NSAI Agrément

IRISH AGRÉMENT BOARD
CERTIFICATE NO. 18/0396
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Greinplast External Insulation Systems

Système d'isolation pour murs extérieurs
Wärmedämmung für Außen-wand

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 2017**.

PRODUCT DESCRIPTION:
This Certificate relates to the Greinplast External Insulation Systems. The systems are comprised of:

- Surface preparation of masonry or concrete substrate;
- Full system beads and render only beads;
- Insulation boards;
  - GREINPLAST EPS - EPS insulation;
  - GREINPLAST MW - Mineral Wool;
- Base coat with reinforcement;
- Decorative finishes (mineral, silicate, silicone, acrylic, silicone-silicate, nano-silicone, dry dash, acrylic panels/slips);
- 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.

Greinplast sp zo.o is responsible for the design, manufacture and supply of all components to approved specifications.

Greinplast sp zo.o has appointed Greinplast External Wall Insulation Ltd as their distribution partner in Ireland.

The system is designed by Greinplast External Wall Insulation 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 Greinplast External Wall Insulation Ltd, and are approved by Greinplast External Wall Insulation Ltd and NSAI Agrément to install the system. Applicators must adhere to strict installation guidelines as specified by Greinplast External Wall Insulation Ltd.

This Certificate certifies compliance with the requirements of the Building Regulations 1997 to 2017.

USE
Greinplast External Insulation Systems are for the external insulation of:

(a) Existing concrete or masonry dwellings;
(b) New concrete or masonry commercial or industrial buildings, which are designed in accordance with the Building Regulations 1997 to 2017.

The Greinplast 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 2017.

The systems have not been assessed for, and as a result are not suitable for, use with timber frame or steel frame construction, or for new dwellings.

In an Irish context, the appropriate 'Impact resistance' category should be specified as described in Section 4.1.2, specifically Table 2 which lists a range of system build-ups and their corresponding impact resistance categories.

MANUFACTURE, DESIGN & MARKETING:
The system is designed and manufactured by:

Greinplast sp zo.o,
36-007 Krasne 512B,
Poland
T: +48 17 77 12 555
E: handel@greinplast.pl
W: www.greinplast.pl

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

Greinplast External Wall Insulation Ltd,
Unit 33 Crag Avenue,
Clondalkin Industrial Estate,
Clondalkin,
Dublin 22.
W: www.greinplastewi.ie

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 10/0061, 10/0222 and 15/0582), 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, Greinplast External Insulation Systems, when installed by Greinplast External Wall Insulation Ltd trained and approved contractors registered with NSAI, in accordance with this Certificate and Greinplast External Wall Insulation Ltd specific design, can meet the requirements of the Building Regulations 1997 to 2017, as indicated in Section 1.2 of this Agrément Certificate.

1.2 BUILDING REGULATIONS 1997 to 2017

REQUIREMENTS:

Part D – Materials and Workmanship

D3 – Proper Materials

Greinplast External Insulation Systems, as certified in this Certificate, are comprised of 'proper materials' fit for their intended use (see Part 3 and 4 of this Certificate).

D1 – Materials & Workmanship

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

Part A - Structure

A1 – Loading

Greinplast 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 (see Part 3 of this Certificate).

A2 – Ground Movement

Greinplast External Insulation Systems can be incorporated into structures that will meet this requirement (see Parts 3 and 4 of this Certificate).

Part B – Fire Safety

B4 – External Fire Spread

Part B Vol 2 – Fire Safety

B9 – External Fire Spread

Grienplast External Insulation Systems can be incorporated into structures that will meet this requirement (see Part 4 of this Certificate).

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 as specified in Parts 3 and 4 of this Certificate.

Part F – Ventilation

F2 – Condensation in Roofs

The systems as certified can be incorporated into structures that will meet the requirements of this Regulation (see Parts 3 and 4 of this Certificate).

Part J – Heat Producing Appliances

J3 – Protection of Building

When Greinplast External Insulation Systems are used in accordance with this Certificate, wall lining, insulation and separation distances meet this requirement (see Part 4 of this Certificate).

Part L – Conservation of Fuel and Energy

L1 – Conservation of Fuel and Energy

The walls of Greinplast External Insulation Systems can be readily designed to incorporate the required thickness of insulation to meet the Elemental Heat Loss method calculations for walls as recommended in TGD to Part L of the Building Regulations 1997 to 2017 (see Part 4 of this Certificate).

L2 – Conservation of Fuel and Energy

At interface junctions at windows and at junctions between elements, the Greinplast 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

Greinplast External Insulation Systems consist of thermal insulation boards/batts fixed both adhesively and mechanically to the external façade of a building. A base coat layer incorporating reinforcement mesh and a decorative finish is then applied.

The GREINPLAST EPS system incorporates graphite-enhanced expanded polystyrene (EPS) insulation, and the GREINPLAST MW system incorporates mineral wool insulation.

See Tables 1a and 1b for the full list of components of Greinplast External Insulation Systems.

