


**IRISH AGRÉMENT BOARD
CERTIFICATE NO. 19/0413**

Carbon 2030 Energy Savings Ltd
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KLEIB External Insulation Systems

Système d'isolation pour murs extérieurs Wärmedämmung für Außenwand

NSAI Agrément (Irish Agrément Board) is designated by Government to issue European Technical Approvals.

NSAI Agrément Certificates establish proof that the certified products are '**proper materials**' suitable for their intended use under Irish site conditions, and in accordance with the **Building Regulations 1997 to 2019**.

PRODUCT DESCRIPTION:

This Certificate relates to the KLEIB External Insulation Systems. The systems are comprised of:

- Surface preparation of masonry or concrete substrate;
- Full system beads and render only beads;
- Insulation boards (expanded polystyrene);
- Base coat with reinforcement;
- Decorative finishes (mineral, acrylic, silicate-silicone, silicone, siloxane, mosaic);
- Mechanical fixings;
- Adhesive fixings;
- Weather tight joints;
- Movement joints;
- Provision for limiting cold bridging at external junctions in compliance with Acceptable Construction Details published by the DHPLG.
- Provision for fire stopping at external compartment walls and floors.

KLEIB Sp. Z o o. is responsible for the manufacture and supply of all components to approved specifications.

KLEIB Sp. Z o o. has appointed Carbon 2030 Energy Savings Ltd as their distribution partner in Ireland.

The system is designed by Carbon 2030 Energy Savings Ltd on a project specific basis in accordance with an approved design process.

The installation of the system is carried out by installers who have been trained by Carbon 2030 Energy Savings Ltd, and are approved by Carbon 2030 Energy Savings Ltd and NSAI Agrément to install the system. Applicators must adhere to strict installation guidelines as specified by Carbon 2030 Energy Savings Ltd.

This Certificate certifies compliance with the requirements of the Building Regulations 1997 to 2019.

USE

KLEIB External Insulation Systems are for the external insulation of existing concrete or masonry dwellings.

The KLEIB External Insulation Systems are suitable for use up to a maximum of six storeys (18m) in height in purpose groups 1(a), 1(c), 1(d), 2(a), 2(b), 3, 4(a) and 4(b), and for use up to a maximum of five storeys (15 metres) in height in purpose group 1(b), as defined in TGD to Part B of the Building Regulations 1997 to 2019.

The systems have not been assessed for use with timber frame or steel frame construction, or for new dwellings.

MANUFACTURE, DESIGN & MARKETING:

The system is designed and manufactured by:

KLEIB Sp. Z o o.,
Pikutkowo 43,
87-880 Brześć Kujawski,
Poland.

Project specific design, technical support, sales, and applicator approval are performed by:

Carbon 2030 Energy Savings Ltd,
Central Chambers,
Dame Street,
Dublin 2.
E: carbon2030energysavingsltd@gmail.com

1.1 ASSESSMENT

The external insulation systems included in this Certificate, which have been tested in accordance with the requirements of ETAG 004 (ref. ETA 16/0978), have been assessed against the specific requirements of the Irish Building Regulations, including method of installation, approval and training of installers, and maintenance requirements of the installed system.

In the opinion of NSAI Agrément, KLEIB External Insulation Systems, when installed by Carbon 2030 Energy Savings Ltd trained and approved contractors registered with NSAI, in accordance with this Certificate and Carbon 2030 Energy Savings Ltd specific design, can meet the requirements of the Building Regulations 1997 to 2019, as indicated in Section 1.2 of this Agrément Certificate.

1.2 BUILDING REGULATIONS 1997 to 2019

APPLICABLE CLAUSES:

Part D – Materials and Workmanship

D3 – Proper Materials

KLEIB External Insulation Systems, as certified in this Certificate, are comprised of 'proper materials' fit for their intended use.

D1 – Materials & Workmanship

KLEIB External Insulation Systems, as certified in this Certificate, meet the requirements for workmanship.

Part A - Structure

A1 – Loading

KLEIB External Insulation Systems, once appropriately designed and installed in accordance with this Certificate, have adequate strength and stability to meet the requirements of this Regulation.

A2 – Ground Movement

KLEIB External Insulation Systems can be incorporated into structures that will meet this requirement.

Part B – Fire Safety

B4 – External Fire Spread

Part B Vol 2 – Fire Safety

B9 – External Fire Spread

KLEIB External Insulation Systems can be incorporated into structures that will meet this requirement.

Part C – Site Preparation and Resistance to Moisture

C4 – Resistance to Weather and Ground Moisture

External walls have adequate weather resistance in all exposures to prevent the passage of moisture from the external atmosphere into the building.

Part F – Ventilation

F2 – Condensation in Roofs

The systems as certified can be incorporated into structures that will meet the requirements of this Regulation.

Part J – Heat Producing Appliances

J3 – Protection of Building

When KLEIB External Insulation Systems are used in accordance with this Certificate, wall lining, insulation and separation distances meet this requirement.

Part L – Conservation of Fuel and Energy

L1 – Conservation of Fuel and Energy

The walls of KLEIB External Insulation Systems can be readily designed to incorporate the required thickness of insulation onto existing buildings to meet the Elemental Heat Loss method calculations for walls as recommended in TGD to Part L of the Building Regulations 1997 to 2019.

L2 – Conservation of Fuel and Energy

At interface junctions at windows and at junctions between elements, the KLEIB system installation details have been assessed, and when installed in accordance with this Certificate and the Certificate holder's approved installation details, excessive heat losses and local condensation problems associated with thermal bridging will be avoided.

2.1 PRODUCT DESCRIPTION

Table 1 lists the full components of the KLEIB External Insulation Systems.

The systems are applied vertical external surfaces of brick or rendered masonry walls. They can also be fixed on surfaces of horizontal or inclined surfaces provided that they are not directly exposed to precipitation. These may include ceilings over passageways, internal walls and roofs (on the ceiling side) of garages or cellars adjacent to heated rooms.

The substrate on which KLEIB External Insulation Systems will be used must have a reaction to fire class A1 or A2-s1 d0 in accordance with I.S. EN 13501-1.

2.2 MANUFACTURE, SUPPLY AND INSTALLATION

KLEIB Sp. Z o o. is responsible for the manufacture of all components to approved specifications. KLEIB Sp. Z o o. has appointed Carbon 2030 Energy Savings Ltd as distribution partner in Ireland, with responsibility for:

- Project specific design in accordance with approved design process;
- Preliminary project assessment incorporating wind load calculations, U-value calculations, condensation risk analysis, impact resistance, substrate suitability and pull-out testing of fixings;
- Training, monitoring and review of licensed applicators in accordance with approved training and assessment procedures;
- Product supply and documentation control;
- Technical support and installation supervision;
- Sales and marketing.

The installation of KLEIB External Insulation Systems is carried out by Carbon 2030 Energy Savings Ltd trained and approved installers in accordance with Carbon 2030 Energy Savings Ltd project specific specifications and method statements. Installers must also be approved and registered by NSAI Agrément under the NSAI Agrément External Thermal Insulating Composite Systems (ETICS) Approval Scheme.

2.2.1 Quality Control

The manufacturer operates a quality management system, and Carbon 2030 Energy Savings have a quality plan for system design and system installation.

2.3 DELIVERY, STORAGE AND HANDLING

The insulation is delivered to site in packs. Each pack is marked with the manufacturer's details, product identification marks and batch numbers. See Table 1 for the designation code that must be included on the insulation identification label.

Each container for other components, e.g. renders, adhesives etc., bears the manufacturer's and the product's identification marks and batch number, and the NSAI Agrément logo incorporating the Certificate number.

