representatives to a standardisation committee. Standardization is an open activity and all interested parties may participate in a CEN/CENELEC/ISO/IEC technical committees through National Mirror Committees and National Standardization Bodies. This is the case of the CEN/TC 249/WG 13 and the participation of ECODEK.

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c) The establishment of a Project Liaison with a Technical Committee. Under this figure, the consortium can participate as an entity in the TC works, without voting rights. This implies an economic cost and is only advisable when the TC is developing a related standard during the life of the project.

4.3.2 Informing technical committees

Other specific actions are related to informing the relevant technical committees about the project. The aim is to familiarise the technical committees with FISSAC project, trying to involve them and taking into account possible opinions. For these purposes the possible actions are:

a) the dissemination of the FISSAC project progress by delivering reports to the relevant TCs Secretaries. UNE can easily perform this task due to its knowledge of standardisation contact information.

b) attending relevant technical committees meetings to show the project and to establish personal contacts with relevant industry representatives. This could be the case of CEN/TC 51 or TC 104 if needed. It can also be managed by UNE, being also interesting the participation of FISSAC partners to present the technical aspects of the project.

4.3.3 Requesting information to technical committees

Finally, the third set of actions is related to requesting information to technical committees. This may help to involve technical committees in FISSSAC project and of course, also to make FISSAC project closer to European standardisation. This is a way to ease collaboration between both parts. For example, this action may include general and specific questions to a technical committee regarding FISSAC project issues, and questions about the possibility of standardisation.

Table 34 – Summary of possible actions for dissemination activities

Summary of possible actions for dissemination activities	
Action	**Who**
Follow up of TCs standardisation activities	UNE
Participation in a TC	Coordinator, partners
Delivering reports to TCs	UNE
Presentation of the project in TCs meetings	UNE, coordinator, partners
Information requests to TCs	UNE
Information to TCs on workshops and conferences	UNE

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