The systems can be applied on a variety of existing vertical external surfaces such as brick or rendered masonry walls. They can also be fixed on surfaces of horizontal or tilted structural elements 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 Greinplast 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

Greinplast sp zo.o is responsible for the design and manufacture of all components to approved specifications. Greinplast sp zo.o has appointed Greinplast External Wall Insulation 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 Greinplast External Insulation Systems is carried out by Greinplast External Wall Insulation Ltd trained and approved installers in accordance with Greinplast External Wall Insulation 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 (See Section 2.4.1 of this Certificate).

2.2.1 Quality Control

The Certificate holder, and the manufacturer, operate a quality management system, and a quality plan is in place for system manufacture, 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 Tables 1a and 1b 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 Greinplast External Wall Insulation Ltd trained applicators who:

1) Are required to meet the requirements of an initial site installation check by NSAI Agrément prior to approval and are subject to the NSAI Agrément ETICS Approval Scheme.

2) Are approved by Greinplast External Wall Insulation Ltd and NSAI Agrément to install the product.
3) Have undertaken to comply with Greinplast External Wall Insulation Ltd installation procedures, the requirements of this Certificate, and the Greinplast External Wall Insulation Ltd Code of Practice for approved contractors.
4) Are employing Supervisors and Operatives who have been issued with appropriate identity cards by Greinplast External Wall Insulation Ltd. Each team must consist of at least one ETICS Operative and ETICS Supervisor (can be the same person).
5) Are subject to supervision by Greinplast External Wall Insulation Ltd, including unannounced site inspections by both the Certificate holder and NSAI Agrément, in accordance with the NSAI Agrément ETICS Approval Scheme.
6) Are subject to periodic surveillance by the certificate holder – site visits and office records.

2.4.2 General

Greinplast External Wall Insulation Ltd prepare a site package for each project, including wind loading and U-value calculations, requirements for materials handling and storage, method statements for installation, building details, fixing requirements, provision for impact resistance, maintenance requirements etc. This document forms part of the contract documentation for circulation to the home owner and the installer. Installers will be expected to adhere to the specification. Deviations must be approved by a Greinplast External Wall Insulation Ltd technical representative. Greinplast External Wall Insulation 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. Certificates of Compliance, Greinplast External Wall Insulation Ltd guarantee and home owner's manual will be issued on successful completion and sign-off of completed projects.

Mineral wool batts and 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.

Details shown in this Certificate were developed to strike a balance between thermal efficiency and economic viability. 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 by a suitably qualified Greinplast External Wall Insulation Ltd technical representative or a Greinplast External Wall Insulation Ltd and NSAI Agrément approved contractor and all key information is recorded on the site survey form. Greinplast External Wall Insulation Ltd pre-installation survey is also used to price the project and identify all the relevant factors/technical information which needs to be considered in the design of the external insulation system and important information to be included in the site specific pack. This pack would typically include wind load calculations and a fixing specification summary sheet, thermal bridging evaluation, condensation risk analysis, elemental wall U-value calculation, and a full set of project specific building details. The survey will also establish the suitability of the substrate, and Greinplast External Wall Insulation Ltd. technical representative will determine if pullout resistance testing is required and what substrate preparation is required.

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/batts.

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.

Components		Coverage (kg/m²)	Thickness (mm)
Adhesives	**GRIENPLAST KS** Cement based powder requiring addition of 0.24 to 0.26l/kg water	4.0 - 6.0 (powder)	-
	GREINPLAST K Cement based powder requiring addition of 0.24 to 0.26l/kg water	3.0 – 4.0	About 3.0
Insulation	**Graphite Enhanced Polystyrene Insulation Board** EPS-EN13163-T1 or T2-L2-W2-S1 or S2-P3 or P4-DS(70,-)1 or DS(70,-)2-DS(N)2-WL(T)1-TR80 or TR100 or TR150, Reaction to fire Class E	-	20 - 250
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 Coat	**GREINPLAST K** Cement based powder requiring addition of 0.24 to 0.26l/kg water	3.0 - 5.0 (powder)	2.5 – 4.0
Glass Fibre Mesh	**VERTEX 145 / AKE 145 / R117 A101** Mesh size of about 4.5x4.0mm, mass per unit area 150g/m²	-	-
	SSA-1363-SM(100) Mesh size of about 3.5x3.5mm, mass per unit area 145g/m²		
	TG 22 Mesh size of about 4.0x4.5mm, mass per unit area 145g/m²		
	TG 15 Mesh size of about 4.0x4.0mm, mass per unit area 170g/m²		
	SSA-1363-SM0.5 / SSA-1363-150 SM0.5 / SSA-1363-145 Mesh size of about 3.6x4.3mm, mass per unit area 145g/m²		
	SSA-1363-160-SM0.5A Mesh size of about 3.6x3.8mm, mass per unit area 160g/m²		
Key Coat	**GREINPLAST SP** Ready to use liquid to be used with silicate finishing coats	About 0.40	-
	GREINPLAST F Ready to use liquid to be used with mineral finishing coats		
	GREINPLAST XP Ready to use liquid to be used with silicone finishing coats		
Finishing Coat	**Mineral finishing coats:** **GREINPLAST TB** Powder requiring addition of 0.20 to 0.23l/kg water Grained structure; max particle size: 1.5, 2.0, 2.5, 3.0mm	2.0 – 4.5	Regulated by particle size
	GREINPLAST TK Powder requiring addition of 0.20 to 0.23l/kg water Ribbed structure; max particle size: 2.0, 3.0, 4.0mm	2.5 – 4.5	
	Silicate finishing coats: **GREINPLAST TSB** Ready to use paste Grained structure; max particle size: 1.5, 2.0, 2.5, 3.0mm	2.5 – 4.5	
	GREINPLAST TSK Ready to use paste Ribbed structure; max particle size: 1.5, 2.0, 2.5, 3.0mm	2.0 – 4.5	
	Silicone finishing coats: **GREINPLAST TXB** Ready to use paste Grained structure; max particle size: 1.5, 2.0, 2.5, 3.0mm	2.0 – 4.5	
	GREINPLAST TXK Ready to use paste Ribbed structure; max particle size: 1.5, 2.0, 2.5, 3.0mm	2.0 – 4.5	