Insulation should be stored on a firm, clean, dry and level base, which is off the ground. The insulation should be protected from prolonged exposure to sunlight by storing opened packs under cover in dry conditions or by re-covering with opaque polythene sheeting. Care must be taken when handling the insulation boards, to avoid damage and contact with solvents or bitumen products. The boards must not be exposed to ignition sources.

Mesh-cloth, primers, renders, paints, texture synthetic finish coatings and sealants should be stored in accordance with the manufacturer's instructions, in dry conditions, at the required storage temperatures. They should be used within the stated shelf life.

2.4 INSTALLATION

2.4.1 Approved Installers

Installation shall be carried out by Carbon 2030 Energy Savings Ltd trained applicators who are registered with NSAI Agrément.

2.4.2 General

Carbon 2030 Energy Savings Ltd prepare a site package for each project, in accordance with the NSAI Agrément ETICS Approval Scheme. Deviations must be approved by a Carbon 2030 Energy Savings Ltd technical representative. Carbon 2030 Energy Savings Ltd technical representatives will visit each site on a regular basis to ensure that work is carried out in accordance with the project specific site package, including the Certificate holder's installation manual. Carbon 2030 Energy Savings Ltd guarantee and home owner's manual will be issued on successful completion and sign-off of completed projects.

Lamella fire stop must be protected from moisture prior to and during installation. It may be necessary to remove and replace any unsuitable/wet material.

External works that leave the external appearance of the building inconsistent with neighbouring buildings may require planning permission. The status of this requirement should be checked with the local planning authority as required.

To maximise thermal performance, reference should be made to the requirements of Section 2 of the Acceptable Construction Details document (ACD).

2.4.3 Site Survey and Preliminary Work

A comprehensive pre-installation site survey of the property shall be carried out in accordance with the NSAI Agrément ETICS Approval Scheme.

The substrate must be free of water repellents, dust, dirt, efflorescence and other harmful contaminants or materials that may interfere with the adhesive bond. Remove projecting mortar or concrete parts mechanically as required. Where the substrate contains dash, it must be levelled as much as possible with a layer of adhesive base coat prior to the application of the insulation boards.

Where discrepancies exist preventing installation of the system in accordance with this Certificate and the Certificate holder's instructions, these discrepancies must be discussed with the Certificate holder and a solution implemented with the approval of the Certificate holder.

2.4.4 Procedure

The systems must be installed in accordance with the Certificate holder's instructions. Key points include:

- Weather conditions must be monitored to ensure correct application and curing conditions. Renders (adhesives, base coats, primers, finish coats) must not be applied if the temperature is below 5°C or above 25°C at the time of applications. In addition, cementitious-based renders must not be applied if the temperature will be below 0°C at any time during 72 hours after application; cement-free, synthetic-resin and silicone-resin plasters must not be applied if the temperature will be below 5°C at any time during 72 hours after application; silicate plasters must not be applied if the temperature will be below 8°C at any time during 72 hours after application.
- Until fully cured, the coatings must be protected from rapid drying, precipitation, direct sunlight and strong wind.
- To avoid thermal bridging, ensure a tight adhesive free joint connection between adjacent insulation boards. Foam filler approved by the Certificate holder may be used for filling gaps up to 5mm. Larger gaps should be avoided, where larger gaps greater than 5mm cannot be practically avoided these gaps

shall be filled with ETICS insulation material cut to size and sufficiently fixed to substrate.

- Window and door reveals should, where practicable, be insulated to minimise the effects of cold bridging in accordance with the recommendations of the Acceptable Construction Details Document published by the DHPLG, Detail 2.21, to achieve a minimum R-value of 0.6m²K/W. Ideally windows should be moved forward to the plane of the external insulation to limit the effects of thermal bridging at the reveal. Where clearance is limited, strips of approved insulation should be installed to suit available margins and details recorded as detailed in Section 4.5 of this Certificate.
- Refer to the Certificate holder's instructions and the project specific site package regarding the installation method and location of the SS fixings through the reinforcing mesh where fire stops have been installed. Additional layers of mesh are also applied at these locations. Stainless steel fire fixings to be provided at a rate of one per square metre above two stories. The fixing design should take account of the extra duty required under fire conditions.
- Purpose-made powder coated aluminium window sills are installed in accordance with the Certificate holder's instructions. These sills incorporate an insulation board fixed between them and the existing sill to limit the effects of thermal bridging. They are designed to prevent water ingress and incorporate drips to shed water clear of the system.
- All necessary post-application inspections should be performed and the homeowner's manual completed and handed over to the homeowner accordingly.

Components		Coverage (kg/m ²)	Thickness (mm)
Insulation	Expanded Polystyrene Insulation Board EPS-EN13163-T1-L2-W2-S5-P5-DS(N)2-DS(70,-)2-BS75-TR80 Reaction to fire Class E, Declared thermal conductivity ($\lambda_{90/90}$) 0.039W/mK standard white and 0.031W/mK graphite enhanced, apparent density $\leq 25\text{kg/m}^3$, diffusion factor (μ) 20 to 40	-	20 - 300
Adhesives	KLEIB C1 Cement based powder requiring addition of 0.18-0.20 l/kg of water KLEIB C2 Cement based powder requiring addition of 0.18-0.20 l/kg of water KLEIB C2 EXTRA Cement based powder requiring addition of 0.18-0.20 l/kg of water KLEIB C2B Cement based powder requiring addition of 0.18-0.20 l/kg of water	4.0 to 5.0 (powder) 3.0 to 4.0 (powder) 3.0 to 4.0 (powder) 3.0 to 4.0 (powder)	-
Plinth Insulation (Below DPC)	Extruded Polystyrene Insulation (XPS) XPS-EN 13164 CFC/HCFC-free, Fire Class 3	-	30 - 200
Anchors	Anchors (supplementary mechanical fixings) issued according to ETAG 014	-	-
Base Coats	KLEIB C2 Cement based powder requiring addition of 0.18-0.20 l/kg of water KLEIB C2 EXTRA Cement based powder requiring addition of 0.18-0.20 l/kg of water KLEIB C2B Cement based powder requiring addition of 0.18-0.20 l/kg of water	3.0 to 4.0 (powder) 3.0 to 4.0 (powder) 3.0 to 4.0 (powder)	3.0 – 5.0
Reinforcement	Standard glass fibre mesh: 122 covered by ETA 16/0546, mass per unit area 160g/m ² or 165g/m ² , mesh size 4.6 x 4.2mm (See Annex 2 of ETA 16/0978)	-	-
Key Coats	KLEIB C3 Ready to use liquid to be used with mineral, acrylic, siloxane and mosaic finishing coats KLEIB C3S Ready to use liquid to be used with silicate-silicone finishing coats KLEIB C3SIL Ready to use liquid to be used with silicone finishing coats	0.25 to 0.35 0.25 to 0.35 0.25 to 0.35	- - -
Finishing Coats	White mineral finishing coat KLEIB C4 Cement based powder requiring addition of 0.23-0.25 l/kg of water, floated structure Max particle size: 1.5, 2.0mm Grey mineral finishing coat KLEIB C4S Cement based powder requiring addition of 0.23-0.25 l/kg of water, floated structure Max particle size: 1.5, 2.0mm Acrylic finishing coat KLEIB C5 Ready to use paste – acrylic binder, floated structure Max particle size: 1.0mm 1.5mm 2.0mm Silicate-silicone finishing coat KLEIB C6 Ready to use paste – silicate-silicone binder, floated structure Max particle size: 1.0mm 1.5mm 2.0mm	2.4 to 2.7 2.4 to 2.7 1.7 to 2.5 2.5 to 3.0 3.0 to 3.5 1.7 to 2.5 2.5 to 3.0 3.0 to 3.5	Regulated by particle size

