Measuring Envelope products and systems contributing to next generation of healthy nearly Zero Energy buildings

Deliverable D3.6 Report on current barriers to innovative building envelope product certification

WP 3

Dissemination level
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The MEZeroE Project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 953157

Measuring Envelope products and systems contributing to next generation of healthy nearly Zero Energy buildings

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Executive summary

Technological innovation in the construction sector is considerably difficult to implement due to several factors such as the fragmentation and complexity of this sector. Many disciplines are involved at various stages, design and production are usually separated, there is a large number of players with a vast majority of small-medium enterprises (SME), and supply chains are long and variegated. As a result, gathering the different specialists together is difficult, and many potentially effective innovative solutions do not even reach the market.

H2020 MEZeroE project aims at tackling this complex issue by creating an EU distributed open innovation ecosystem for (i) developing nearly Zero Energy Building (nZEB) Enabler Envelope technology solutions; (ii) transferring knowledge; (iii) matching testing needs with existing facilities; (iv) providing monitoring in living labs; and (v) standardizing cutting-edge solutions coming from SMEs and larger industries, to foster inclusive change in the building sector, being accessible via a single-entry point to all users.

MEZeroE ecosystem will be accessed via a single-entry point web-based multi-side virtual marketplace which will include 9 Pilot Measurement & Verification Lines (PM&VL), 3 Open Innovation Services (OIS), and resources for training, business model development, systematic intellectual property (IP) and knowledge management. MEZeroE will fast-track prototypes to the market as fully characterized products.

This document describes the development and validation of several specialized services within Open Innovation Service 3 (OIS3) - Guidance for open innovation life cycle management. This deliverable presents how these services have been designed, tested, and refined through collaboration with industrial partners within the MEZeroE consortium, ensuring they will be reliable and valuable offerings once available on the MEZeroE marketplace.

A key challenge identified is the misalignment between harmonized European standards and the performance assessment of innovative products, particularly hybrid and modular systems. The study found gaps in regulatory clarity, especially concerning software integration and electrical components, highlighting the need for flexible and updated certification frameworks. To bridge this gap, MEZeroE developed a structured approach, mapping 34 existing certification schemes, 98 relevant standards, over a hundred EADs and identifying regulatory obstacles.

A major outcome of the project is a step-by-step certification checklist aimed at assisting manufacturers in navigating CE marking requirements. This framework clarifies documentation, testing protocols, and regulatory pathways, significantly reducing delays and uncertainties in product certification. Validation exercises conducted in collaboration with industrial partners confirmed the framework's effectiveness, demonstrating the value of structured guidance in regulatory compliance.

Furthermore, the project underscores the importance of early certification considerations during product development. Fire safety and sustainability benchmarks, in particular, require extensive testing, making early planning essential to prevent certification bottlenecks. The case study of FlexbrickPV, an innovative façade and photovoltaic system, exemplifies how integrating certification strategies early in the design process can streamline approvals.
This deliverable is addressed to industrial and research stakeholders as a guide for choosing the correct certification path and obtaining certification with as few barriers as possible.

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List of acronyms

AVCP	Assessment and Verification of Constancy of Performance
BIM	Building Information Modelling
CPR	Construction Product Regulation
DoP	Declaration of Performance
EAD	European Assessment Document
EN	European Standard
EPD	Environmental Product Declaration
ETA	European Technical Assessment
EOTA	European Organisation for Technical Assessment.
FPC	Factory Production Control
hEN	harmonized European Standard
LCA	Life Cycle Assessment
LCC	Life Cycle Cost
LL	Living Laboratory
M&V	Measurement and Verification
NB	Notified Body
nZEB	nearly Zero Energy Building
OIS	Open Innovation Service
PM&VL	Pilot Measurement and Verification Line
Psets	Property sets of a product
SME	Small Medium Enterprises
TAB	Technical Assessment Body
TRL	Technology Readiness Levels

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1 Introduction

Innovative construction solutions, including envelope technologies, often face challenges when preparing for market release. The successful commercialization of these solutions relies on obtaining certifications and regulatory recognition, often on a per-market basis. However, the certification process is often more complex than anticipated due to existing governing standards that are inadequate or overly restrictive in defining performance. Furthermore, the growing importance of sustainability benchmarks necessitates obtaining environmental certificates or system compliance.
Challenges that the manufacturers are facing can be summed into three points:

- Inadequate governing standards: Existing governing standards are primarily designed for conventional products already in the market, making them ill-suited for evaluating innovative construction solutions. These standards often fail to effectively define performance to the satisfaction of both manufacturers and legislators. The mechanisms to push the boundaries of the legislation exist but are time-consuming and often quite arcane.
- Restrictive regulations: Regulatory frameworks can be overly restrictive, imposing unnecessary obstacles and stifling the introduction of new technologies. The rigid nature of these regulations hampers the ability to bring innovative solutions to market in a timely manner. Where performance-based design is allowed, these problems are somewhat alleviated, but innovative products also tend to face the lack of tools and references to evaluate performance to satisfaction of legislative bodies
- Sustainability benchmarks: With the green revolution gaining momentum, the verification of a product's performance through environmental certificates or system compliance has become increasingly crucial. This involves satisfying the requirements of various point-based systems such as LEVELs, BREEAM, WELL, and LEED, which quantify sustainability performance. These systems are often quite prescriptive and truly innovative products can struggle with proving their sustainability.

Part of the MEZeroE project reported herein was aimed to streamline and optimize the certification process in different ways.
First, a comprehensive list of existing certification schemes applicable to construction and innovative envelope solutions was compiled. This list encompasses both national and international certification bodies, providing manufacturers with a clear understanding of available options.
Secondly, industrial partners' feedback was gathered to identify the specific challenges they encountered in obtaining CE marking. This input helped to identify common barriers, such as compliance issues, and propose effective solutions.
Third, a step-by-step checklist was developed, outlining the actions required to obtain certification. This comprehensive checklist covered documentation requirements, testing procedures, audit processes, and compliance with relevant standards.
Finally, the certification process, including the checklist, was tested in a real-world scenario within the Open Innovation Service (OIS) 1 framework. This verification phase ensured that the certification process was functional and effective for commercial use. Feedback was gathered and incorporated to improve its functionality.

2 Mapping of certification schemes

The certification process for innovative construction products necessitates a clear understanding of the applicable technical standards and voluntary schemes. The overreaching framework is the Construction Products Regulation (CPR, EU regulation 305/2011), which established harmonised rules for the marketing of construction products in the EU. The Regulation provides a common technical language to assess the performance of construction products and introduces the Assessment and Verification of Constancy of Performance (AVCP). AVCP establishes five systems for declaring and assessing performance of construction products and lays out the tasks required of the manufacturers within. Since innovative products often exhibit hybrid characteristics or may not fit within conventional EN standards, it becomes essential to have a comprehensive understanding of both EN standards and harmonized European assessment documents (EADs), which include the technical details for the implementation of the AVCP system. This ensures that no pre-established product requirements are overlooked. Mandatory certification is required only for characteristics which have a direct impact on safety, but voluntary certifications are available within the scheme.

Nine product categories were defined at the start of research: Multifunctional, multilayer façade systems; Cladding systems; Coatings and finishes; Glazing and frames; Membranes; Joints and connectors; Insulation; Green roofs and green facades; and Active solar energy systems. Within these categories, a comprehensive analysis revealed a total of 97 EN standards and 130 EADs that govern the respective product categories. Furthermore, 34 environmental certifications were identified, classified into two groups: those pertaining to buildings and those pertaining to products. For a detailed list of certification schemes, refer to Appendix 1.

3 Identifying barriers to CE marking

In order to identify barriers to CE marking, a survey targeting MEZeroE industrial partners has been conducted. The survey consisted of three key questions aimed at gathering insights into the parameters and features of their innovative products that may not be covered by existing certification schemes, potential barriers to CE marking, and any missing or desired certifications. The feedback was collected through a combination of email correspondence and video calls. The detailed feedback minutes can be found in Appendix 2.

In summary, the industrial partners expressed a common concern regarding the certification of hybrid and modular products, as the regulatory landscape is unclear in some cases. However, they generally demonstrated a good understanding of the standards they need to comply with, with the need for additional clarification primarily arising in areas related to software and electrical legislation. Two partners have already set their sights on acquiring an EAD due to the limitations or non-compliance of existing product categories in meeting their specific requirements. All the participants expressed their desire for greater support in areas that lie beyond the traditional construction sector regulations. Specifically, they highlighted the need for guidance on software regulations for smart products and the regulations governing electrical wiring and electronic components in photovoltaic (PV) and smart products.

The feedback received from our industrial partners provides valuable insights into their concerns and requirements regarding CE marking. It emphasizes the importance of addressing the challenges associated with hybrid and modular products and the need for clear regulations in software and electrical legislation. The expressed interest in obtaining EADs reflects a desire for more tailored certifications to accommodate innovative products that do not align with existing categories. Furthermore, the partners' call for support in non-construction-specific areas highlights the importance of comprehensive guidance, particularly concerning software and electrical components in smart and PV products.

4 Checklist of actions toward innovative product certification

Manufacturers play a crucial role in ensuring the safety of products sold in the European Economic Area. They are responsible for compliance of their products with EU safety, health and environmental protection requirements.

The checklist has been developed as a tool to help manufacturers quickly identify their place in the process and swiftly navigate the CE marking process. The phases of obtaining a new EAD are explained with examples. Some additional context is also given within chapter 5.2. of this document. A quick overview of the changes introduced by the new CPR (Regulation 2024/3110) is provided.

All of the information is publicly available within the various European Union websites but is often scattered or illogically hidden within subtabs. The checklist aims to collect that data in an easily readable format.

The flowchart below graphically outlines the process of obtaining the CE mark. It presents the major milestones in the CE marking process. Easily seen are two major forks in the process – the determination of the framework for the declaration of performance of the given product (the framework is either a harmonized standard or an EAD) and the determination of the assessment system for controlling the performance of the products.