Table 1a: GREINPLAST EPS Component Specification

Components		Coverage (kg/m²)	Thickness (mm)
Finishing Coat	**Acrylic finishing coats:** **GREINPLAST TAB** Ready to use paste Grained structure; max particle size: 1.5, 2.0, 2.5, 3.0mm **GREINPLAST TAK** Ready to use paste Ribbed structure; max particle size: 1.5, 2.0, 2.5, 3.0mm **GREINPLAST TAN** Sprayed structure; max particle size: 1.5, 2.0mm **GREINPLAST G/KGP** Ready to use paste Fine-grained or coarse-grained; particle size: 0.5 to 1.2, 0.8 to 1.2, 1.0 to 1.6, 0.8 to 2.0, 0.8 to 3.0mm **GREINPLAST G-N** Fine-grained, sprayed structure; particle size: 0.2 to 1.0mm	2.6 – 4.5 2.0 – 4.5 2.0 – 3.5 3.5 – 7.0 2.5 – 5.0	Regulated by particle size
	Silicone-silicate finishing coats: **GREINPLAST THB** Ready to use paste Floated structure; particle size: 1.0, 1.5, 2.0, 3.5, 3.0mm **GREINPLAST THK** Ready to use paste Ribbed structure; particle size: 1.5, 2.0, 2.5, 3.0mm	1.4 – 4.8 2.0 – 4.8	
	Nano-silicone finishing coats: **GREINPLAST TNB** Ready to use paste Floated structure; particle size: 1.5, 2.0, 2.5, 3.0mm	1.4 – 4.5	
	KREND Silicone Dash Receiver Silicone coat to receive approved dash stones, nominal 6mm in diameter, supplied by Kilwaughter	12 – 16	
Decorative Coat (used optionally)	**GREINPLAST FA** Ready to use pigmented liquid, to be used optionally with mineral finishing coats **GREINPLAST FX** Ready to use pigmented liquid, to be used optionally with all finishing coats **GREINPLAST FS** Ready to use pigmented liquid, to be used optionally with mineral and silicate finishing coats **GREINPLAST FH** Ready to use pigmented liquid, to be used optionally with mineral, acrylic and silicone-silicate finishing coats **GREINPLAST FNX** Ready to use pigmented liquid, to be used optionally with all finishing coats **GREINPLAST OEA** Acrylic façade panels, 2-7mm thick, where the surface imitates the textures of building materials	0.25 – 0.45 0.20 – 0.40 0.20 – 0.40 0.20 – 0.40 0.20 – 0.40 -	-
Ancillary Materials	Ancillary materials in accordance with Clause 3.2.2.5 of ETAG 004. Must be approved by the Certificate holder.		