Table 1: KLEIB Component Specification

Components		Coverage (kg/m ²)	Thickness (mm)
Finishing Coats	Silicone finishing coat KLEIB C7 Ready to use paste – silicone-acrylic binder, floated structure Max particle size: 1.0mm 1.5mm 2.0mm	1.7 to 2.5 2.2 to 2.7 3.0 to 3.4	Regulated by particle size
	Siloxane finishing coat KLEIB C8 Ready to use paste – siloxane-acrylic binder, floated structure Max particle size: 1.0mm 1.5mm 2.0mm	1.7 to 2.1 2.1 to 2.5 2.8 to 3.2	
	Mosaic finishing coats KLEIB M9 Mosaic structure: 1.0 to 1.6mm	3.1 to 3.5	
	KLEIB M10 Mosaic structure: 0.8 to 1.2mm 1.0 to 1.6mm	3.1 to 3.5 3.3 to 3.6	
Decorative Coats	Acrylic paint KLEIB Q1 Ready to use pigmented liquid to be used optionally with acrylic finishing coats	0.25 to 0.35	-
	Silicate paint KLEIB Q2 Ready to use pigmented liquid to be used optionally with mineral or silicate-silicone finishing coats	0.25 to 0.35	
	Silicone paint KLEIB Q3 Ready to use pigmented liquid to be used optionally with mineral or silicone finishing coats	0.25 to 0.35	
	Siloxane paint KLEIB Q4 Ready to use pigmented liquid to be used optionally with mineral or siloxane finishing coats	0.25 to 0.35	
Ancillary Materials	Ancillary materials in accordance with Clause 3.2.2.5 of ETAG 004. Remain under the manufacturer’s responsibility.		