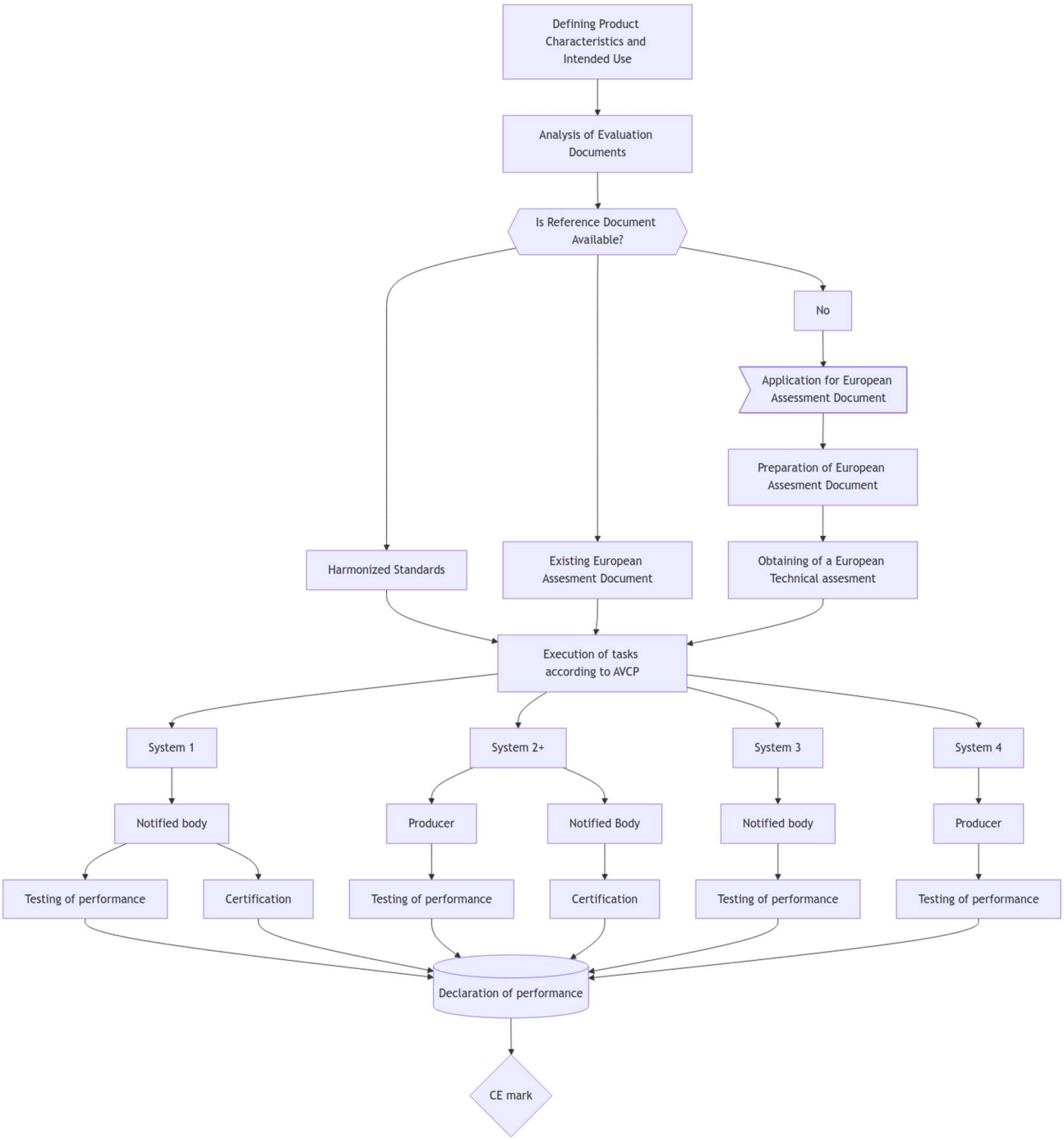

Figure 1: Schematic representation of the path to CE marking

For products that neatly fit into established harmonized standards or European Assessment Documents (EADs), only following and conforming to the steps outlined in the documents is necessary in order to obtain a European Technical Assessment (ETA) and eventually a CE mark. For innovative products that do not fit into existing categories, the route is a bit more involved. Determination of the system of verification is either obtained from existing standards or EADs or determined en route to

obtaining a new EAD. As such, the systems in flowchart are shown just for quick comparison of the differences.

When trying to obtain CE marking for a new product, the first step is to determine key product characteristics and the intended use. Then, the existing directive and product group needs to be analysed. If a harmonized European standard (hEN) or an existing EAD is applicable, all that is left to do is request an ETA from a technical assessment body and follow the execution of tasks according to the Assessment and Verification of Constancy of Performance (AVCP). After the conformity is verified, the technical documentation can be drawn up as the Declaration of Performance and a CE mark can be affixed to the product.

However, innovative products often step outside the available reference documents and as such, require the creation of a new EAD. This is the so-called voluntary or EOTA route to CE marking. The first step in that process is submitting an application for an EAD, with cooperation with an institution who will become the responsible technical assessment body (RTAB). EAD development is then separated into 8 stages, and ETA request is **Stage 1**.

The application requires several details of the product, which should be researched and determined in advance to shorten processing time and revisions – picking the correct RTAB partner with experience in both EADs in general and similar products is crucial here. The application first requires a general description (including a sketch or a drawing), working life, intended use of the product and the suggested AVCP system and the justification for it. If the manufacturer is unsure what the most fitting system would be, they should consult reference documents of similar products. In general, products that present higher safety risks require independent verification and/or certification of safety (i.e. System 1 or 2+). In such cases, working closely with an accredited organization during the application process is suggested, as the eventual EAD will require a notified body to be declared as capable of verifying performance. Close cooperation will ensure that a declaration of performance will be able to be produced swiftly.

The main portion of the EAD application is the assessment of product characteristics, which are examined in the work programme. If sensible, determined essential characteristics should be in line with similar existing products. Characteristics should have suggested classes and thresholds for said classes, assessment methods, and additional information for testing, if applicable. For example: *Tensile strength of a reinforcement steel bar is an essential characteristic of a product. The test for tensile strength is the EN ISO 15630-1, Clause 5, which is adopted in the EAD. The level and acceptance criteria are determined according to to EN 10080, Clause 7.2.3. Characteristic values determined by the noted standards are then stated in the ETA.*

Further examples of adopted EADs are freely available on EOTA website[1].

A well-thought-out work and assessment programme before submission will also help the application to be approved swiftly and successfully. If applicable, preliminary testing regarding complex testing, for example fire safety, is highly suggested. Several examinations, notably resistance to fire testing, are often time consuming, expensive and may raise additional questions of the product. Thus, exploring

[1] https://www.eota.eu/eads

possible difficulties with the help of RTAB in advance and presenting the results as part of the application keeps the timeline in bigger control of the applicant, the manufacturer.

Before the application is submitted, the following questions should ideally be answered:

- Are all product characteristics accounted for with relevant test methods?
- Has full-scale safety testing (i.e. fire testing) been conducted and analysed?
- Does the proposed assessment programme validate all safety and performance questions?
- Is the AVCP system proposed adequate for the safety risk of the product?
- If needed, is there a notified body that can perform testing of performance and/or certification of the product?

The submitted work and assessment programme is put under scrutiny of an EOTA-organized working group with member TABs designated for the relevant product area in **Stage 2**. Once the work programme is agreed upon all competent TABs, EOTA informs the EC of the work programme, closing **Stage 3**. From this moment on, the development of EAD should not exceed six months until its adoption.

With the work programme finalized, the RTAB prepares the draft EAD in **Stage 4**. Other TAB are invited to participate in the EAD drafting and provide comments throughout the development. The completed draft EAD is officially adopted by EOTA in **Stage 5**. **Stage 6** is called “Extensions and delays for the finalisation of EU legislative procedures, where relevant”. The general timeframe given in the Construction Products Regulation (CPR) for the development of an EAD is 9 months. However, delays cannot always be avoided. Recognised reasons for possible delays include:

- Consultation of Member States on delegated acts for AVCP decisions and publication

- Consultation of Member States on agreements on classes of performances or threshold levels and respective agreements

- Need to develop a new test method

If the development process is delayed, the applicant will be informed as soon as possible, and generally RTABs can anticipate likely delays. In **Stage 7**, the final EAD is agreed in the responsible EOTA working group. It is then adopted by EOTA’s Technical board and submitted for official observations by the European Commission. If no comments are received after 15 days, the EAD is considered adopted by EC. This version, called Adopted EAD, forms the basis for drafting of the ETA in the final **Stage 8**. After the first ETA is issued, the lessons learned from the ETA procedure are included in the Final EAD, which is then submitted and published in the Official Journal of the European Union.

After the implementation of the required AVCP system, the Declaration of Performance can be drawn up and finally, the CE marking affixed.

The new Construction Products Regulation has been published in December 2024 (Regulation 2024/3110) and is gradually replacing current CPR (EU) 305/2011 in the next years. The now outgoing

CPR (EU) 305/2011 is the reference for this checklist, as it is valid for the duration of the MEZeroE project. The 2024/3110 regulation will generally keep the same path for voluntary CE-marking, with some important new elements which will need to be taken into account for the development of EADs:

- Sustainability requirements will appear through compulsory essential characteristics inspired by EN 15804: this obligation will start with the CE-marking of the main four sustainability indicators and will grow over time with new batches of indicators.
- Sustainability requirements of construction works will be covered by two new basic requirements of the regulation:
    - BWR 7: Emissions into the outdoor environment.
    - BWR 8: Sustainable use of natural resources.
- CE-marking documents (CE-labelling, Declaration of Performance and Conformity (DoPC) and accompanying information such as safety instructions and installation instructions) will become digital documents, in order to be machine readable. This digitalization of the complete information related to the construction product will be gathered and centralized in the DPP-Digital Product Passport.
- DoP will become DOPC, including the following concepts:
    - Mandatory assessment of performance
    - Voluntary assessment of conformity (for product requirements, not performance).
- An ETA can only be issued if the corresponding EAD is cited in the Official Journal of the European Union. If a new EAD needs to be developed for an ETA request, the TAB (Technical Assessment Body member of EOTA) will provide the ETA only after the EAD is cited in OJEU.
- EADs can be requested by groups of manufacturers, associations, or the Commission, but each manufacturer receives an individual ETA upon request.
- There will be specific validity and expiration periods:
    - EADs are valid for 10 years
    - EOTA can request a 10-year extension from the Commission in the final year before expiration
    - ETAs can be used for five years after an EAD expires
- New CPR will have to be coordinated with ESPR-Ecodesign for Sustainable Products Regulation and with Level(s) methodology; the final goal will be the sustainability assessment of works, based on the sustainability performance of products.