Table 1a contd: GREINPLAST EPS Component Specification

Components		Coverage (kg/m²)	Thickness (mm)
Adhesives	**GRIENPLAST KWP** Cement based powder requiring addition of 0.24 to 0.27l/kg water	4.0 - 6.0 (powder)	-
	GREINPLAST KW Cement based powder requiring addition of 0.24 to 0.27l/kg water		
Insulation	**Mineral Wool (MW)** MW-EN13162-T4 or T5-DS(TH)-WS-WL(P)-TR15 (TR80 or TR100 for lamella), Reaction to fire Class A1 with a maximum density of 135kg/m^3	-	50 - 250
Plinth Insulation (Below DPC)	**Extruded Polystyrene Insulation (XPS)** XPS-EN 13164 CFC/HCFC-free, Fire Class 3	-	30 - 200
Anchors	WKET-MET-LMX8; WKET-MET-LMX10; ejotherm STR U; ejotherm NT U; KOELNER TFIX-8M; KOELNER KI-10M; KOELNER KI-10N; BRAVOLL PTH-SL 60/8-L_a	-	-
Base Coat	**GREINPLAST KW** Cement based powder requiring addition of 0.24 to 0.27l/kg water	4.0 - 5.0 (powder)	3.0 – 5.0
Glass Fibre Mesh	**VERTEX 145 / AKE 145 / R117 A101** Mesh size of about 4.5x4.0mm, mass per unit area 150g/m^2	-	-
	TG 15 Mesh size of about 4.0x4.0mm, mass per unit area 170g/m^2		
Key Coat	**GREINPLAST SP** Ready to use liquid to be used with silicate finishing coats	About 0.40	-
	GREINPLAST F Ready to use liquid to be used with mineral and acrylic finishing coats		
	GREINPLAST XP Ready to use liquid to be used with silicone finishing coats		
Finishing Coat	**Mineral finishing coats:** **GREINPLAST TB** Powder requiring addition of 0.20 to 0.23l/kg water Grained structure; max particle size: 1.5, 2.0, 2.5, 3.0mm **GREINPLAST TK** Powder requiring addition of 0.20 to 0.23l/kg water Ribbed structure; max particle size: 2.0, 3.0, 4.0mm	2.0 – 4.5 2.5 – 4.5	Regulated by particle size
	Silicate finishing coats: **GREINPLAST TSB** Ready to use paste Grained structure; max particle size: 1.5, 2.0, 2.5, 3.0mm **GREINPLAST TSK** Ready to use paste Ribbed structure; max particle size: 1.5, 2.0, 2.5, 3.0mm	2.5 – 4.5 2.0 – 4.5	
	Silicone finishing coats: **GREINPLAST TXB** Ready to use paste Grained structure; max particle size: 1.5, 2.0, 2.5, 3.0mm **GREINPLAST TXK** Ready to use paste Ribbed structure; max particle size: 1.5, 2.0, 2.5, 3.0mm	0.20 – 0.40 0.20 – 0.40	
Decorative Coat (used optionally)	**GREINPLAST FX** Ready to use pigmented liquid, to be used optionally with all finishing coats **GREINPLAST FS** Ready to use pigmented liquid, to be used optionally with mineral and silicate finishing coats **IZOFLEX** Surface layer (façade) made of tiles, 4mm thick	0.20 – 0.40 0.20 – 0.40 -	-
Ancillary Materials	Ancillary materials in accordance with Clause 3.2.2.5 of ETAG 004. Must be approved by the Certificate holder.		

Table 1b: GREINPLAST MW Component Specification

2.4.4 Procedure

- Following award of contract, the site specific pack is prepared by Greinplast External Wall Insulation Ltd based on the information recorded on the site survey form.
- The substrate is prepared in accordance with the project specific site package. This may include brushing down of walls, washing with clean water and treatment with a fungicidal wash as required.
- The integrity of the existing substrate is assessed by checking the surface for loose render by tapping with a hammer and listening for a hollow sound. If render is loose it must be removed and replaced.
- At external window & door frame reveals, the existing plaster reveals should only be removed if a minimum clearance of 30mm cannot be achieved between the reveal and the window/door frame. This clearance must allow for opening sections of window and door frames. This is to allow the application of insulation around the reveals and heads of the doors and windows to significantly reduce cold bridging.
- 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.
- Refer to the site package for guidance on modifications of down pipes, soil and vent pipes, pipe extensions etc.
- Where possible all pipe work should be relocated as required to accommodate the insulation. Where pipe work cannot be relocated and is to be housed in the depth of the system, access for maintenance must be maintained through the use of removable covers or alternative design to be approved by the Certificate holder.
- Base beads and all full system beads are fixed as specified. Insulation and render only beads are fixed as specified in the site package.
- The starter track is mechanically fixed to the substrate level with the DPC line. This provides a horizontal line for the installation of insulation panels as well as providing reinforcement to the lower edge of the system. In addition, the starter track serves as a bottom end closer to impede vermin and burrowing insects.
- At plinth level, XPS plinth boards are then fixed to the wall below the starter track. These boards provide resistance to both moisture and water vapour ingress. To minimise the effects of cold bridging, the plinth boards should extend below ground level where possible. Where this is not possible the first run of plinth boards is positioned at ground level.
- When adhesively fixing, care must be taken to ensure an appropriate amount of adhesive is used and that the appropriate adhesive spread and board fixing patterns are used. The adhesive must not be applied onto the sides or fill the gaps between insulation boards. Holes are drilled through the insulation boards and adhesive and into the substrate wall and the mechanical fixings are applied. Care must be taken to ensure the fixing holes are drilled sufficiently deep, perpendicular to the surface of the insulation.
- For EPS and XPS boards, apply cement based adhesive using the 'Ribbon and dab' method. A continuous band of cement based adhesive, at least 30mm wide in diameter, is placed along the perimeter of the insulation boards. A minimum of 6 evenly distributed target patches of adhesive 80 – 120mm in diameter are then applied to the boards so that an adhesive surface of at least 40% is achieved (60% after application and pressing). Alternatively, for even and smooth substrates, the whole panel can be coated with adhesive using a toothed float/notched trowel to produce a coat 2 – 5mm in thickness. The insulation board should be immediately placed on the substrate and pressed into place.
- Before applying adhesive to mineral wool, the boards must be cleared of dust and loose particles. The boards should be initially covered with adhesive by applying a thin layer using a smooth edge trowel in order to increase adhesion. On the surface of the mineral wool prepared as described above the actual adhesion layer can be applied as a thin layer using a notched trowel or using the "Ribbon and dab' method as described previously for the EPS insulation boards.
- Subsequent rows of insulation boards are positioned so that the vertical board joints are staggered and overlapped at the building corners.
- 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.

