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WORKSHOP

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AGREEMENT

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Innovative and adaptable envelopes over existing façades in building refurbishment - Design, economic assessment, logistics and installation guidelines

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European foreword

This Workshop Agreement has been proposed by the BRESAER consortium (www.bresaer.eu), which is developing a Horizon 2020 project to design, develop and demonstrate an innovative, cost-effective, adaptable and industrialized envelope system for buildings refurbishment including combined active and passive prefabricated solutions integrated in a structural mesh.

This CWA is a technical agreement, developed and approved by an open, independent Workshop structure within the framework of the CEN-CENELEC system, developed in accordance with the CEN-CENELEC Guide 29 "CEN-CENELEC Workshop Agreements" and with the relevant provisions of **CEN-CENELEC** Internal Regulations – Part 2.

This CWA was agreed on 2019-01-29 through a decision adopted by representatives of interested parties, approved and supported by CEN following a public call for participation made on 2019-02-26. It reflects the agreement only of the registered participants responsible for its content, and it does not necessarily reflect the views of all stakeholders that might have an interest in its subject matter. The secretariat of the CEN Workshop that developed this CWA was the Spanish Association for Standardisation (UNE).

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Introduction

The current building stock of the EU has an enormous potential for improvement of the energy efficiency and the application of renewable energy systems, making the transformation of that building stock into energy efficient buildings essential to the climate and energy objectives established in the European 2020 Strategy:

- a) 20% target for GHG reductions.
- b) 20% of EU energy to be sourced from renewables.
- c) 20% reduction in energy use

The industry sector can improve its technological competence, particularly aiming at producing solutions that require less energy. By doing so, the industry sector becomes ready to reach these environmental goals. In addition, this will also contribute to increase the competitiveness of the European construction sector in a global competitive environment. The construction industry however, due to its economic model and long time needed to finish a product and obtain payback, has the particularity that it cannot experiment widely with new technologies. It will do so unless they have been proven, there are guarantees they will perform better than traditional ones in the long term, that they comply with regulations and that there are incentives for their application (reduced costs when compared to traditional technologies).

Since the building envelope (façade and roof) is usually a passive boundary between the indoor and outdoor climate, an 'active' envelope responds to (and anticipates on) changes in indoor and outdoor conditions. Therefore the envelope is key element to address in order to significantly increase the energy efficiency and the use of renewable energy in the building sector.

Standardisation, through CEN/TC 89 and CEN/TC 371, is contributing to reduce the use of non-renewable resources and the emission of CO_2 to the atmosphere in support of the EU Directive on Energy Performance of Buildings (EPBD), developing test methods related to the energy use and thermal performance of buildings. Its scope and the objectives of this workshop are closely related.

Advanced technologies achieve considerable gains concerning the energetic efficiency of building envelopes. This concerns both new buildings and the energetic retrofitting of existing ones. Better insulation of buildings is not only increasing their energy efficiency in cold climates but also in warm and hot regions due to the reduction of cooling (AC) power. The use of renewable energy in the building sector has been traditionally dominated by the application of solar domestic hot water and PV systems in new buildings for single-family houses and small non-residential buildings, omitting the existing building stock. Hence, integrated retrofitting concepts can contribute to take advantage of the potential in the existing stock of both residential and non-residential buildings. Concepts easily implemented and versatile as building envelope to integrate both active and passive solutions using prefabricated and adapted existing technologies, as well as technologies tailored for the building use, are needed.

This workshop is a result of the Horizon 2020 BRESAER project (Breakthrough solutions for adaptable envelopes for building refurbishment), whose general objective is to design, develop and demonstrate an innovative, cost-effective, adaptable and industrialized envelope system for buildings refurbishment including combined active and passive prefabricated solutions integrated in a structural mesh. The BRESAER system has the potential to solve the problem of the construction sector with respect the utilisation of innovative solutions, by using a combination of known and novel technologies, having potential for success when applied in building refurbishment projects.

1 Scope

This CEN Workshop Agreement (CWA) provides orientation for the:

- design process of an innovative and adaptable envelope over existing façades for building refurbishment, describing the possible different technologies and components, and providing guidelines on the selection criteria, limitations for the implementation, estimated costs and payback calculations. This information is intended to help building envelope designers to make informed decisions considering the building particularities.
- production, transport, storage and installation aspects for each system component of an innovative and adaptable envelope for building refurbishment, providing advice for installers on the overall logistics for the real implementation.
- assessment and evaluation of innovative and complex envelope system at building level that is not completely addressed by existing standards. Tests to be selected to feasibly asses an envelope system composed by different components.

This CWA is not designed to support European legislative requirements, such as the Construction Products Regulation 305/2011, or to address issues with significant health and safety implications. CEN and CENELEC are not accountable for its technical content or any possible conflict with national standards or legislation.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 10346, Continuously hot-dip coated steel flat products for cold forming - Technical delivery conditions

EN 10169, Continuously organic coated (coil coated) steel flat products - Technical delivery conditions

3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1.1

innovative and adaptable envelope

combination of active and passive prefabricated constructive solutions integrated into a structural mesh and installed over an existing façade of a building to improve its energy performance

3.1.2

dynamic window with automated solar blinds

window equipped with blinds capable of auto-adapting to external climate conditions and day-night cycles to improve the energy consumption of a building

3.1.3

multifunctional insulated panel

precast fibre reinforced concrete panel with a layer of thermal insulation capable to receive different finishes, as photovoltaic panels or a combined thermal reflective and photocatalytic functional coating