Key takeout of the CE marking process is that navigating it quickly and successfully requires a good deal of experience and preparation, especially with the new CPR additions. Within MEZeroE project, the Open innovation service 1, subservice 4 aims to provide that guidance to manufacturers of innovative products an easy and reliable path to such institutions.

5 Validation of the certification process

5.1 Validation of OiS1, Subservice 4

The practical implementation of CE certification is encompassed within MEZeroE project, specifically under Open Innovation Service 1 (OiS 1), Subservice 4: Establishment of a Clear Informative Path to CE-Marking. This subservice, managed by ITeC, has been utilized by several industrial partners throughout the project duration. Feedback from these partners has been collected via validation forms, and this report aims to summarize the challenges reported by the industrial partners who engaged with the subservice, as well as to assess the validity of the subservice itself.

OiS 1, Subservice 4 is designed as a consultative service targeting manufacturers seeking CE certification for innovative products. The certification process for such products typically necessitates the acquisition of a European Technical Assessment (ETA), as there are usually no harmonized European standards (hEN) applicable (see Figure 2).

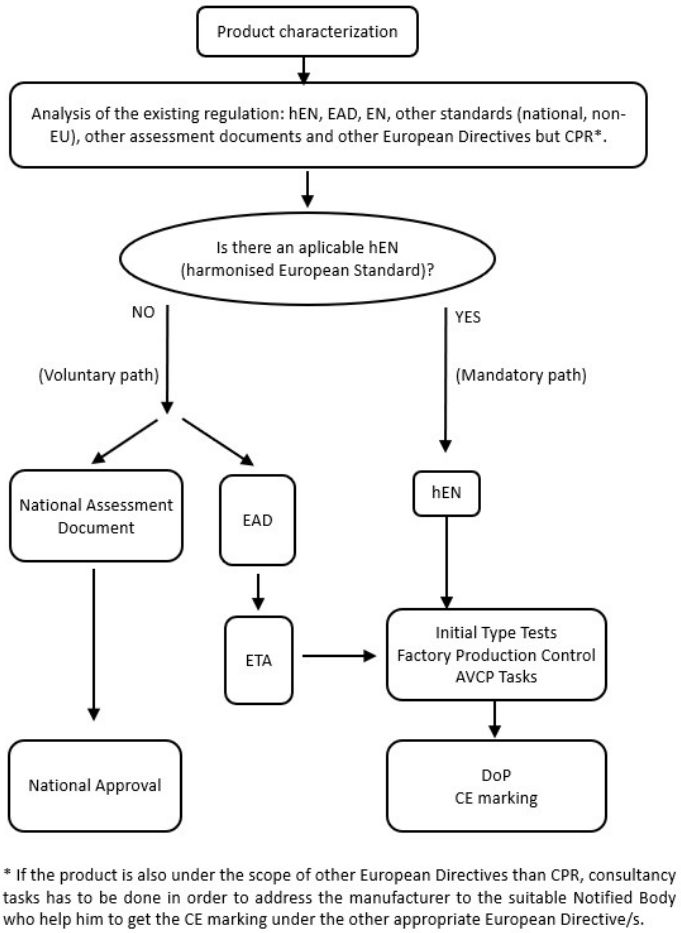

Figure 2: Types of Certifications for Innovative Construction Products - Path to CE Attainment

The service provider's role is to guide manufacturers through the certification pathway, ensuring clarity regarding the requirements at each stage. This guidance often demands a comprehensive range of expertise, as innovative products frequently embody hybrid characteristics (e.g., photovoltaic facades) and must comply with multiple regulatory frameworks concurrently. While the certification process is driven by the manufacturer, the service provider offers essential support and pre-emptive information to facilitate and optimize what can often be a protracted certification journey.

For validation purposes, the service provider interviewed three manufacturers and documented the services rendered, soliciting feedback through validation forms.

The initial step for all manufacturers involved defining the scope and approach for product certification. For the first manufacturer, the examined products were found to align with existing European Assessment Documents (EADs). The manufacturer received guidance on adapting their testing to meet these EADs and was advised on requesting an ETA from a Technical Assessment Body (TAB) to make their products CE-certifiable. They also posed questions regarding ETA attainment, which the service provider addressed, clarifying the viability of results for ETA inclusion. The manufacturer engaged with the service provider through email and online meetings, finding all steps to be clear and well-defined (1/5). They expressed agreement (2/5) regarding the value of the service and agreed (2/5) they were likely to use it again.

For the other two manufacturers, their products did not align with any existing hEN or EADs, and the ETA route was recommended. One manufacturer had not begun testing yet; therefore, relevant technical requirements associated with the Basic Work Requirements of the Construction Products Regulation 305/2011 were outlined. Key performance characteristics and reasonable criteria for performance were established. The manufacturer voiced concerns about the effort required for recertification if changes were made to the product. The service provider offered general guidelines on the necessity and extent of recertification, emphasizing that case-by-case analysis would be essential for any product modifications. Additional advice was provided regarding the selection of existing mounting products to ensure compatibility and avoid unnecessary additional testing.

The second manufacturer was already testing several performance characteristics according to EADs governing similar systems. The service provider recommended adhering closely to these EADs and thoroughly documenting all test conditions to enhance the potential eligibility of existing tests for future assessments. They were also cautioned that criteria and assessment methods might evolve during the EAD development process.

Both manufacturers reported that the steps in the process were clear and well-defined (1/5) and strongly agreed (1/5) that they recognized the value of the service. One manufacturer strongly agreed (1/5) about the likelihood of using the service again, while the other simply agreed (2/5).

In summary, the validation of OiS 1, Subservice 4: *Establishment of a Clear Informative Path to CE-Marking,* was conducted through case studies of three manufacturers who independently utilized the service. Each case was documented, and feedback was collected at the conclusion of the process. The service provider successfully guided the manufacturers toward CE marking, with several steps on the route clarified or specific problems exposed. The manufacturers did not achieve a CE mark within

the timeline of the project,but the feedback indicated positive or very positive evaluations across all categories, which shows the value of the service at providing help at key points of the process. Given the highly individualized nature of the service, tailored to the specific provider, manufacturer, and product, suggestions for improvement are challenging to determine and likely unnecessary due to the overwhelmingly positive feedback received.

5.2 Case study of FlexbrickPV

As part of Task 3.4: *Performance lab experimental campaign*, industrial partner Flexbrick and ITeC have been working on developing reaction to fire assessment procedures for an external skin façade system called FlexbrickPV. The case study is included as it provides key context in how innovative product characteristics need to be determined as a part of a testing campaign during the product development, as otherwise uncomfortable questions can be raised quite late during the EOTA route while trying to develop a new EAD, leading to delays or worse.

While the testing and classification of reaction to fire is governed by EN 13501-1 and the associated test methods, the test specimens mounting and fixing rules, the criteria for evaluation of a specific product or system and the provisions for establishing the field of application of the obtained classification are given in the relevant product Technical Specification (EN or EAD).

As FlexbrickPV is an innovative product, a hybrid of a façade and photovoltaic system, no product standard (EN) exists and the above-mentioned criteria for testing and assessing the reaction to fire in accordance with EN 13501-1 need to be established in an EAD. The product underwent a testing campaign as a part of Task 3.4 of the MEZeroE project and is fully described in the relevant deliverable.

The summarized technical report called "*Technical basis for the development of the reaction to fire assessment procedures of FlexbrickPV within the CE marking framework*" is enclosed as Appendix 3. The enclosed document shows how an actual testing campaign is required to truly assess the key product characteristics and determination of worst-case scenarios in cases where variable installations are used (e.g. insulation or adhesive thickness in case of facades). As was mentioned multiple times in the deliverable, preparation is key in ensuring that EAD development is on a reasonable time scale. Complex, large scale testing like preliminary fire resistance testing is thus best done as part of product development and not as an afterthought before certification The report shows the need for several product characteristics need to be optimized or at least carefully documented, as fire testing has exposed unforeseen impact of seemingly irrelevant characteristics. Combined with the busy schedules and long lead times of testing laboratories, leaving complex testing completely until the end might introduce sizeable delays in certification of a nominally complete product. Conversely, having a well-argued EAD application and good testing and technical documentation can speed up EOTA working group deliberation considerably, as some TAB concerns can be answered in advance. Additionally, the testing data and reports thus obtained can be used in an ETA process where applicable and agreed upon, again shortening the certification process.

6 Conclusions

The MEZeroE project has systematically identified and addressed the barriers to certification of innovative building envelope products. The research and engagement with industry stakeholders highlighted key challenges and provided structured methodologies to improve certification workflows, particularly for products that do not fit within conventional regulatory frameworks.

One of the main findings of the project is the discrepancy between existing harmonized standards and the characteristics of innovative building envelope solutions. While the Construction Products Regulation (CPR) and related European Assessment Documents (EADs) provide a pathway for product certification, manufacturers of hybrid and modular products continue to face difficulties in achieving compliance due to the evolving nature of technical requirements and the absence of predefined categories for novel technologies. This issue is particularly evident in the integration of digital components and electrical systems, where current regulations provide limited guidance.

To address these challenges, MEZeroE facilitated the development of a comprehensive mapping of certification schemes, which both identified gaps in the regulatory landscape and created a simple, all-in-one overview of related European legislation. A checklist of actions was designed to support manufacturers in navigating the certification process, ensuring compliance with both mandatory and voluntary standards. The step-by-step framework developed within the project provides clarity on essential documentation, testing procedures, and regulatory engagement, significantly reducing the time and effort required for CE marking.

The validation of the certification process was carried out through direct engagement with industrial partners. The structured approach tested in real-world conditions confirmed the viability of the services offered within the MEZeroE ecosystem. Feedback from manufacturers underscored the need for continued support in regulatory interpretation, particularly for emerging product categories, which shows the need for such services beyond the timeline of the project. The Open Innovation Service (OiS 1) played a crucial role in assisting companies in structuring their certification strategies, with positive results reported across multiple case studies, as was the case with other services offered during the project.

A significant outcome of the project is the recognition that early integration of certification requirements in the product development phase is essential for reducing delays in market entry. This was particularly evident in the case of fire safety and sustainability assessments, where extensive testing is required. The experience gained through the development of the reaction-to-fire assessment framework for the FlexbrickPV system illustrates the importance of detailed preparatory work in ensuring compliance with certification standards.