- At façade openings, e.g. window and door opes, full insulation boards must be installed across these openings in elevation and then the insulation is cut back to reinstate the clearance at the opening. This method of installation will minimise the linear length of abutments and joints between boards at openings. In addition, vertical joints should be staggered. Any projecting EPS boards should be levelled out using a rubbing board with local trimming as required on mineral wool boards.
- 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 $0.6m^2K/W$. 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.
- To minimise the effects of cold bridging in all other junctions over and above windows and doors, designers should consider the recommendations of the Acceptable Construction Details Document (published by the DHPLG), Section 2 – External Wall Insulation. Where clearance is limited remove plaster at reveal, and strips of approved insulation (with better thermal resistance values) should be installed to suit available margins and details recorded as outlined in Section 4.5 of this Certificate.
- Details of mechanical fixings (including their arrangement in the insulation boards) are specified in the project specific design based on pullout test results, substrate type and wind loading data. Installation of mechanical fixings shall commence no earlier than 2 days after the insulation panels have been adhesively fixed as this is the proper setting time for mortar glue.
- A minimum number of 6 mechanical fixings per m^2 shall be installed for EPS and a minimum number of 8 mechanical fixings per m^2 for mineral wool shall be installed unless otherwise specified in the project specific design.
- Above two stories an additional stainless steel fire fixing is provided at a rate of 1 per m^2.
- For drilling holes in thin or cavity materials, (hollow block) a drill with an engaged hammer action should not be used. Minimum pullout resistance of mechanical fixings must be established alternatively low pullout values will require an increased frequency of fixing.
- The heads of mechanical fixings cannot protrude beyond the plane of the boards i.e. they should be exactly flush. Excessively deep insertion of fixing heads in the insulation material can cause cracking of the boards which in turn weakens the insulation. Filling indentations in these areas can cause thermal bridges and consequently may lead to plaster loosening in such areas.
- 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 with PVC stop-ends 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.
- The Certificate holder also offers an insulated resin coated sill for use with the Greinplast External Insulation Systems on buildings up to 2.5 stories in height. This insulated resin sill is manufactured from high density EPS with a resin coating which is applied in production. **Installation of the sill must not proceed if it would result in the weep holes of the window being covered.** Existing sills must not be cut flush to the substrate walls, in order to ensure a maximum bonding area between the insulated oversill and the existing sill. The oversill is cut to size to meet the window dimensions, and is fixed with adhesive. The resulting cut ends of the side projections are protected by the application of glass fibre mesh with base coat and appropriate finish coat in accordance with the Certificate holder's instructions (see Tables 1a and 1b for appropriate mesh, base coat and finish coat). Any gaps between the sill and the existing reveal should be filled with silicone or mastic sealant approved by the Certificate holder. The reveals are insulated once the insulated oversill has been installed. Refer to the Certificate holder's instructions for details regarding large window openings, on-site joining of sills etc.