Table 1 continued: KLEIB Component Specification

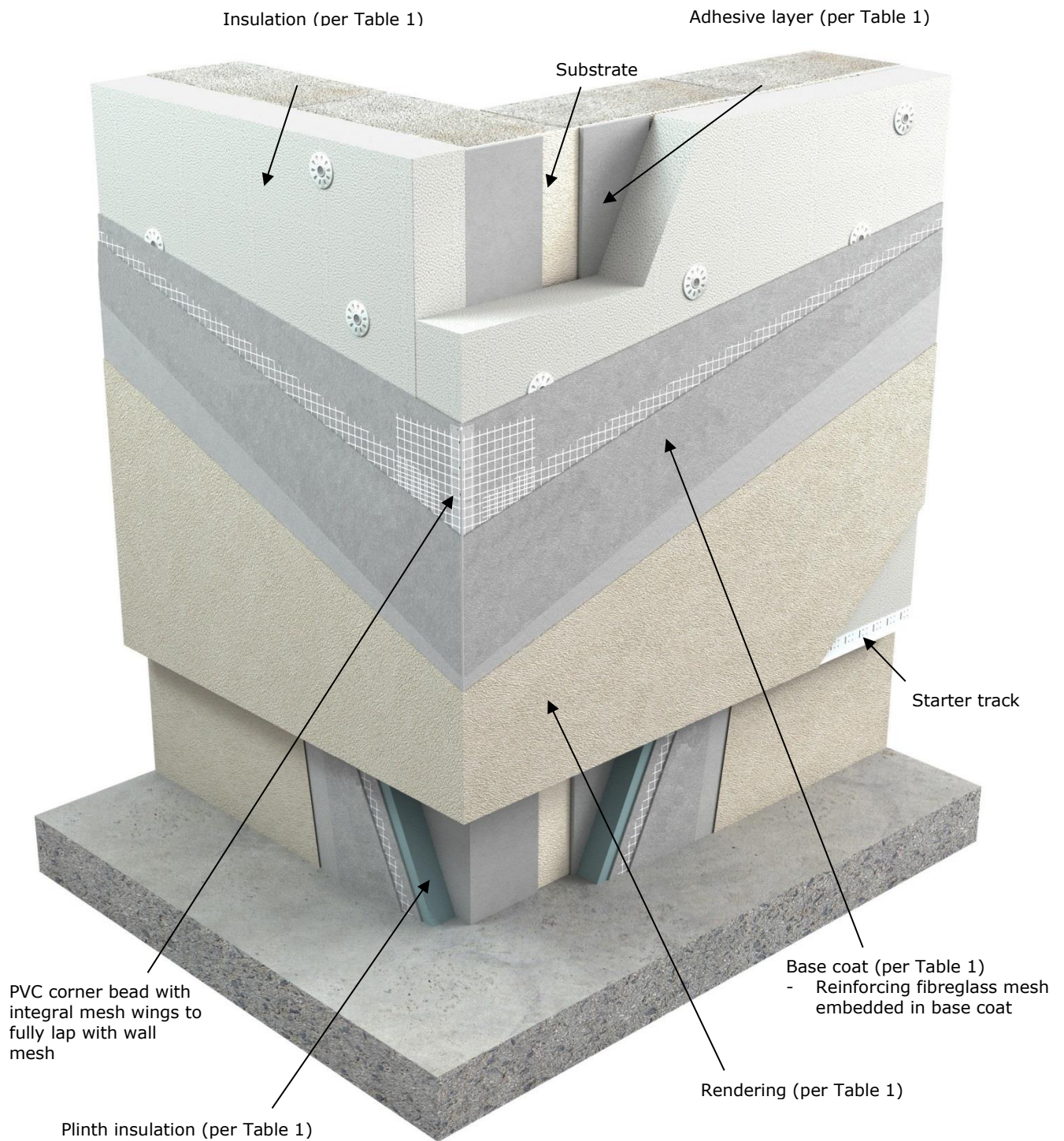


Figure 1: Build-up of System Components

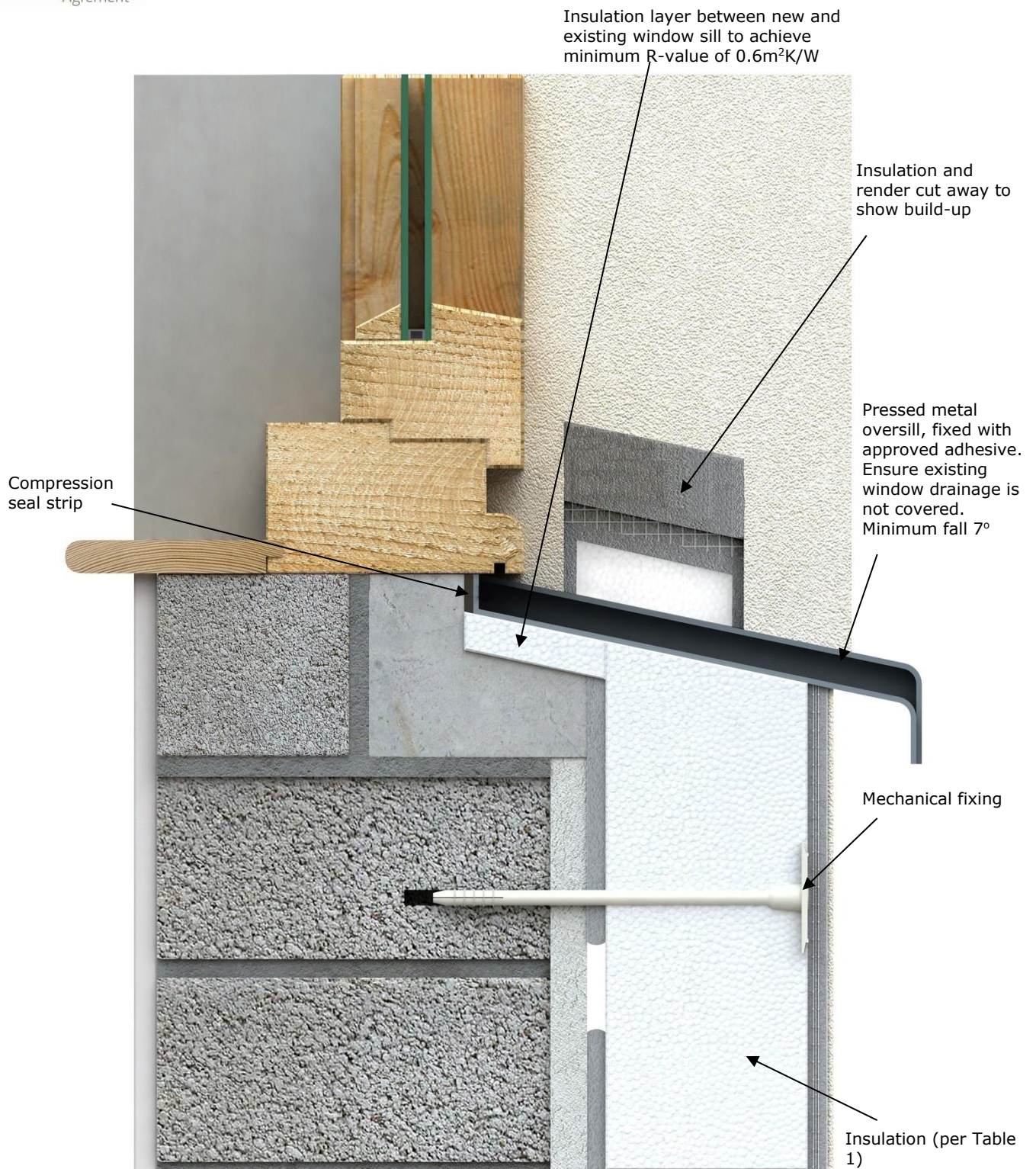


Figure 2: Window Sill Detail

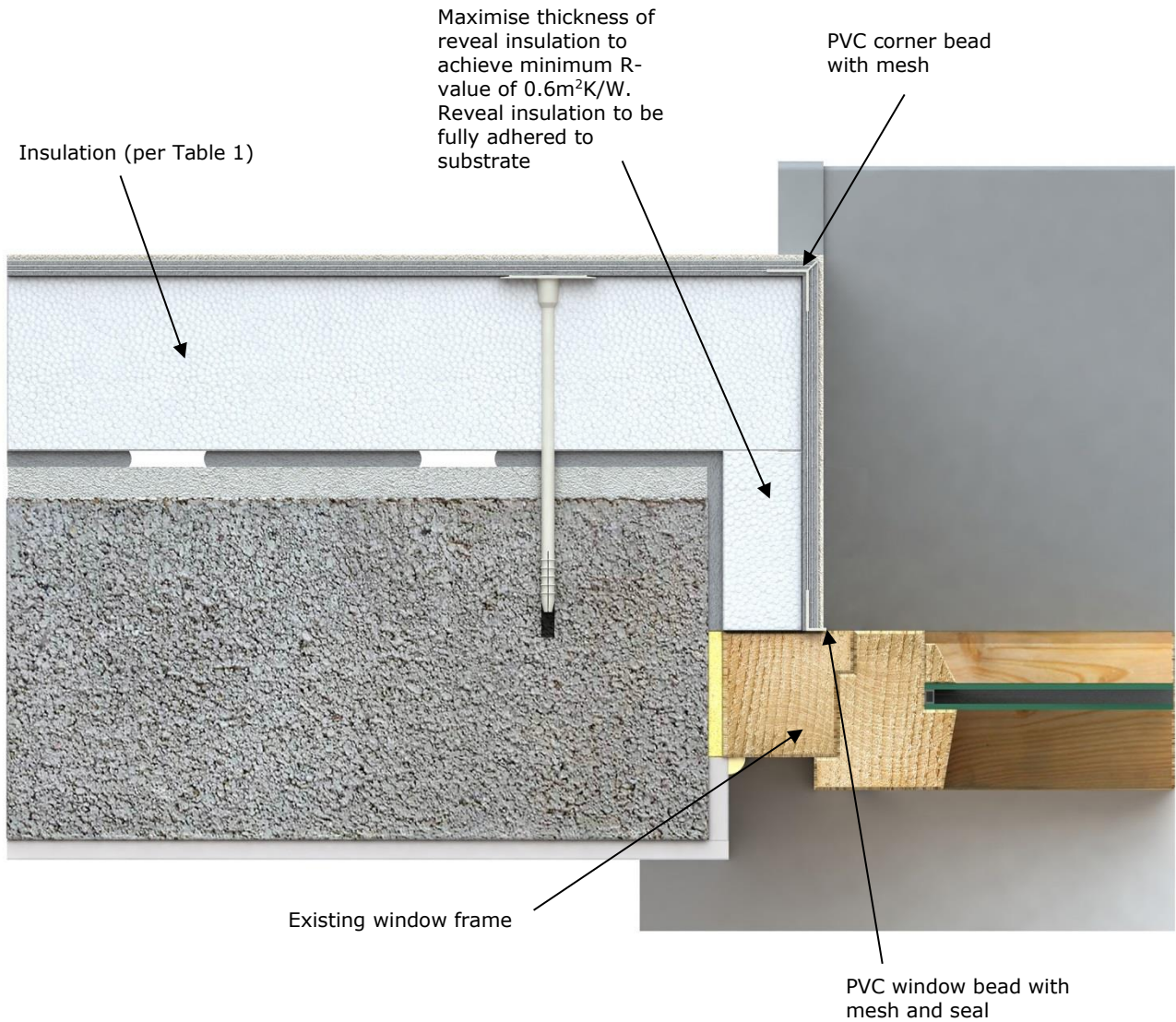


Figure 3: Window Reveal Detail

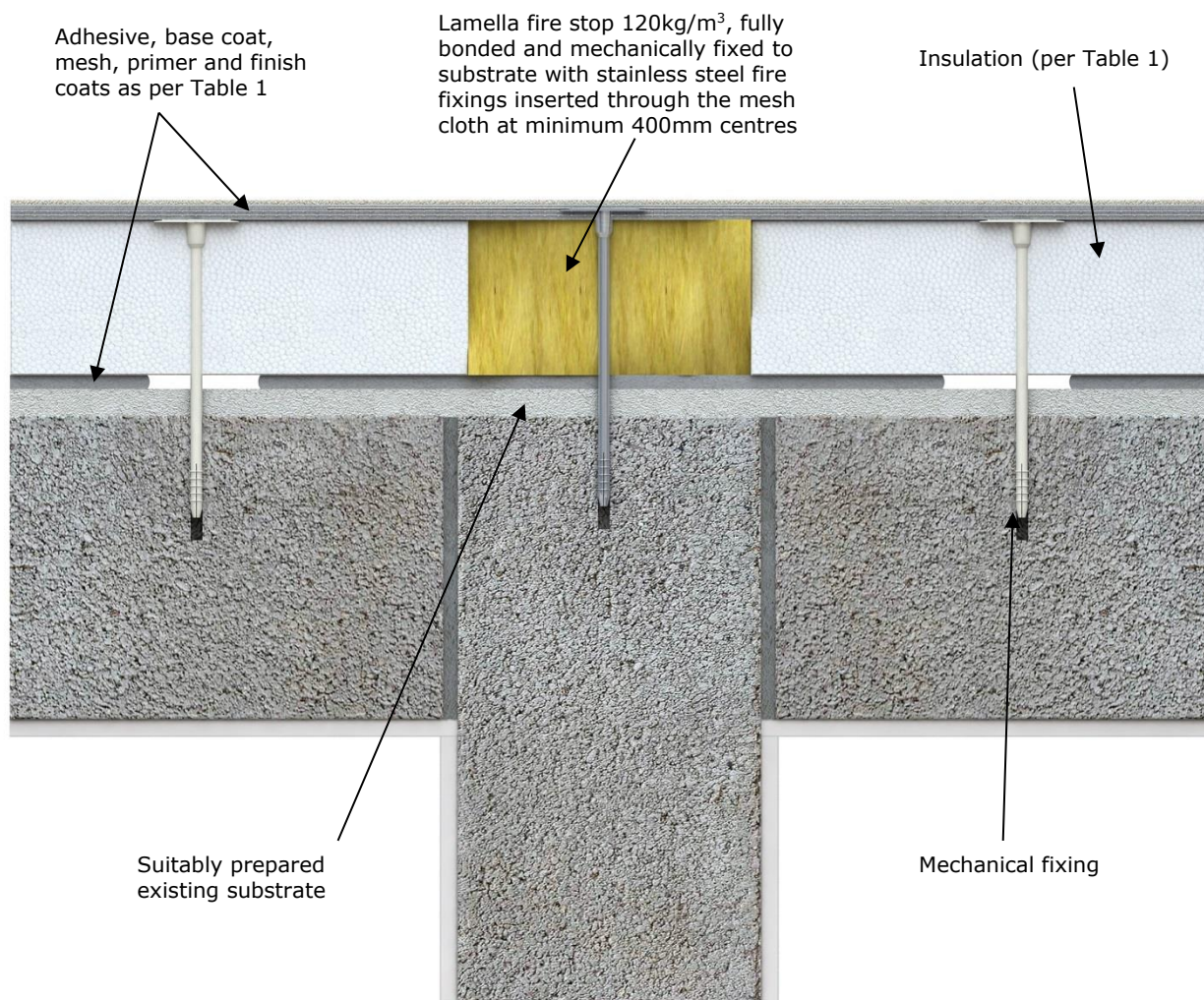


Figure 4: Fire Break Detail

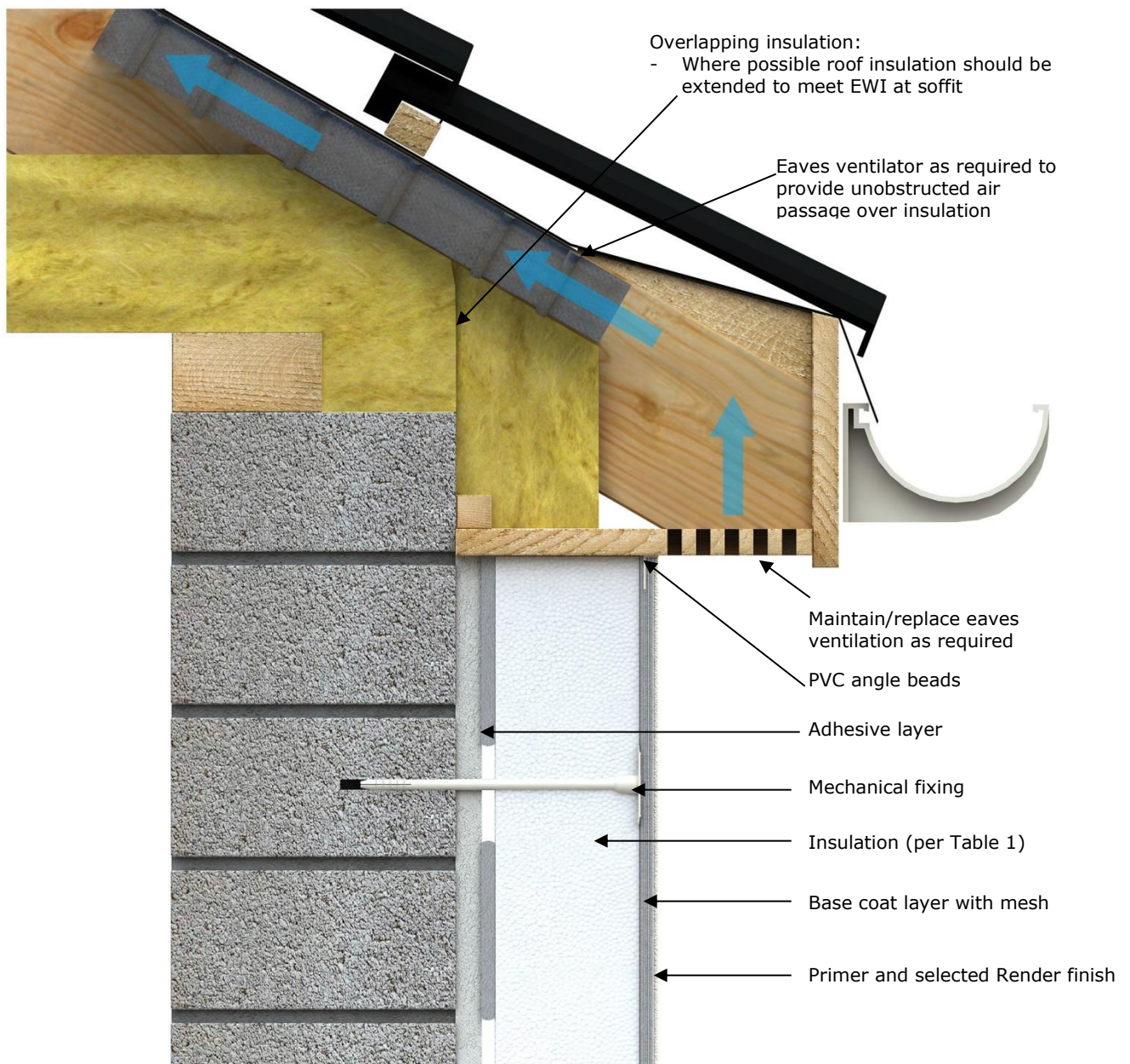


Figure 5: Eaves Detail

3.1 GENERAL

KLEIB External Insulation Systems are designed by Carbon 2030 Energy Savings Ltd on a project specific basis. Where the external insulation system is being applied to improve the thermal performance of an existing building, Carbon 2030 Energy Savings Ltd will assess the building and advise on how to maximise the benefits of the external insulation system for that building. The design will include for:

- a) The completion and recording of a site survey. For existing buildings, U-value calculations, pull-out resistance etc. should be based on the existing structure.
- b) Evaluation and preparation of substrate.
- c) Minimising risk of condensation in accordance with the recommendations of BS 5250^[2]. This includes the use of approved detailing as shown in Figures 1 to 5 incorporating the requirements of SR 54^[3] and, where possible, meeting all of the Acceptable Construction Details published by DHPLG.
- d) Thermal insulation provision to Part L of the Building Regulations 1997 to 2019.
- e) Resistance to impact and abrasion.
- f) Resistance to thermal stresses.
- g) Resistance to wind loading.
- h) Design of fixings to withstand design wind loadings, using a safety factor of 3 (three) for mechanical fixings and a safety factor of 9 (nine) for adhesive. In addition, fixings around window and door openings shall be at a maximum of 300mm centres in each board or section of board so as to provide positive and robust restraint over the life of the system.
- i) The design for wind loading on buildings greater than 2 stories should be checked by a chartered engineer in accordance with Eurocode 1 I.S. EN 1991-1-4^[4].
- j) Design for fire resistance, fire spread and fire stopping, as defined in Section 4.2 and 4.3 of this Certificate.
- k) Design of a water management system to prevent ingress of water at movement joints, windows, doors, openings for services etc. Particular attention is required to ensure that window and sill design are coordinated to achieve a fully integrated design.
- l) Movement joints.
- m) A site-specific maintenance programme for inclusion in the homeowner's documentation.
- n) Durability requirements.