Moving forward, the MEZeroE ecosystem will continue to evolve as a resource for both industrial and research stakeholders. Further refinements to certification pathways, including the integration of digital product passports and sustainability criteria under the revised CPR, will be critical to ensuring that innovative building envelope solutions can be effectively certified and deployed in the European market. Continued collaboration between regulatory bodies, industry experts, and research institutions will be

necessary to maintain an adaptive and efficient certification process for next-generation construction technologies.

Appendix 1 : Certification schemes

Scope: Construction segments	Short Title	Long title	Developer	Description	Parameters	Link
Buildings	BREEAM	Building Research Establishment Environmental Assessment Methodology	BRE (UK)	The most widespread scheme together with LEED	Energy Efficiency Water consumption Internal environment (health and well-being) Pollution Transport Materials	https://www.breeam.com/
Buildings	LEED	Leadership in Energy & Environmental Design	US Green Building Council (USA)	LEED is a holistic system that doesn't simply focus on one element of a building such as energy, water or health, rather it looks at the big picture factoring in all of the critical elements that work together to create the best building possible. In fact, 35% of the credits in LEED are related to climate change, 20% of the credits directly impact human health, 15% of the credits impact water resources, 10% of the credits affect biodiversity, 10% of the credits relate to the green economy, 5% of the credits impact community and 5% of the credits impact natural resources.	Energy Efficiency Water consumption Indoor air quality Pollution Transport Sustainable sites selection	https://www.usgbc.org/leed

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Buildings	DGNB	Deutsche Gesellschaft für Nachhaltiges Bauen (German Sustainable Building Council)	German Sustainable Building Council (Germany)	In order to make sustainable construction plannable, assessable and measurable, the DGNB has developed a certification system which, as a planning and optimisation tool, helps all those involved in construction to implement a holistic quality of sustainability. In order to be able to evaluate sustainable construction, various certification criteria are applied individually to different types of buildings. Every building, from planning to demolition, goes through different phases, which are linked to different requirements and conditions. These can be accompanied by the DGNB certification system in terms of a holistic sustainable construction method.	Requirements are different depending if it is a new construction, renovated buildings/existing buildings and buildings in use	https://www.dgnb-system.de/en/
Buildings	HQE	High Quality Environmental	Association pour la Haute Qualité Environnementale (France)	HQE certification covers the entire lifecycle of a building (construction, renovation and operation): non-residential buildings, residential buildings and detached houses as well as urban planning and development.	Environment Energy Health Comfort	https://www.behqe.com/
Products and Buildings	Passive Hause	Passive House Standard	Passive House Institute (Germany)	Passive House is the world‘s leading standard in energy efficient construction. The Passive House Standard stands for quality, comfort and energy efficiency.	Space Heating/Cooling Energy Demand Renewable Primary Energy Demand Airtightness Comfort	https://passivehouse.com/

Buildings	Minergie	Minergie	Minergie's association (Switzerland)	The focus is on comfort, efficiency and value retention. The comfort is made possible by a high-quality building envelope and systematic air renewal, above-average heat protection and comprehensive quality assurance. Minergie buildings are also characterized by a very low energy requirement and a maximum share of renewable energies. Different standards: Minergie, Minergie-P, Minergie-A, ECO, MQS Construction SNBS complements the Minergie standards with meaningful social and economic aspects		https://www.minergie.com/
Buildings	SNBS	Swiss Sustainable Building Standard	Switzerland	The certification is available for buildings (new buildings and renovations) from the following categories: Residential, Office, Educational buildings, Mixed use with ground floor use Retail. Objects with further uses can also be certified if these further uses do not take up more than 20% of the floor area (GF). Can be double certified with Minergie.	A total of 45 indicators from the fields of environment, society and the economy are evaluated.	https://www.snbs-hochbau.ch/
Buildings	WELL	WELL Building Standard	International WELL Building Institute (USA)	WELL takes a holistic approach to health in the built environment addressing behavior, operations and design. The first standard of its kind that focuses solely on the health and wellness of building occupants.	Air Water Nourishment Light Fitness Comfort Mind	https://standard.wellcertified.com/well

Buildings	Miljöbyggnad	Miljöbyggnad	Sweden Green Building Council (Sweden)	Through careful control of the house with sixteen different indicators for energy use, indoor environment and materials, Miljöbyggnad ensures that the building you are staying in is good for you and for the environment. They have a tool (Miljöbyggnad iDrift) that creates environmental and climate benefits through measures and certification of buildings in operation. They have another certification: NollCO2	16 different indicators for energy use, indoor environment and materials	https://www.sgbc.se/certifiering/miljobyggnad/
Buildings	CasaClima (KlimaHaus)	CasaClima (KlimaHaus)	CasaClima Agency (Italy)	For CasaClima, sustainability in buildings is a holistic concept, which not only evaluates the energy efficiency but goes futher by considering broad spectrum of aspects. They have different certifications: CasaClima Sustainability, Nature, ClimaHotel, and Wine	Energy efficiency Environmental sustainability of the materials used Water management Interior air quality Natural lighting Measures to protect from Radon exposure Sound insulation	https://www.agenziacasaclima.it/it/home-1.html
Buildings	CASBEE	Comprehensive Assessment System for Building Environmental Efficiency	Japan Sustainable Building Consortium (Japan)	CASBEE has been designed to both enhance the quality of people's lives and to reduce the life-cycle resource use and environmental loads associated with the built environment, from a single home to a whole city. Consequently, various CASBEE schemes are now deployed all over Japan and supported by national and local governments.	CASBEE covers the following four assessment fields: (1) Energy efficiency (2) Resource efficiency (3) Local environment (4) Indoor environment	https://www.ibec.or.jp/CASBEE/english/

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Buildings	Green Globes	Green Globes	Green Building Initiative (Canada)	Green Globes offers a different approach: one that provides in-depth support for improvements ideally suited to each project. Building owners and facility managers know their buildings and operations better than anyone else. We respect and leverage that knowledge with personalized assistance to produce best practices in sustainable design, construction and operations. Incorporating third-party assessors available throughout the certification process, we forge a partnership that allows experienced green building project teams to shine and reduces the learning curve for those new to green building.		https://thegbi.org/green-globes-certification/
Buildings	Green Star	Green Star	Green Building Council of Australia (Australia)	Founded by Green Building Council of Australia in 2003, Green Star is an internationally recognised rating system setting the standard for healthy, resilient, positive buildings and places. Developed for the Australian environment, Green Star has certified thousands of sustainable fitouts, buildings, homes and communities right across the country.		https://new.gbca.org.au/green-star/exploring-green-star/
Buildings	TQB2010	TQB2010	Österreichische Gesellschaft für Nachhaltiges Bauen - The Austrian Sustainable Building Council (ÖGNB) (Austria)	Designed in 2002, TQB has been a comprehensive building assessment scheme ever since, which is referred to as the second generation building assessment system. The TQB content is fully compatible with international norms (e.g. CEN TC350), these are currently being developed. TQB.2010 is 100 percent compatible with the klimaaktiv building standard.		https://www.oegnb.net/en/tqb.htm

Buildings	k:a haus	klima:aktiv Gebäudestandard	Austrian Federal Ministry of Agriculture, Forestry, Water Management and the Environment (Austria)	klimaaktiv is the climate protection initiative of the Austrian Federal Ministry of Agriculture, Forestry, Water Management and the Environment. Under klimaaktiv, numerous initiatives and activities for climate protection take place, which can be assigned to the four core topics of construction & renovation, renewable energy, energy saving and mobility. In the Construction & Renovation programme area, the klimaaktiv building standard was developed, which is available in numerous forms of use for both residential buildings and service buildings. TQB.2010 is 100 percent compatible with the klimaaktiv building standard. For this reason, if the klimaaktiv mandatory criteria are met, it is possible to carry out a building declaration according to klima:aktiv at no additional cost at the same time as certification by the ÖGNB.		https://www.oegnb.net/klimaaktiv.htm
Buildings	Energy Star	Energy Star Certification for Buildings	Environmental Protection Agency (USA)	Specifically, to be eligible for ENERGY STAR certification, a building must earn an ENERGY STAR score of 75 or higher on EPA's 1 – 100 scale, indicating that it performs better than at least 75 percent of similar buildings nationwide. This 1 – 100 ENERGY STAR score is based on the actual, measured energy use of a building and is calculated within EPA's ENERGY STAR Portfolio Manager tool. The score accounts for differences in operating conditions, regional weather data, and other important considerations.		https://www.energystar.gov/buildings/building_recognition/building_certification

Buildings	SBTool ICZ	SBTool CZ	Czech Republic	The SBToolCZ methodology is based on a multi-criteria concept, where a set of different criteria is entered into the evaluation, which take into account the principles of sustainable construction. The range of criteria that enter the evaluation process varies according to the type of building (residential buildings, office buildings, etc.) and according to the life cycle phase that is assessed (building design quality evaluation phase, building quality evaluation phase).		https://www-sbtool-cz.translate.goog/?_x_tr_sl=cs&_x_tr_tl=en&_x_tr_hl=es
Buildings	VERDE	Valoración de Eficiencia de Referencia de Edificios (Building Reference Efficiency Evaluation)	Green Building Council Spain			https://gbce.es/certificacion-verde/
Buildings	FEBY12	FEBY12	Sweden			https://www.feby.se/Kriterier
Buildings	GPR Gebow	GPR Gebow	Netherlands	As a government sponsored assessment methodology for sustainability GPR measures the environmental performance for residential and commercial construction; new, existing and for renovations. Through differing grades and star ratings a value is placed on how a building project or plan complies.		https://www.igg.nl/diensten/gpr-gebouw/

Products	DECLARE	DECLARE label	International Living Future Institute	Declare is an ingredients label for building products, paired with an online database. It allows manufacturers to demonstrate their leadership in the marketplace and it provides consumers with honest information for product selection. All products are eligible for inclusion, regardless of their composition; the key to Declare is honest information sharing. Information about each product has been declared by the Manufacturer's CEO to be true. This database is provided by the International Living Future Institute (ILFI) as a tool for registered project teams. Products are not endorsed or certified by ILFI.	Each ingredient must be reported with a chemical name, CAS number, and percentage or percentage range.	https://declare.living-future.org/
Products	C2C	Cradle to Cradle Certified	The Cradle to Cradle Products Innovation Institute (Netherlands)	Cradle to Cradle Certified® is the global standard for products that are safe, circular and responsibly made. Leading brands, retailers, designers and manufacturers across the value chain rely on the Cradle to Cradle Certified Product Standard to ensure the impact of their products on people and planet is a positive one. For more than a decade, Cradle to Cradle Certified has been helping companies to innovate and optimize materials and products according to the world's most advanced science-based measures.	Cradle to Cradle Certified assesses the safety, circularity and responsibility of materials and products across five categories of sustainability performance: Material health Product circularity Clean air & climate protection Water & soil stewardship Social fairness	https://www.c2ccertified.org/

Buildings	Living Building Challenge	Living Building Challenge	International Living Future Institute (United States of America)	To qualify, a project must meet each of seven broad goals, called “Petals,” which consist of a total of 20 narrower requirements, called “imperatives.” Petal Certification: Certain projects may run into complications attaining all the Petals. In this case, they may opt to obtain three to six of the petals without attaining full certification. Zero Energy, Living Product Challenge and Living Community Challenge.		https://living-future.org/
Buildings	EN 15978	Sustainability of construction works. Assessment of environmental performance of buildings. Calculation method				-
Products and Buildings	ISO 14040/14044	Life Cycle Assesment				
Buildings	EN 15643	Sustainability of construction works. Framework for assessment of buildings and civil engineering works.				