- Lamella fire stops are installed in accordance with the Certificate holder's instructions as defined in Section 4.2 of this Certificate, at locations defined in the project specific site package.
- For EPS insulation, any high spots or irregularities should be removed by lightly planeing with a rasp to ensure the application of an even thickness of base coat. After sufficient stabilisation of the installed insulation (normally 2 days, during which time the insulation should be protected from exposure to extreme weather conditions to prevent degradation), and after the mechanical fixings have been installed, the insulated wall is ready for the application of the base and finish coats.
- EPS boards exposed to UV light for extended periods prior to the application of the render coatings are subject to breakdown and should be rasped down as required in preparation for rendering.
- Movement joints shall be provided in accordance with the project specific site package.
- At all locations where there is a risk of insulant exposure to weather, e.g. window reveals, eaves or stepped gables, the system must be protected, e.g. by an adequate overhang or by purpose-made sub-sills, seals or flashings.
- Building corners, door and window heads and jambs are formed using angle beads bonded to the insulation in accordance with the Certificate holder's instructions.
- To minimise the thermal bridge effect during the installation of railings, exterior lighting, shutter guide rails, canopies, aerials, satellite dishes etc, the Certificate holder offers a range of anchoring options. These anchors must be installed in accordance with the Certificate holder's instruction, as defined in the project specific site package, during the installation of the insulation boards.
- Where the external insulation meets intersecting walls etc and the abutting structure cannot be cut back, the edge of the insulation where it meets the wall should be protected using PVC universal stop-trim, followed by the application of a low modular silicone sealant between the top coat and the abutting structure.
- Prior to application of base coat and finish coat, all necessary protective measures such as taping off of existing window frames and covering of glass should be in place.
- If it is not possible to install the ETICS to all external walls, alternative forms of thermal upgrades, such as full fill cavity wall insulation or dry lining should be provided where physically and economically feasible. There should be an adequate overlap at the junction between the ETICS and the alternative insulation method selected to limit thermal bridging at this interface.
- Expansion joints should be used at intersections where movement in the structure is expected, and these should be incorporated into the project specific-design provided by the Certificate holder. In the case of un-heated lean-to buildings, the ETICS should continue around the lean-to.
- In sunny weather, work should commence on the shady side of the building and be continued following the sun to prevent the rendering drying out too rapidly.
- The appropriate base coat as per Tables 1a and 1b is prepared in accordance with the manufacturer's instructions, and is evenly applied to an appropriate thickness over the insulation boards. Base coats requiring the addition of water should be mixed mechanically using a drill and mixer. The base coat should be applied to the insulation boards to the width of the mesh.
- The reinforcing mesh must be immediately embedded into the fresh base coat, trowelling from the centre and outward to the edges, with a 100mm overlap maintained at all ends and edges. The mesh should be free of rippling or creases and must be fully embedded in the base coat in such a way that in the case of a thin-layered reinforcement the mesh is in the middle of the base coat layer, and in the case of thick-layered reinforcement it is in the upper third of the base coat layer. The mesh can be laid either vertically or horizontally.
- In the case of double reinforcement, the whole procedure should be repeated before the initial layer dries. Overlaps in each layer when double reinforcing should be offset from one another. The reinforcing mesh should extend over the edges of laths and be cut back once the cement has dried.
- Where required, in the case of fire fixings, fixings can be installed through the reinforcing mesh. This should be done before the basecoat hardens. Mechanical fixings placed through the reinforcement should be smoothed over with basecoat as soon as they have been installed.
- An additional diagonal reinforcement must be applied around the façade openings. This involves embedding the diagonal reinforcement strips of mesh 200x350mm into the basecoat at a 45° angle in relation to the lines determined by the reveal.
- Base profiles and corner profiles are fixed as specified in the site specific pack. Existing structural expansion joints should be extended through the surface of the ETICS system with full system expansion beads.
- Refer to the Certificate holder's instructions and project specific site package regarding the requirement of additional fixings to be

provided at a rate one per square metre above two stories. The fixing design should take account of the additional layers of mesh that are also applied at these locations.

- The primer and/or finish coat must not be applied until after the base coat has dried out fully (3 days approximately depending on weather conditions).
- Primers (see Tables 1a and 1b) for approved list of primers and their compatibility with finishing coats) shall be applied in accordance with the Certificate holder's instructions and allowed to dry fully prior to the application of the finishing coat. Render primers prevent penetration of impurities from the adhesive into the render, protects and reinforces the substrate, and increases the bond strength between the render and the substrate.
- Finishing coats and compatible primers are specified in tables 1a and 1b and shall be applied in accordance with the Certificate holder's instructions.
- It is imperative that weather conditions are suitable for the application and curing of the Greinplast finish coats. Finish coats should not be applied when the air or wall temperature is below +5°C or above 25°C for the duration of the curing time. In wet weather the finished walls should be protected to prevent wash-off. It is also advisable that protective covers remain in place as required to maximise the drying process.
- To minimise colour shade variations and to avoid dry line jointing, continuous surfaces should be completed without a break. If breaks cannot be avoided they should be made where services or architectural features, such as reveals or lines of doors and windows, help mask cold joints. Where long uninterrupted runs are planned, containers of the finish coat should be checked for batch numbers. Containers with different batch numbers should be checked for colour consistency.
- Where dash is being applied, the base coat and first layer of reinforcement mesh are applied as previously described. Once the base coat is touch dry, an additional layer of base coat is applied and the second layer of mesh is embedded with mechanical fixings through this second layer of mesh. This second layer of basecoat is scraped with a castellated trowel to provide a better key for the dash receiver coat. The K Rend Silicone Dash Receiver coat is then applied to the correct minimum thickness (6 to 8mm). While the render is still soft, selected clean and approved Kilwaughter Dashing Aggregate (nominal 6mm in diameter) is thrown or sprayed onto the surface. On completion, the surface must be checked to ensure an even coverage of dash has been achieved. Where necessary, the aggregate should be lightly tamped to ensure that a good bond is achieved.
- All rendering should follow best practice guidelines, e.g. 8000-0:2014 *Workmanship on construction sites – Introduction and general principles* and IS EN 13914-1:2016 *Design, preparation and application of external rendering and internal plastering – External rendering*.
- On completion of the installation, external fittings, rainwater goods etc. are fixed through the system into the substrate in accordance with the Certificate holder's instructions.
- When obstructions abut external walls such as a boundary wall, best practice would be to cut back the boundary wall to allow for the continuation of the external insulation system.
- All necessary post-application inspections should be performed and the homeowner's manual completed and handed over to the homeowner accordingly.