Detailing and construction must be to a high standard to prevent the ingress of water and to achieve the design thermal performance. Window

details should be designed such that, where possible, they can be removed and replaced from within the building, with best practice being to move the windows forward. Consideration should be given to maximising improvement of thermal insulation at window reveals, door openings etc. Adequate provision should be made at design and installation stage for the release of trapped moisture e.g. above window heads.

When designed and installed in accordance with this Certificate, the system will satisfy the wall elemental U-value and linear thermal transmittance requirements of Part L of the Building Regulations 1997 to 2019. The design shall include for the elimination/minimising of cold bridging at window and door reveals, eaves and at ground floor level in compliance with Acceptable Construction Details published by DHPLG.

The system is intended to improve the weather resistance of the external walls. Seals to windows and doors shall be provided in accordance with the project specific site plan and the Acceptable Construction Details. Care should be taken to ensure that any ventilation or drainage openings are not obstructed.

In areas where electric cables can come into contact with EPS, in accordance with good practice all PVC sheathed cables should be run through ducting or be re-routed. Domestic gas installations must not be adversely affected by the fitting of external insulation. If the external insulation has an impact on the gas service line/meter location, then Bord Gáis Networks must be contacted so that a suitable solution can be achieved. If altering a gas installation, a Registered Gas Installer (RGI) must be employed.

The durability of the render systems is influenced by the colour of the render used. Further information is available by contacting the Certificate holder.

In locations where frost heave is likely to occur, plinth XPS must be kept 10mm above ground level.

3.2 MAJOR RENOVATION

As external insulation over 25% of the building envelope is classified as Major Renovation in TGD to Part L of the Building Regulations 1997 to 2019, attention should be paid to Section 2.3 of TGD to Part L 2019 where external insulation is undertaken as part of a deep retrofit installation.

4.1 STRENGTH AND STABILITY

4.1.1 Wind Loading

KLEIB External Insulation Systems can be designed to withstand the wind pressures (including suction) and thermal stresses in accordance with the Building Regulations 1997 to 2019. The design for wind loading on buildings greater than two stories should be checked by a chartered engineer in accordance with Eurocode 1 I.S. EN 1991-1-4^[4]. A general factor of safety of 1.5 is applied to design wind loads.

4.1.2 Impact Resistance

- a) The KLEIB External Insulation Systems have been classified as defined in Table 3 to be suitable for use as defined in ETAG 004 Cl. 6.1.3.3 Table 8 as follows:

Category I: A zone readily accessible at ground level to the public and vulnerable to hard impacts but not subject to abnormally rough use.

Category II: A zone liable to impacts from thrown or kicked objects, but in public locations where the height of the system will limit the size of the impact; or at lower levels where access to the building is primarily to those with some incentive to exercise care.

Category III: A zone not likely to be damaged by normal impacts caused by people or by thrown or kicked objects.

Note: The above classifications do not include acts of vandalism.

In an Irish context, Category II excludes any wall at ground level adjacent to a public footpath but includes one with its own private, walled-in garden. Category III excludes all walls at ground level.

- b) The design should include for preventing damage from impact by motor vehicles or other machinery. Preventive measures such as provision of protective barriers or kerbs should be considered.

4.2 BEHAVIOUR IN RELATION TO FIRE

The reaction to fire classification according to IS EN 13501-1^[5] for the KLEIB External Insulation Systems are defined in Table 4.

Systems that achieve a Class B Reaction to Fire Classification are suitable for use up to a maximum of six storeys (18 metres) in height on purpose groups 1(a), 1(c), 1(d), 2(a), 2(b), 3, 4(a) and 4(b), and for use up to a maximum of five storeys (15 metres) in height on purpose group 1(b), as defined in TGD to Part B of the Building Regulations 1997 to 2019.

Systems that achieve a Class C Reaction to Fire Classification are suitable for use up to a maximum storey heights as for Class B, but with the added restriction they may not be used on a wall which is less than 1m away from a boundary, as defined in TGD to Part B of the Building Regulations 1997 to 2019. Reference should be made to Section 4.1 and 4.2 of TGD to Part B of the Building Regulations 1997 to 2019, and to Sections 4.4 and 4.5 of TGD to Part B Volume 2 of the Building Regulations 1997 to 2019.

With regard to fire stopping and limitations on use of combustible materials, walls must comply with Sections 3.2, 3.3, 3.4 and 4 of TGD to Part B of the Building Regulations 1997 to 2019, and Sections 3.5, 3.6, 3.7 and 4 of TGD to Part B Volume 2 of the Building Regulations 1997 to 2019. Stainless steel fire fixings must be provided at the rate of one per square metre when specified. The fixing design should take account of the extra duty required under fire conditions.

Vertical and horizontal lamella fire barriers shall be provided at each compartment floor and wall, with stainless steel fixings provided at 400mm vertical centres and 400mm horizontal centres respectively, including the second floor level of a three-storey single occupancy house (see Diagram 12 of TGD to Part B Volume 2 of the Building Regulations 1997 to 2019). Firebreaks should be fully adhesively bonded to the substrate (i.e. ribbons or dabs of adhesive are not acceptable) and mechanically fixed with stainless steel fire fixings at 400mm centres. The fire barrier shall be of non-combustible material (i.e. lamella, slab of minimum density 120kg/m³), be at least 200mm high, continuous and unbroken for the full perimeter of the building and for the full thickness of the insulation. Glass wool is not suitable for use as a firestop (see Clause 3.6.3 of TGD to Part B Volume 2 of the Building Regulations 1997 to 2019 for types of suitable firestop).

4.3 PROXIMITY OF HEAT PRODUCING APPLIANCES

Combustible material must be separated from a brick or blockwork chimney by at least 200mm from a flue and 40mm from the outer surface of the brick or blockwork chimney, in accordance with Clause 2.5.6 of TGD to Part J of the Building Regulations 1997 to 2019. Metal fixings in contact with combustible materials should be at least 50mm from a flue.

4.4 THERMAL INSULATION

Assessments were carried out to verify that the requirements of Part L of the Building Regulations 1997 to 2019 can be achieved using the KLEIB

External Insulation Systems. The manufacturer's declared thermal conductivity values ($\lambda_{90/90}$) taken from their CE Marking Declarations of Performance are 0.039W/mK for the standard white EPS board and 0.031W/mK for the graphite enhanced grey EPS board. These have not been assessed by NSAI Agrément. Table 2 shows typical insulation thicknesses to achieve minimum U-values of 0.27W/m²K (retrofit only) and 0.21W/m²K for different construction types. The thermal resistance value for the render (R_{render}) can be taken as 0.02m²K/W.

Calculation of U-values will be required on individual projects to confirm a U-value of 0.27W/m²K or better has been achieved, based on the wall construction and the insulation used. The thermal conductivity (λ) value of the insulation to be used in all U-value calculations must be the $\lambda_{90/90}$ value.