Products	ISO 21930	Sustainability in building construction: Environmental declaration of building products				
Buildings	ISO 21931	Sustainability in building construction: Framework for methods of assessment of the environmental performance of construction works				
Buildings	ISO 23045	Building environmental design: Guidelines to assess energy efficiency of new buildings				
Buildings	ANSI/ASHRAE/USGBC/IES Standard 189.1-2011	Standard for the design of High-Performance Green Buildings. Except Low-Rise Residential Buildings				

Buildings	ANSI/ASHRAE/IES Standard 90.1-2019	Energy Standard for Buildings Except Low-Rise Residential Buildings				https://www.ashrae.org/technical-resources/bookstore/standard-90-1?msclkid=f2f95d9fd11711ec8acd18975a785339
Products	EN 15804	Sustainability of construction works. Environmental product declarations. Core rules for the product category of construction products.				-
Products	ISO 14025	Environmental Product Declarations (EPDs)				
Buildings	ISO 50001	Energy management systems				

Envelope Product Categories (Construction segment)	Title	
Multifunctional, multilayer façade systems	EN 179	Building hardware - Emergency exit devices operated by a lever handle or push pad, for use on escape routes - Requirements and test methods
Multifunctional, multilayer façade systems	EN 1125	Building hardware - Panic exit devices operated by a horizontal bar, for use on escape routes - Requirements and test methods
Multifunctional, multilayer façade systems	EN 1154	Building hardware - Controlled door closing devices - Requirements and test methods
Multifunctional, multilayer façade systems	EN 1155	Building hardware - Electrically powered hold-open devices for swing doors - Requirements and test methods
Multifunctional, multilayer façade systems	EN 1158	Building hardware - Door coordinator devices - Requirements and test methods
Multifunctional, multilayer façade systems	EN 1935	Building hardware - Single-axis hinges - Requirements and test methods
Multifunctional, multilayer façade systems	EN 12209	Building hardware - Mechanically operated locks and locking plates - Requirements and test methods
Multifunctional, multilayer façade systems	EN 13830	Curtain walling - Product standard
Multifunctional, multilayer façade systems	EN 14351-1	Windows and doors - Product standard, performance characteristics - Part 1: Windows and external pedestrian doorsets
Multifunctional, multilayer façade systems	EN 14846	Building hardware - Locks and latches - Electromechanically operated locks and striking plates - Requirements and test methods
Membranes	EN 534	Corrugated bitumen sheets - Product specification and test methods
Membranes	EN 13707	Flexible sheets for waterproofing - Reinforced bitumen sheets for roof waterproofing - Definitions and characteristics
Membranes	EN 13859-1	Flexible sheets for waterproofing - Definitions and characteristics of underlays - Part 1: Underlays for discontinuous roofing
Membranes	EN 13859-2	Flexible sheets for waterproofing - Definitions and characteristics of underlays - Part 2: Underlays for walls

Membranes	EN 13956	Flexible sheets for waterproofing - Plastic and rubber sheets for roof waterproofing - Definitions and characteristics
Membranes	EN 13967	Flexible sheets for waterproofing - Plastic and rubber damp proof sheets including plastic and rubber basement tanking sheet - Definitions and characteristics
Membranes	EN 13969	Flexible sheets for waterproofing - Bitumen damp proof sheets including bitumen basement tanking sheets - Definitions and characteristics
Membranes	EN 13970	Flexible sheets for waterproofing - Bitumen water vapour control layers - Definitions and characteristics
Membranes	EN 13984	Flexible sheets for waterproofing - Plastic and rubber vapour control layers - Definitions and characteristics
Membranes	EN 14909	Flexible sheets for waterproofing - Plastic and rubber damp proof courses - Definitions and characteristics
Membranes	EN 14967	Flexible sheets for waterproofing - Bitumen damp proof courses - Definitions and characteristics
Membranes	EN 15651-1	Sealants for non-structural use in joints in buildings and pedestrian walkways - Part 1: Sealants for facade elements
Membranes	EN 15651-2	Sealants for non-structural use in joints in buildings and pedestrian walkways - Part 2: Sealants for glazing
Membranes	EN 15651-3	Sealants for non-structural use in joints in buildings and pedestrian walkways - Part 3: Sealants for sanitary joints
Membranes	EN 15651-4	Sealants for non-structural use in joints in buildings and pedestrian walkways - Part 4: Sealants for pedestrian walkways
Membranes	EN 15814	Polymer modified bituminous thick coatings for waterproofing - Definitions and requirements
Glazing and frames	EN 572-9	Glass in building - Basic soda lime silicate glass products - Part 9: Product standard
Glazing and frames	EN 1036-2	Glass in Building - Mirrors from silver-coated float glass for internal use - Part 2: Evaluation of conformity/Product standard
Glazing and frames	EN 1051-2	Glass in building - Glass blocks and glass pavers - Part 2: Evaluation of conformity/Product standard
Glazing and frames	EN 1096-1	Glass in building - Coated glass - Part 1: Definitions and classification
Glazing and frames	EN 1096-2	Glass in building - Coated glass - Part 2: Requirements and test methods for class A, B and S coatings
Glazing and frames	EN 1096-3	Glass in building - Coated glass - Part 3: Requirements and test methods for class C and D coatings

Glazing and frames	EN 1096-4	Glass in building - Coated glass - Part 4: Product standard
Glazing and frames	EN 1096-5	Glass in building - Coated glass - Part 5 - Test method and classification for the self-cleaning performances of coated glass surfaces
Glazing and frames	EN 1279-5	Glass in building - Insulating glass units - Part 5: Product standard
Glazing and frames	EN 1748-1-2	Glass in building - Special basic products - Borosilicate glasses - Part 1-2: Evaluation of conformity/Product standard
Glazing and frames	EN 1748-2-2	Glass in building - Special basic products - Glass ceramics - Part 2-2: Evaluation of conformity/Product standard
Glazing and frames	EN 1863-2	Glass in building - Heat strengthened soda lime silicate glass - Part 2: Evaluation of conformity/Product standard
Glazing and frames	EN 12150-2	Glass in building - Thermally toughened soda lime silicate safety glass - Part 2: Evaluation of conformity/Product standard
Glazing and frames	EN 12337-2	Glass in building - Chemically strengthened soda lime silicate glass - Part 2: Evaluation of conformity/Product standard
Glazing and frames	EN 13024-2	Glass in building - Thermally toughened borosilicate safety glass - Part 2: Evaluation of conformity/Product standard
Glazing and frames	EN 14178-2	Glass in building - Basic alkaline earth silicate glass products - Part 2: Evaluation of conformity/Product standard
Glazing and frames	EN 14179-2	Glass in building - Heat soaked thermally toughened soda lime silicate safety glass - Part 2: Evaluation of conformity/Product standard
Glazing and frames	EN 14321-2	Glass in building - Thermally toughened alkaline earth silicate safety glass - Part 2: Evaluation of conformity/Product standard
Glazing and frames	EN 14449	Glass in building - Laminated glass and laminated safety glass - Product standard
Insulation	EN 13162	Thermal insulation products for buildings - Factory made mineral wool (MW) products - Specification
Insulation	EN 13163	Thermal insulation products for buildings - Factory made expanded polystyrene (EPS) products - Specification
Insulation	EN 13164	Thermal insulation products for buildings - Factory made extruded polystyrene foam (XPS) products - Specification

Insulation	EN 13165	Thermal insulation products for buildings - Factory made rigid polyurethane foam (PU) products - Specification
Insulation	EN 13166	Thermal insulation products for buildings - Factory made phenolic foam (PF) products - Specification
Insulation	EN 13167	Thermal insulation products for buildings - Factory made cellular glass (CG) products - Specification
Insulation	EN 13168	Thermal insulation products for buildings - Factory made wood wool (WW) products - Specification
Insulation	EN 13169	Thermal insulation products for buildings - Factory made expanded perlite board (EPB) products - Specification
Insulation	EN 13170	Thermal insulation products for buildings - Factory made products of expanded cork (ICB) - Specification
Insulation	EN 13171	Thermal insulation products for buildings - Factory made wood fibre (WF) products - Specification
Insulation	EN 14063-1	Thermal insulation products for buildings - In-situ formed expanded clay lightweight aggregate products - Part 1: Specification for the loose-fill products before installation
Insulation	EN 14064-1	Thermal insulation products for buildings - In-situ formed loose-fill mineral wool (MW) products - Part 1: Specification for the loose-fill products before installation
Insulation	EN 14303	Thermal insulation products for building equipment and industrial installations - Factory made mineral wool (MW) products - Specification
Insulation	EN 14304	Thermal insulation products for building equipment and industrial installations - Factory made flexible elastomeric foam (FEF) products - Specification
Insulation	EN 14305	Thermal insulation products for building equipment and industrial installations - Factory made cellular glass (CG) products - Specification
Insulation	EN 14306	Thermal insulation products for building equipment and industrial installations - Factory made calcium silicate (CS) products - Specification
Insulation	EN 14307	Thermal insulation products for building equipment and industrial installations - Factory made extruded polystyrene foam (XPS) products - Specification
Insulation	EN 14308	Thermal insulation products for building equipment and industrial installations - Factory made rigid polyurethane foam (PUR) and polyisocyanurate foam (PIR) products - Specification
Insulation	EN 14309	Thermal insulation products for building equipment and industrial installations - Factory made products of expanded polystyrene (EPS) - Specification