2.4.5 GREINPLAST OEA PANELS

GREINPLAST OEA façade panels can be used 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 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 2017. The GREINPLAST OEA panels are suitable for use with the GREINPLAST EPS System.

Installation

- GREINPLAST OEA panels are bonded to a suitably prepared reinforced layer, using GREINPLAST KA adhesive, applied by means of a notched trowel, both to the substrate (i.e. insulation board with reinforced base coat) and to the bottom surface of the panels.
- The panel should be pressed firmly to the substrate so that the adhesive spreads evenly over its entire surface.
- Apply GREINPLAST FA primer or GREINPLAST FH primer to the front side of the bonded panels.
- After the primer paint has dried completely, a layer of GREINPLAST FA is applied, which after applying, is wiped with a slightly moistened sponge to remove excess paint and partially reveal the first layer of primer.

2.4.6 IZOFLEX SLIPS

IZOFLEX surface layer (façade) tiles can be used 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 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 2017. The Izoflex slips are suitable for use with the GREINPLAST MW System.

Installation

- Starting at the bottom of the wall, apply the adhesive to the base coat over an area of approximately 500mm^2.
- Push the Izoflex slips into the adhesive in the desired location.
- After the Izoflex slips are in place the joints must be levelled out using a wet brush.
- The façade must be protected from the weather, such as heavy rain, over a minimum of 5 days after application.

Note: EPS insulation is shown in the following details for illustrative purposes only. Full installation details for both Greinplast EPS and Greinplast MW Systems can be obtained from the certificate holder.