When the system is to be applied to a masonry cavity wall, including hollow block walls, consideration should be given to the treatment of the ventilated cavity. In order to ensure the thermal effectiveness of the external insulation system, it is critical to eliminate airflow within the cavity void. It is essential to seal the cavity to achieve an unventilated air layer. This eliminates heat losses due to airflow within the cavity circumventing the ETIC system. Best practice is to fill the cavity void with an NSAI Agrément approved Cavity Wall Insulation (CWI) system. Ventilation to the building must be maintained in accordance with the requirements of TGD to Part F of the Building Regulations 1997 to 2019.

4.5 LIMITING THERMAL BRIDGING

The linear thermal transmittance ' ψ ' (Psi) describes the heat loss associated with junctions and around openings. Window and door reveal design used on the KLEIB External Insulation Systems have been assessed and when detailed in accordance with this Certificate can meet the requirements of Table D2 of TGD to Part L of the Building Regulations 1997 to 2019.

When **all** bridged junctions within a building comply with the requirements of Table D2 of TGD to Part L, the improved ' γ ' factor of 0.08 can be entered into the DEAP building energy rating (BER) calculation. If **all** junctions can be shown to be equivalent or better than Acceptable Construction Details published by the DHPLG, then the values published in Table D2 apply.

Where either of the above options are shown to be valid, or when the required values cannot be achieved, all relevant details should be recorded on the 'Certificate of Compliance' for that project for use in future BER calculations.

' Ψ ' values for other junctions outside the scope of this Certificate should be assessed by an NSAI approved thermal modeller.

As per Acceptable Construction Details, a minimum thermal resistance of 0.6m²K/W should be provided at window reveals, heads and sills.

4.6 CONDENSATION RISK

Areas where there is a significant risk of condensation due to high levels of humidity should be identified during the initial site survey.

4.6.1 Internal Surface Condensation

When improving the thermal performance of the external envelope of a building through external wall insulation, designers need to consider the impact of these improvements on other untouched elements of the building. As discussed in Section 4.5 of this Certificate, thermally bridged sections of the envelope such as window jambs, sills and eaves will experience a lower level of increased thermal performance. The degree of improvement to these junctions can be limited due to physical restrictions on site i.e. footpaths, soffit boards or hinges for windows.

When bridged junctions meet the requirements of Appendix D Table D2 of TGD to Part L of the Building Regulations 1997 to 2019, the coldest internal surface temperature will satisfy the requirements of Section D2, namely that the temperature factor shall be equal to or greater than 0.75. As a result, best practice will have to be adopted in order to limit the risk of internal surface condensation which can result in dampness and mould growth.

When site limiting factors give rise to substandard levels of insulation at bridged junctions, guidance should be sought from the Certificate holder as to acceptable minimum requirements.

4.6.2 Interstitial Condensation

An interstitial condensation risk analysis will be carried out by Carbon 2030 Energy Savings Ltd in accordance with BS 5250^[2] and the design modified as appropriate to reduce the risk of interstitial condensation to acceptable levels. Table 5 lists the s_d values for a range of build-ups.

4.6.3 Ventilation

When installing the external insulation system, the works to be undertaken must not compromise the existing ventilation provisions in the home, including the ventilation of suspended timber floors, where existing vents must be sleeved across the rising wall and sealed.

When these existing ventilation provisions do not meet the requirements of Part F of the Building Regulations 1997 to 2019, the homeowner should

be informed and remedial action must be taken before the external insulation system is installed.

4.7 MAINTENANCE

Adequate provision should be made in the initial design phase for access and maintenance over the life of the system.

Regular inspections should be made over the life of the system. The system shall be inspected and maintained in accordance with the Certificate holder's instructions, as detailed in the Repair and Maintenance Method Statement, which is incorporated into the Building Owner's Manual.

- Visually inspect the render and architectural details for signs of damage or water ingress (at least annually).
- Necessary repairs must be carried out immediately and must be in accordance with the Certificate holder's instructions to prevent deterioration or damage, and to protect the integrity of the system.
- Sealants shall be subject to regular inspection (at least annually).
- Sealants should be replaced as required and fully replaced every 18 to 20 years to maintain performance.
- Synthetic finishes may be subject to aesthetic deterioration due to exposure to UV light. They should be re-painted every 18 to 20 years to maintain appearance.
- Care should be taken to ensure that the synthetic finish used is compatible with the original system and that the water vapour transmission or fire characteristics are not adversely affected.

4.8 WEATHERTIGHTNESS

When designed and detailed in accordance with this Certificate, the system will prevent moisture from the ground coming in contact with the insulation. The external render has adequate resistance to water penetration when applied in accordance with the Certificate holder's instructions.

Joint designs, sealant specifications and recommendations for detailing at windows and doors were assessed and are considered adequate to ensure that water penetration will not occur, assuming that regular maintenance is carried out in accordance with the Certificate holder's instructions.

4.9 DURABILITY

4.9.1 Design Life

An assessment of the life of the system was carried out. This included an assessment of:

- Design and installation controls;
- Proposed building heights;
- Render thickness and specification;

- Material specifications, including insulant, mesh, beading and fixings specifications;
- Joint design;
- Construction details;
- Maintenance requirements.

The assessment indicates that the system should remain effective for at least 30 years subject to normal use, regular inspection and maintenance; providing that it is designed, installed and maintained in accordance with this Certificate. Any damage to the surface finish shall be repaired immediately and regular maintenance shall be undertaken as outlined in Section 4.7 of this Certificate.

It is important to note that the durability of the render system is entirely dependent on the correct installation of the product in accordance with this Certificate, the manufacturer's instructions, IS EN 13914-1^[1] and ongoing care and maintenance as described in Clause 4.7 of this Certificate. Critical details include rendering at window sills, raised features, junctions with eaves and verges, and the use of suitably designed overhangs and flashings. Reference should be made to IS EN 13914-1^[1] for general advice on design, in particular on the use of angle, stop and movement joint beads.

4.9.2 Aesthetic Performance

As with traditional renders, the aesthetic performance of the systems, e.g. due to discolouration, soiling, staining, algal growth or lime bloom, is depended on a range of factors such as:

- Type, colour and texture of surface finish;
- Water retaining properties of the finish;
- Architectural form and detailing;
- Building orientation/elevation;
- Local climate/atmospheric pollution.

Where cleaning of walls is required, for example in the case of algal growth, the procedure in the KLEIB maintenance document must be followed which contains detailed information on the removal of algae. It is the homeowner's responsibility to inspect the walls every year and clean when required; however the homeowner may contract the approved installer to provide this service.

Adequate consideration should be given at the design stage to all of the above to ensure that the level of maintenance necessary to preserve the aesthetics of the building is acceptable.

4.10 PRACTICABILITY

The practicability of construction and the adequacy of site supervision arrangements were assessed and considered adequate. The project specific designs and method statements for

application, inspection and repair were reviewed and found to be satisfactory.

4.11 TESTS AND ASSESSMENTS WERE CARRIED OUT TO DETERMINE THE FOLLOWING

- Structural strength and stability
- Behaviour in fire
- Impact resistance
- Pull-out resistance of fixings
- Thermal resistance
- Hygrothermal behaviour
- Condensation risk
- Site erection controls
- Durability of components
- Dimensional stability of insulants

4.12 OTHER INVESTIGATIONS

- Existing data on product properties in relation to fire, toxicity, environmental impact and the effect on mechanical strength/stability and durability were assessed.
- The manufacturing process was examined including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.
- Special building details (e.g. ground level, window and door openings, window sill and movement joints) were assessed and approved for use in conjunctions with this Certificate.
- Site visits were conducted to assess the practicability of installation and the history of performance in use of the product.