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Insulation	EN 14313	Thermal insulation products for building equipment and industrial installations - Factory made polyethylene foam (PEF) products - Specification
Insulation	EN 14314	Thermal insulation products for building equipment and industrial installations - Factory made phenolic foam (PF) products - Specification
Insulation	EN 14315-1	Thermal insulating products for buildings - In-situ formed sprayed rigid polyurethane (PUR) and polyisocyanurate (PIR) foam products - Part 1: Specification for the rigid foam spray system before installation
Insulation	EN 14318-1	Thermal insulating products for buildings - In-situ formed dispensed rigid polyurethane (PUR) and polyisocyanurate (PIR) foam products - Part 1: Specification for the rigid foam dispensed system before installation
Insulation	EN 14319-1	Thermal insulating products for building equipment and industrial installations - In-situ formed dispensed rigid polyurethane (PUR) and polyisocyanurate foam (PIR) products - Part 1: Specification for the rigid foam dispensed system before installation
Insulation	EN 14320-1	Thermal insulating products for building equipment and industrial installations - In-situ formed sprayed rigid polyurethane (PUR) and polyisocyanurate foam (PIR) products - Part 1: Specification for the rigid foam spray system before installation
Insulation	EN 14933	Thermal insulation and light weight fill products for civil engineering applications — Factory made products of expanded polystyrene (EPS) — Specification
Insulation	EN 14934	Thermal insulation and light weight fill products for civil engineering applications - Factory made products of extruded polystyrene foam (XPS) - Specification
Insulation	EN 15732	Light weight fill and thermal insulation products for civil engineering applications (CEA) - Expanded clay lightweight aggregate products (LWA)
Insulation	EN 16069	Thermal insulation products for buildings - Factory made products of polyethylene foam (PEF) - Specification
Cladding systems	EN 1013	Cold rolled narrow steel strip for heat treatment - Technical delivery conditions
Cladding systems	EN 14509	Factory-made double skin metal faced insulating sandwich panels - Part 1: Self-supporting applications
Cladding systems	EN 14963	Roof coverings - Continuous rooflights of plastics with or without upstands - Classification, requirements and test methods

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Cladding systems	EN 14964	Rigid underlays for discontinuous roofing - Definitions and characteristics
Joints and connectors	EN 681-1	Elastomeric seals - Materials requirements for pipe joint seals used in water and drainage applications - Part 1: Vulcanized rubber
Joints and connectors	EN 681-2	Elastomeric seals - Material requirements for pipe joint seals used in water and drainage applications - Part 2: Thermoplastic elastomers
Joints and connectors	EN 681-3	Elastomeric seals - Material requirements for pipe joint seals used in water and drainage applications - Part 3: Cellular materials of vulcanized rubber
Joints and connectors	EN 681-4	Elastomeric seals - Materials requirements for pipe joint seals used in water and drainage applications - Part 4: Cast polyurethane sealing elements
Joints and connectors	EN 682	Elastomeric Seals - Materials requirements for seals used in pipes and fittings carrying gas and hydrocarbon fluids
Active solar energy systems	EN 12975-1	Thermal solar systems and components - Solar collectors - Part 1: General requirements
Active solar energy systems	EN 12975-2	Thermal solar systems and components - Solar collectors - Part 2: Test methods
Active solar energy systems	EN ISO 9806	Solar energy - Solar thermal collectors - Test methods (ISO 9806:2017)
Active solar energy systems	EN 12976-1	Thermal solar systems and components - Factory made systems - Part 1: General requirements
Active solar energy systems	EN 12976-2	Thermal solar systems and components - Factory made systems - Part 2: Test methods
Active solar energy systems	EN 12977-1	Thermal solar systems and components - Custom built systems - Part 1: General requirements for solar water heaters and combisystems
Active solar energy systems	EN 12977-2	Thermal solar systems and components - Custom built systems - Part 2: Test methods for solar water heaters and combisystems
Active solar energy systems	EN 12977-3	Thermal solar systems and components - Custom built systems - Part 3: Performance test methods for solar water heater stores
Active solar energy systems	EN 50583-1	Photovoltaics in buildings - Part 1: BIPV modules
Active solar energy systems	EN 50583-2	Photovoltaics in buildings - Part 2: BIPV systems
Active solar energy systems	EN IEC 61215-1	Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1-1: Special requirements for testing of crystalline silicon photovoltaic (PV) modules
Active solar energy systems	EN IEC 61215-2	Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 2: Test procedures

Active solar energy systems	EN IEC 61730-1	Photovoltaic (PV) module safety qualification - Part 1: Requirements for construction
Active solar energy systems	EN IEC 61730-2	Photovoltaic (PV) module safety qualification - Part 2: Requirements for testing

Envelope Product Categories (Construction segment)	EAD Number	EAD Title	OJEU	Status
Membranes	030016-00-0402	Corrugated bitumen tiles/sheets		Pending for citation in OJEU
Membranes	030019-00-0402	Liquid applied roof waterproofing on the basis of polysiloxane	2017/C 118/04	Cited
Membranes	030065-00-0402	Composite roof waterproofing kit	2018/C 228/03	Cited
Membranes	030092-00-0605	Mineral non-flexible sealing slurry kit on the basis of cement	2018/C 370/05	Cited
Membranes	030155-00-0402	One component bitumen-polyurethane resin for flashing application	2018/C 417/07	Cited
Membranes	030218-00-0402	Membrane for use as roof underlay	2017/C 379/07	Cited
Membranes	030218-01-0402	Membrane for use as roof underlay		Pending for citation in OJEU
Membranes	030219-00-0501	Acoustic spray coating based on a water-based organic binder	Decision (EU) 2020/1574	Cited
Membranes	030271-00-0605	Humidity-dependent vapour control layers		Pending for citation in OJEU

Membranes	030295-00-0605	Flexible polymer modified mineral thick coating		Pending for citation in OJEU
Membranes	030350-00-0402	Liquid applied roof waterproofing kits	Decision (EU) 2020/1574	Cited
Membranes	030351-00-0402	Systems of Mechanically Fastened Flexible Roof Waterproofing Sheets	Decision (EU) 2019/896	Cited
Membranes	030352-00-0503	Liquid applied watertight covering kits for wet room floors and/or walls	Decision (EU) 2020/1574	Cited
Membranes	030378-00-0605	Fully bonded, pre-applied flexible sheet for waterproofing	Decision (EU) 2020/1574	Cited
Membranes	030400-00-0605	Waterproofing kit based on polymeric membranes for in- and outdoor walls and floors of wet areas and swimming pools	Decision (EU) 2020/962	Cited
Membranes	030436-00-0503	Watertight covering kits based on flexible sheets for wet room floors and/or walls	Decision (EU) 2020/1574	Cited
Membranes	030437-00-0503	Watertight covering kits based on inherently watertight boards for wet room floors and/or walls	Decision (EU) 2020/1574	Cited
Membranes	030588-00-1202	Three-layer polyethylene based (PE) coating for corrosion protection of steel pipes		Pending for citation in OJEU
Membranes	030675-00-0107	Liquid applied bridge deck waterproofing kits		Pending for citation in OJEU
Insulation	040005-00-1201	Factory-made thermal and/or acoustic insulation products made of vegetable or animal fibres	2016/C 054/14	Cited
Insulation	040007-00-1201	Thermal insulation products for buildings with radiant heat reflective component	2017/C 435/07	Cited
Insulation	040010-00-1201	Insulation product made of expanded perlite (EPB)	2018/C 090/04	Cited
Insulation	040011-00-1201	Vacuum insulation panels (VIP) with factory applied protection layers	2018/C 019/04	Cited

Insulation	040012-00-1201	Thermal insulation board made of mineral material	2018/C 281/04	Cited
Insulation	040012-01-1201	Thermal insulation board made of mineral material		Pending for citation in OJEU
Insulation	040016-00-0404	Glass fibre mesh for reinforcement of cement based renderings	2016/C 172/03	Superseded by 040016-01-0404
Insulation	040016-01-0404	Glass fibre mesh for reinforcement of cementitious or cement-based renderings	Decision (EU) 2021/1183	Cited
Insulation	040036-00-0501	Mineral pre-coated ceiling panels	Decision (EU) 2021/1183	Cited
Insulation	040037-00-1201	Low lambda composite boards made of mineral wool fibres and aerogel additives	2017/C 118/04	Cited
Insulation	040048-00-0502	Rubber fibre mat to be used for impact sound insulation	2015/C 378/02	Superseded by 040048-01-0502
Insulation	040049-00-0502	Polyurethane (PU) foam mat to be used for impact sound insulation	2018/C 228/03	Cited
Insulation	040049-01-0502	Polyurethane (PU) foam mat to be used for impact sound insulation		Pending for citation in OJEU
Insulation	040057-00-1201	Thermal insulation board made of microporous silica	2018/C 228/03	Cited
Insulation	040065-00-1201	Thermal insulation an/or sound absorbing boards based on expanded polystyrene and cement	2016/C 378/08	Cited
Insulation	040083-00-0404	External thermal insulation composite systems (ETICS) with renderings	Decision (EU) 2020/1574	Cited
Insulation	040089-00-0404	ETICS with renderings for the use on timber frame buildings	2017/C 118/04	Cited
Insulation	040090-00-1201	Factory-made boards and products formed by moulding of an expanded polylactic acid (EPLA) for thermal and/ or acoustical insulation	2016/C 248/06	Cited

Insulation	040138-00-1201	In-situ formed loose fill thermal and/or acoustic insulation products made of vegetable fibres	2016/C 172/03	Superseded by 040138-01-1201
Insulation	040138-01-1201	In-situ formed loose fill thermal and/or acoustic insulation products made of vegetable fibres.	2018/C 417/07	Cited
Insulation	040146-00-1201	Thermal insulation for buidlings made of straw bales		Pending for citation in OJEU
Insulation	040179-00-1201	Factory-made products of extruded, foamed Polyethylene terephthalate (PET) for thermal and or acoustical insulation		Pending for citation in OJEU
Insulation	040287-00-0404	Kits for external thermal insulation composite system (ETICS) with panels as thermal insulation product and discontinuous claddings as exterior skin	2018/C 019/04	Cited
Insulation	040288-00-1201	Factory-made thermal and acoustic insulation made of polyester fibres	2016/C 459/08	Cited
Insulation	040313-00-1201	In-situ formed loose fill thermal and/or acoustic insulation product made of granulated expanded cork	2017/C 118/04	Cited
Insulation	040369-00-1201	Insulation made of loose-fill or compound granulated expanded cork	2017/C 343/06	Cited
Insulation	040369-01-1201	Insulation made of loose-fill or compound granulated expanded cork or loose-fill granulated natural cork and rubber		Pending for citation in OJEU
Insulation	040394-00-1201	Factory made cellular glass loose fill	2018/C 049/04	Cited
Insulation	040419-00-1201	Thermal insulation board made of pressed rigid polyurethane foam	Decision (EU) 2020/1574	Cited
Insulation	040427-00-0404	Kits for external thermal insulation composite system (ETICS) with mortar as thermal insulation product and renderings or discontinuous claddings as exterior skin	Decision (EU) 2019/450	Cited
Insulation	040456-00-1201	In-situ formed loose fill thermal and/or acoustic insulation material made of animal fibres	2017/C 343/06	Cited

Insulation	040461-00-1201	Thermal insulation product made of loose fill expanded perlite (EP)	2018/C 281/04	Cited
Insulation	040465-00-0404	ETICS with renderings on mono-layer or multi-layer wall made of timber	Decision (EU) 2020/962	Cited
Insulation	040635-00-1201	Thermal and/or sound insulation based on bound expanded polystyrene bulk material	2017/C 379/07	Cited
Insulation	040643-00-1201	Fiber reinforced silica aerogel thermal insulation	2017/C 343/06	Cited
Insulation	040650-00-1201	Extruded polystyrene foam boards as load bearing layer and/or thermal insulation outside the waterproofing	2017/C 435/07	Cited
Insulation	040685-00-1201	Factory-made insulation on glass fibers' support loaded with silica amorphous		Pending for citation in OJEU
Insulation	040708-00-0402	Impact sound insulation mat with additional function of rainwater drainage and protection of external waterproofing layers		Pending for citation in OJEU
Insulation	040729-00-1201	Thermal insulation made of loose mineral wool	Decision (EU) 2020/962	Cited
Insulation	040759-00-0404	External thermal insulation composite system (ETICS) with rendering on boards based on polystyrene and cement	Decision (EU) 2021/1183	Cited
Insulation	040773-00-1201	Expanded polystyrene foam boards as load bearing layer and thermal insulation outside the waterproofing	2018/C 417/07	Cited
Insulation	040777-00-1201	Cellular glass boards as load bearing layer and thermal insulation outside the waterproofing	2017/C 435/07	Cited
Insulation	040831-00-1201	Factory-made bonded foam to be used as acoustic and thermal insulation		Pending for citation in OJEU
Insulation	040831-01-1201	Factory-made bonded foam to be used as acoustic and thermal insulation		Pending for citation in OJEU
Insulation	040868-00-0404	Rigid polyurethane foam (PUR) elements for fastening attachment parts in thermal insulation composite systems		Pending for citation in OJEU

Insulation	040914-00-0404	Veture kits – prefabricated units for external wall insulation and their fixing devices	Decision (EU) 2020/1574	Cited
Insulation	041094-00-1201	Open cell factory made rigid polyurethane foam (PUR) and polyisocyanurate foam (PIR) products for building equipment and industrial installations		Pending for citation in OJEU
Insulation	041125-00-1201	Load-bearing in-situ loose fill thermal and/or acoustic insulating products made of vegetable fibres to be used in floor constructions		Pending for citation in OJEU
Insulation	041369-00-1201	Insulating boards made of recycled PUR (polyurethane) to be used as acoustic and thermal insulation		Pending for citation in OJEU
Insulation	041389-00-1201	Boards made of agglomerated natural cork for thermal and acoustic insulation	Decision (EU) 2020/962	Cited
Insulation	041499-00-1201	Polyurethane elements to be used as thermal insulation frame around the PVC-U windows		Pending for citation in OJEU
Insulation	041559-00-1201	Thermal insulation and sound absorbing rendering/plastering		Pending for citation in OJEU
Insulation	041561-00-1201	In-situ formed thermal insulation made of mineral-based foam	Decision (EU) 2022/0381	Cited
Joints and connectors	050001-00-0301	Load bearing thermal insulating elements which form a thermal break between balconies and internal floors	2018/C 090/04	Cited
Joints and connectors	050003-00-0301	Pot bearing with special internal sealing for increased action effects		Pending for citation in OJEU
Joints and connectors	050004-00-0301	Spherical and cylindrical bearing with special sliding material made of UHMWPE (ultra high molecular weight polyethylene)	2018/C 090/04	Cited
Joints and connectors	050004-01-0301	Spherical and cylindrical bearing with special sliding material made of UHMWPE (ultra high molecular weight polyethylene)		Pending for citation in OJEU
Joints and connectors	050006-00-0301	Curved surface slider with special friction material		Pending for citation in OJEU

Joints and connectors	050009-00-0301	Spherical and cylindrical bearing with special sliding material made of fluoropolymer	2017/C 118/04	Cited
Joints and connectors	050013-00-0301	Spherical and cylindrical bearing with special sliding material made of filled PTFE with solid lubricant and reinforcing fibres	2017/C 435/07	Cited
Joints and connectors	050019-00-0301	Dowels for structural joints under static and quasi-static loading	Decision (EU) 2020/1574	Cited
Multifunctional, multilayer façade systems	090001-01-0404	Prefabricated compressed mineral wool boards with organic or inorganic finish and with specified fastening system		Pending for citation in OJEU
Multifunctional, multilayer façade systems	090017-00-0404	Point supported vertical glazing	2016/C 248/06	Cited
Multifunctional, multilayer façade systems	090018-00-0404	Reduced thermal bridge wall brackets as part of the subframe of ventilated external wall cladding systems		Pending for citation in OJEU
Multifunctional, multilayer façade systems	090019-00-0404	Kits for ventilated external wall claddings of lightweight boards on subframe with rendering applied in situ with or without thermal insulation	2018/C 019/04	Cited
Multifunctional, multilayer façade systems	090019-01-0404	Kits for ventilated external wall claddings made of expanded glass granulates or magnesium oxide boards on subframe, with rendering applied in situ, with or without thermal insulation		Pending for citation in OJEU
Multifunctional, multilayer façade systems	090020-00-0404	Kits for external wall claddings made of agglomerated stone	2017/C 118/04	Cited
Multifunctional, multilayer façade systems	090034-00-0404	Kit composed by subframe and fixings for fastening cladding and external wall elements	2017/C 343/06	Cited
Multifunctional, multilayer façade systems	090034-01-0404	Kit composed by subframe and fixings for fastening cladding and external wall elements		Pending for citation in OJEU

Multifunctional, multilayer façade systems	090035-00-0404	Insulated glass unit with structural sealant punctually anchored	2017/C 379/07	Cited
Multifunctional, multilayer façade systems	090040-00-0404	Cantilevered structural glass railing/balustrade	Decision (EU) 2022/0381	Cited
Multifunctional, multilayer façade systems	090058-00-0404	Ventilated external wall cladding kit comprising a metallic honeycomb panel and its associated fixings	2016/C 459/08	Cited
Multifunctional, multilayer façade systems	090062-00-0404	Kits for external wall claddings mechanically fixed	2018/C 417/07	Cited
Multifunctional, multilayer façade systems	090095-00-0404	Kit to establish a fully glazed corner to be used in facades in buildings		Pending for citation in OJEU
Multifunctional, multilayer façade systems	090097-00-0404	Kits for external wall claddings glued to the subframe		Pending for citation in OJEU
Multifunctional, multilayer façade systems	090101-00-0404	Cruciform glazing support to be used in curtain walls	2018/C 417/07	Cited
Multifunctional, multilayer façade systems	090119-00-0404	Kits for external wall cladding of mineral boards with rendering applied in situ	Decision (EU) 2019/450	Cited
Multifunctional, multilayer façade systems	090120-00-0404	Kits for non-load bearing mineral board external wall systems	Decision (EU) 2019/450	Cited
Multifunctional, multilayer façade systems	090125-00-0404	Kits for external wall claddings with laminated rigid cladding element		Pending for citation in OJEU

Multifunctional, multilayer façade systems	090203-00-0401	Sandwich roof panels with metallic facing, GFRP sheet and polyurethane core		Pending for citation in OJEU
Multifunctional, multilayer façade systems	300007-00-0404	Special mirrors		Pending for citation in OJEU
Cladding systems	220006-00-0402	Roofing slates made of polypropylene, limestone and fillers	2017/C 118/04	Cited
Cladding systems	220007-00-0402	Fully supported copper alloy sheet and strip for roofing, external cladding and internal lining	2016/C 054/14	Cited
Cladding systems	220008-00-0402	Eaves profiles for terraces and balconies	2016/C 248/06	Cited
Green roofs and green façades	220009-00-0401	Kits for green roofs		Pending for citation in OJEU
Cladding systems	220010-00-0402	Flat plastic sheets for fully supported discontinuous roofing and external cladding	2017/C 010/02	Superseded by 220010-01-0402
Cladding systems	220010-01-0402	Flat plastic roofing sheets made of recycled plastic for self-supporting and/or fully supported discontinuous roofing and/or external cladding	Decision (EU) 2020/962	Cited
Cladding systems	220013-00-0401	Self–supporting ridgelight	2016/C 459/08	Superseded by 220013-01-0401
Cladding systems	220013-01-0401	Self–supporting ridgelight	2017/C 343/06	Cited
Cladding systems	220018-00-0401	Decentralized energy efficient low-pressure ventilations unit with alternating flow and heat recovery	2017/C 379/07	Cited
Cladding systems	220020-00-0402	Low bitumen mass shingles, laminated or not, with mineral or synthetic reinforcement		Pending for citation in OJEU
Cladding systems	220021-00-0402	Tubular daylighting devices (TDD)	2015/C 378/02	Cited