Insulation	Declared Thermal Conductivity ($\lambda_{90/90}$) of Insulation (W/mK)	Thickness of Insulation (mm)	U-Value (W/m ² K)
No external insulation	-	-	2.05
Standard white EPS	0.039	130	0.26
		170	0.21
Graphite-enhanced EPS	0.031	100	0.27
		130	0.21
These values are based on a typical house of hollow block construction (Building Regulations Part L 2017) with the following construction (internal to external): <ul style="list-style-type: none">• 12.5mm plasterboard• 215mm hollow block• 15mm sand & cement render• Insulation board – as specified• Render finish with mesh basecoat – 8mm			
No external insulation	-	-	0.27
Standard white EPS	0.039	40	0.21
Graphite-enhanced EPS	0.031	30	0.21
These values are based on a typical house of cavity wall construction (Building Regulations Part L 2017) with the following construction (internal to external): <ul style="list-style-type: none">• 12.5mm plasterboard• 100mm concrete block• 130mm pumped cavity insulation• 100mm concrete block• 15mm sand & cement render• Insulation board – as specified• Render finish with mesh basecoat – 8mm			

Table 2: Typical U-values (W/m²K)

Render system: Base coat <u>KLEIB C2</u> + Relevant key coat + Finishing coat indicated hereafter:	Single layer of standard mesh
KLEIB C4	Category III
KLEIB C4S	Category III
KLEIB C5	Category III
KLEIB C6	Category II
KLEIB C7	Category II
KLEIB C8	Category II
KLEIB M9	Category I
KLEIB M10	Category I
Render system: Base coat <u>KLEIB C2 EXTRA</u> + Relevant key coat + Finishing coat indicated hereafter:	Single layer of standard mesh
KLEIB C4	Category II
KLEIB C4S	Category III
KLEIB C5	Category III
KLEIB C6	Category III
KLEIB C7	Category III
KLEIB C8	Category III
KLEIB M9	Category I
KLEIB M10	Category I
Render system: Base coat <u>KLEIB C2B</u> + Relevant key coat + Finishing coat indicated hereafter:	Single layer of standard mesh
KLEIB C4	Category II
KLEIB C4S	Category III
KLEIB C5	Category II
KLEIB C6	Category II
KLEIB C7	Category III
KLEIB C8	Category III
KLEIB M9	Category I
KLEIB M10	Category I

Table 3: Impact Resistance

Configuration	Max organic content/ Max heat of combustion	Flame retardant content	Euroclass according to EN 13501-1
Adhesive	1.8% / -	No flame retardant	B – s1, d0
EPS boards Density ≤25lg/m ³ Flame retardant content in quantity ensuring Euroclass E according to EN 13501-1	- / -		
Base coat	1.8% / -		
Glass fibre mesh	- / 8.19MJ/kg		
Key coat <i>Excluding KLEIB C3S</i>	10.9% / 3.19MJ/kg		
Finishing coat <i>Excluding KLEIB C6, KLEIB M9, KLEIB M10</i>	8.3% / 1.96MJ/kg		
Decorative coat	16.2% / 5.33MJ/kg		

Remaining configurations	-	No flame retardant	C-s1, d0
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Table 4 – Reaction to Fire

Base Coat	Finishing Coat	Equivalent Air Layer Thickness s_d
KLEIB C2 or KLEIB C2 EXTRA or KLEIB C2B	KLEIB C4 + - KLEIB Q2 - KLEIB Q3 - KLEIB Q4	≤2m, results: 0.1m 0.1m 0.1m
	KLEIB C4S + - KLEIB Q2 - KLEIB Q3 - KLEIB Q4	≤2m, results: 0.1m 0.1m 0.1m
	KLEIB C5 + KLEIB Q1	≤2m, result: 0.2m
	KLEIB C6 + KLEIB Q2	≤2m, result: 0.1m
	KLEIB C7 + KLEIB Q3	≤2m, result: 0.2m
	KLEIB C8 + KLEIB Q4	≤2m, result: 0.2m
	KLEIB M9*	≤2m, result: 0.3m
	KLEIB M10*	≤2m, result: 0.2m
	* Decorative coat not used	

Table 5: Water Vapour Permeability

5.1 National Standards Authority of Ireland ("NSAI") following consultation with NSAI Agrément has assessed the performance and method of installation of the product/process and the quality of the materials used in its manufacture and certifies the product/process to be fit for the use for which it is certified provided that it is manufactured, installed, used and maintained in accordance with the descriptions and specifications set out in this Certificate and in accordance with the manufacturer's instructions and usual trade practice. This Certificate shall remain valid for five years from date of latest revision so long as:

- (a) the specification of the product is unchanged.
- (b) the Building Regulations 1997 to 2019 and any other regulation or standard applicable to the product/process, its use or installation remains unchanged.
- (c) the product continues to be assessed for the quality of its manufacture and marking by NSAI.
- (d) no new information becomes available which in the opinion of the NSAI, would preclude the granting of the Certificate.
- (e) the product or process continues to be manufactured, installed, used and maintained in accordance with the description, specifications and safety recommendations set out in this certificate.
- (f) the registration and/or surveillance fees due to IAB are paid.

5.2 The NSAI Agrément mark and certification number may only be used on or in relation to product/processes in respect of which a valid Certificate exists. If the Certificate becomes invalid the Certificate holder must not use the NSAI Agrément mark and certification number and must remove them from the products already marked.

5.3 In granting Certification, the NSAI makes no representation as to;

- (a) the absence or presence of patent rights subsisting in the product/process; or
- (b) the legal right of the Certificate holder to market, install or maintain the product/process; or
- (c) whether individual products have been manufactured or installed by the Certificate

holder in accordance with the descriptions and specifications set out in this Certificate.

5.4 This Certificate does not comprise installation instructions and does not replace the manufacturer's directions or any professional or trade advice relating to use and installation which may be appropriate.

5.5 Any recommendations contained in this Certificate relating to the safe use of the certified product/process are preconditions to the validity of the Certificate. However the NSAI does not certify that the manufacture or installation of the certified product or process in accordance with the descriptions and specifications set out in this Certificate will satisfy the requirements of the Safety, Health and Welfare at Work Act 2005, or of any other current or future common law duty of care owed by the manufacturer or by the Certificate holder.

5.6 The NSAI is not responsible to any person or body for loss or damage including personal injury arising as a direct or indirect result of the use of this product or process.

5.7 Where reference is made in this Certificate to any Act of the Oireachtas, Regulation made thereunder, Statutory Instrument, Code of Practice, National Standards, manufacturer's instructions, or similar publication, it shall be construed as reference to such publication in the form in which it is in force at the date of this Certification.

NSAI Agrément

This Certificate No. **19/0413** is accordingly granted by the NSAI to **Carbon 2030 Energy Savings Ltd** on behalf of NSAI Agrément.

Date of Issue: **April 3rd 2020**

Signed



Kevin D. Mullaney
Director of Certification, NSAI

Readers may check that the status of this Certificate has not changed by contacting NSAI Agrément, NSAI, 1 Swift Square, Northwood, Santry, Dublin 9, Ireland. Telephone: (01) 807 3800. Fax: (01) 807 3842. www.nsai.ie

Revisions:

- **10 February 2025:** Revised Sections 4.7 and 4.9.1.

Bibliography

- [1] IS EN 13914-1:2016 *Design, preparation and application of external rendering and internal plastering – External rendering.*
- [2] BS 5250:2016 *Code of practice for control of condensation in buildings.*
- [3] SR 54:2014 *Code of practice for the energy efficient retrofit of dwellings.*
- [4] I.S. EN 1991-1-4:2005 *Actions on structures – General actions – Wind actions.*
- [5] IS EN 13501-1:2007 *Fire classification of construction products and building elements – Classification using data from reaction to fire tests.*