Cladding systems	220022-00-0401	Polycarbonate snow stopper for roof	2017/C 010/02	Cited
Cladding systems	220025-00-0401	Cantilevered Structural horizontal glazing (structural glass canopy/roof)	2016/C 172/03	Cited
Cladding systems	220034-00-0607	Roof tile coupling system		Pending for citation in OJEU
Cladding systems	220062-00-0401	Rooflight with bonded or mechanically fastened cover glass	Decision (EU) 2020/962	Cited
Cladding systems	220069-00-0402	Flat and profiled (with a pattern) plastic roofing sheets made of recycled material for fully supported discontinuous roofing	2017/C 435/07	Cited
Cladding systems	220072-00-0401	Self supporting translucent roof and wall kits		Pending for citation in OJEU
Green roofs and green façades	220078-00-0401	Green roofing element made of plastic and its fixing devices		Pending for citation in OJEU
Cladding systems	220089-00-0401	Self-Supporting translucent roof kits with covering made of plastic sheets	Decision (EU) 2019/896	Cited
Cladding systems	220106-00-0402	Thin steel roof and wall cladding panels		Pending for citation in OJEU
Cladding systems	220116-00-0401	Fixed fire-resistant roof window	Decision (EU) 2020/962	Cited
Cladding systems	220122-00-0401	Ceiling window/Ceiling daylighting device		Pending for citation in OJEU
Cladding systems	220150-00-0401	Roof window with integrated balcony element		Pending for citation in OJEU
Joints and connectors	320001-00-0605	Joint sealing tape on the basis of a pre-compressed flexible polyurethane foam for sealing around windows and joints in building facades	2018/C 417/07	Cited
Joints and connectors	320002-00-0605	Coated metal water stop sheet for construction and controlled crack joints in waterproof concrete	2016/C 248/06	Superseded by 320002-01-0605

Joints and connectors	320002-01-0605	Coated metal water stop sheet for construction and controlled crack joints in waterproof concrete	2016/C 248/06	Superseded by 320002-02-0605
Joints and connectors	320002-02-0605	Coated metal water stop sheet for construction and controlled crack joints in waterproof concrete	2016/C 459/08	Cited
Joints and connectors	320008-00-0605	Swellable joint sealing tape on the basis of bentonite for construction joints in watertight concrete	2017/C 118/04	Superseded by 320008-01-0605
Joints and connectors	320008-01-0605	Swellable joint sealing tape on the basis of swellable materials for construction in watertight concrete	2018/C 417/07	Cited
Joints and connectors	320014-00-0605	Joint sealing profile made of EPDM for the sealing of joints in tubbing constructions		Pending for citation in OJEU

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Appendix 2: CE marking barriers questionnaire

Focchi:

- only required test for Curtain wall facade CE is EN 13830. Additional tests are needed for various local norms, they mentioned EN 16283-3, EN 10848, EN 717-1, EN 12152, EN 12153, EN 12154, EN 12155, EN 12179, EN 14019, EN 13049, EN 13116.
- main problem they see is integration of other tech – what can be replaced and what can not be in a tested configuration, what certification is required from the suppliers if it can be replaced without retesting
- integration of electrical systems and hardware – CE and/or other certification of the system itself or part of the façade
- Software; they are unclear if controlling software certification is required or what is the legal framework surrounding it

Flexbrick:

- The original system is already CE certified
- They want to attach solar cell PV to the system and are unsure of certification; does the whole system need CE recertification or is CE of added PV enough
- Possible certification problems with electrical systems attached to PV if system recertification is not needed
- Unusure of governing EAD, will require ETA in future

Tecnan:

- They foresee no major problems with CE certifications and are generally aware of governing standards

Flex and Robust:

- Will likely require a specific EAD as they're unaware of any category they could fit currently
- Any precedent on polyurethane glue or sealant is welcomed

Indresmat:

- Two products; polyurethane insulation foam and polyurethane window frames
- **Polyurethane insulation** foam is straightforward in CE certification
- They want to find or create a way to market their polyurethane as a "green(er)" alternative to other PU foams, current starting points are ASTM 1678 and EN 45545-2 standards and ZAG experimental research
- **Polyurethane window frames** don't fit any current testing class (PVC/wood/aluminium)
- Likely will require an EAD as they foresee problems in some current requirements, eventually they hope for a new class in the general window standard

Heliatek:

- They want CE for both of their products and generally foresee no major problems
- Some questions regarding electrical systems

Windowmaster, Velux and Riko Hiše did not respond to any queries.

Appendix 3: Case study

Technical basis for the development of the reaction to fire assessment procedures of FlexbrickPV within the CE marking framework

1. Introduction

From the reaction to fire tests and classification of the external skin façade system FlexbrickPV, carried out in the framework of Task 3.4, the following conclusions can be drawn in relation to the certification procedures for CE marking of an innovative constructive system:

- Within the CE marking framework under CPR (EU) 305/2011[2], the testing and classification of the reaction to fire is ruled by the classification standard EN 13501-1[3] and the associated test methods.
- However, the test specimens mounting and fixing rules, the criteria for evaluation of a specific product or system and the provisions for establishing the field of application of the obtained classification are given in the relevant product Technical Specification (EN or EAD).
- In the case of the external skin façade system FlexbrickPV, no product standard (EN) exists and, therefore, the above-mentioned criteria for testing and assessing the reaction to fire in accordance with EN 13501-1 shall be established in an EAD (European Assessment Document).
- Development of such an EAD (including the clauses relating to the reaction to fire assessment) is necessary in order to CE mark the façade system FlexbrickPV.

Therefore, after the testing campaign in T3.4 of the façade system FlexbrickPV, some initial findings were made to complement the reaction to fire European classification system and testing methodology, especially in relation to the testing adjustments needed for the photovoltaic system, which is not yet standardised in the European framework.

The criteria given in the next section are based on the current state-of-art and available technical knowledge, for example as given in the EOTA Technical Report 078[4], and could be used as the technical basis to establish the necessary assessment procedures in a future development of a European Assessment Document (EAD) for the CE marking of the façade system FlexbrickPV. Similarly, these criteria could also serve as the technical basis for the assessment procedures related to the reaction to fire within the scope of a National Approval.

[2] Repealed by Regulation (EU) 2024/3110 in the terms given in the new regulation. The entry in force of the new regulation in January 2026 does not affect the contents of this chapter.

[3] EN 13501-1 Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests.

[4] EOTA TR 078 Determination of fire-related characteristics of external wall cladding in EADs.

2. Technical basis to develop the reaction to fire assessment procedures

From the lessons learned in the reaction to fire tests (EN 13823[5] and EN ISO 11925-2[6]) of the external skin façade system FlexbrickPV (see D3.4), the following technical criteria are identified for its use as the basis for development of the reaction to fire assessment procedures in an EAD or a National Approval. However, the analysis carried out could need to be confirmed by further testing or technical approval to meet the relevant regulatory requirements. In the case of an EAD development, the criteria will need to be agreed within EOTA[7] and endorsed by the European Commission, during the EAD publication procedure.

In addition to the reaction to fire classification of the façade system FlexbrickPV, it is also recommended that the reference Technical Specification (EAD) or National Approval considers the façade fire real scale test methods (e.g., in accordance with the British standard BS 8414[8] or the ISO 13785-1[9]).

The identified assessment criteria are as follows:

- Ceramic tiles: the dimensions of the pieces do not affect the system performance, as long as they are fully ceramic (in case the tile is provided with a rear side reinforcing mesh embedded in a resin layer, this rear layer has a relevant impact on the reaction to fire behaviour of the tile and of the system, and thus the thickness and PCS of the back side resin layer become relevant).
- PV panel:
  - Every type of PV panel shall be tested (e.g., glass-glass or glass-foil).
  - The thickness of the glass panes may have an influence on the reaction to fire performance (worst case: minimum thickness)
  - The thickness of the plastic and/or adhesive interlayers may have an influence on the reaction to fire performance (worst case: maximum thickness).
  - Different colours of the PV panel may have an influence on the reaction to fire performance.
- Sealing, protective frame of the PV panel: the material type and applied quantity (end-use dimensions) may have an influence on the reaction to fire performance (worst case: maximum PCS[10] of the sealing material and maximum quantity (dimensions)).
- Cables: the electric cables reaction to fire according to EN 13501-6[11], the quantity and position, may have an influence on the reaction to fire performance of the system (worst case: worst reaction to fire class of the cables and maximum quantity).

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5 EN 13823 Reaction to fire tests for building products - Building products excluding floorings exposed to the thermal attack by a single burning item.

6 EN ISO 11925-2 Reaction to fire tests - Ignitability of products subjected to direct impingement of flame - Part 2: Single-flame source test.

7 EOTA. European Organisation for Technical Assessment.

8 BS 8414 Fire performance of external cladding systems. Test method for non-loadbearing external cladding systems fixed to, and supported by, a masonry substrate.

9 ISO 13785-1 Reaction-to-fire tests for façades. Part 1: Intermediate-scale test.

10 Calorific value (MJ/kg) determined in accordance with EN ISO 1716.

11 EN 13501-6 Fire classification of construction products and building elements - Part 6: Classification using data from reaction to fire tests on power, control and communication cables.

- Junction box, bullet connector and sealant for cables connection to PV panel: the material type and applied quantity (end-use dimensions) may have an influence on the reaction to fire performance (worst case: maximum PCS of the components and maximum quantity (dimensions)).
- The configuration of the external skin façade system FlexbrickPV in relation to the quantity (density) of tiles installed on the supporting steel mesh is deemed as not affecting the reaction to fire performance. Ceramic tiles without PV panels can also be installed without adverse effect.
- Joints: the vertical separation between ceramic tiles may have an influence on the reaction to fire performance (worst case: minimum distance); horizontal separation between ceramic tiles is deemed as not influencing the reaction to fire.
- The ventilated air gap behind the ceramic tiles skin may have an influence on the reaction to fire performance. Minimum and maximum air gap thickness shall be considered.
- The substrate where the external skin façade system FlexbrickPV is installed may have an influence on the reaction to fire performance. Rules in EN 13238[12] and EOTA TR078 shall be followed.
- Steel mesh: changes in the steel type and mesh dimensions are deemed as not influencing the reaction to fire performance.

[12] EN 13238 Reaction to fire tests for building products - Conditioning procedures and general rules for selection of substrates.