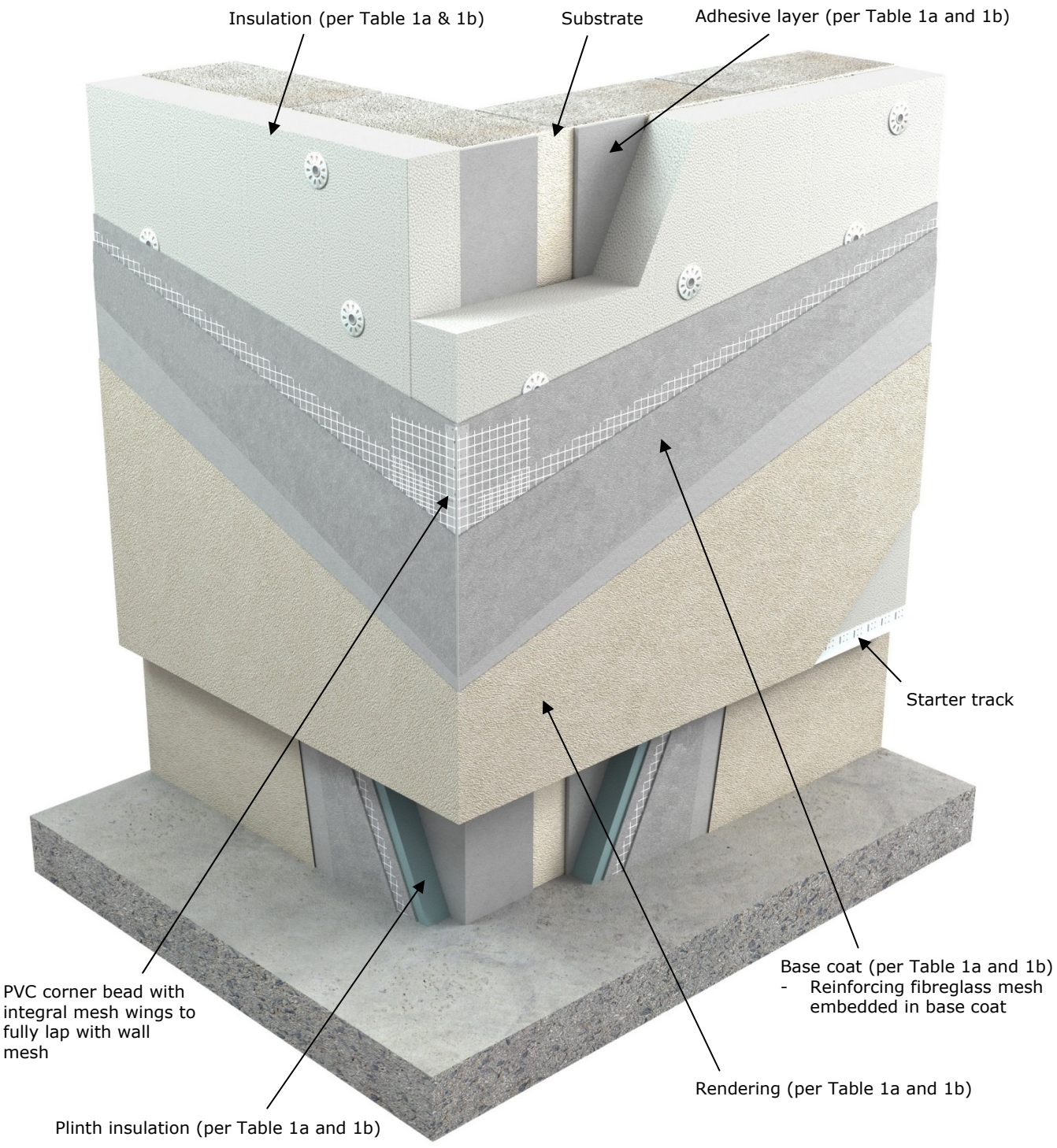

Figure 1: Build-up of System Components

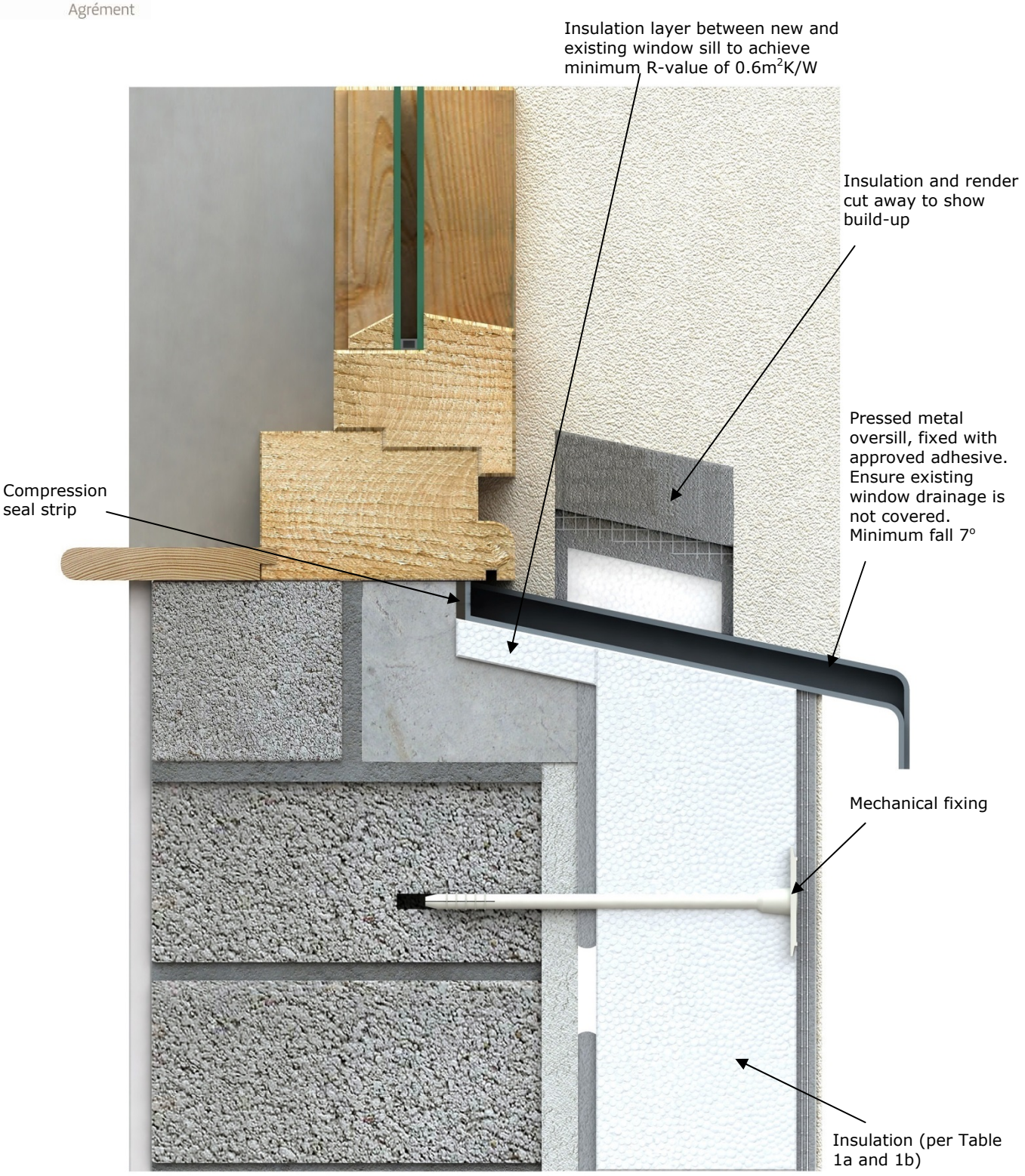

Figure 2: Window Sill Detail

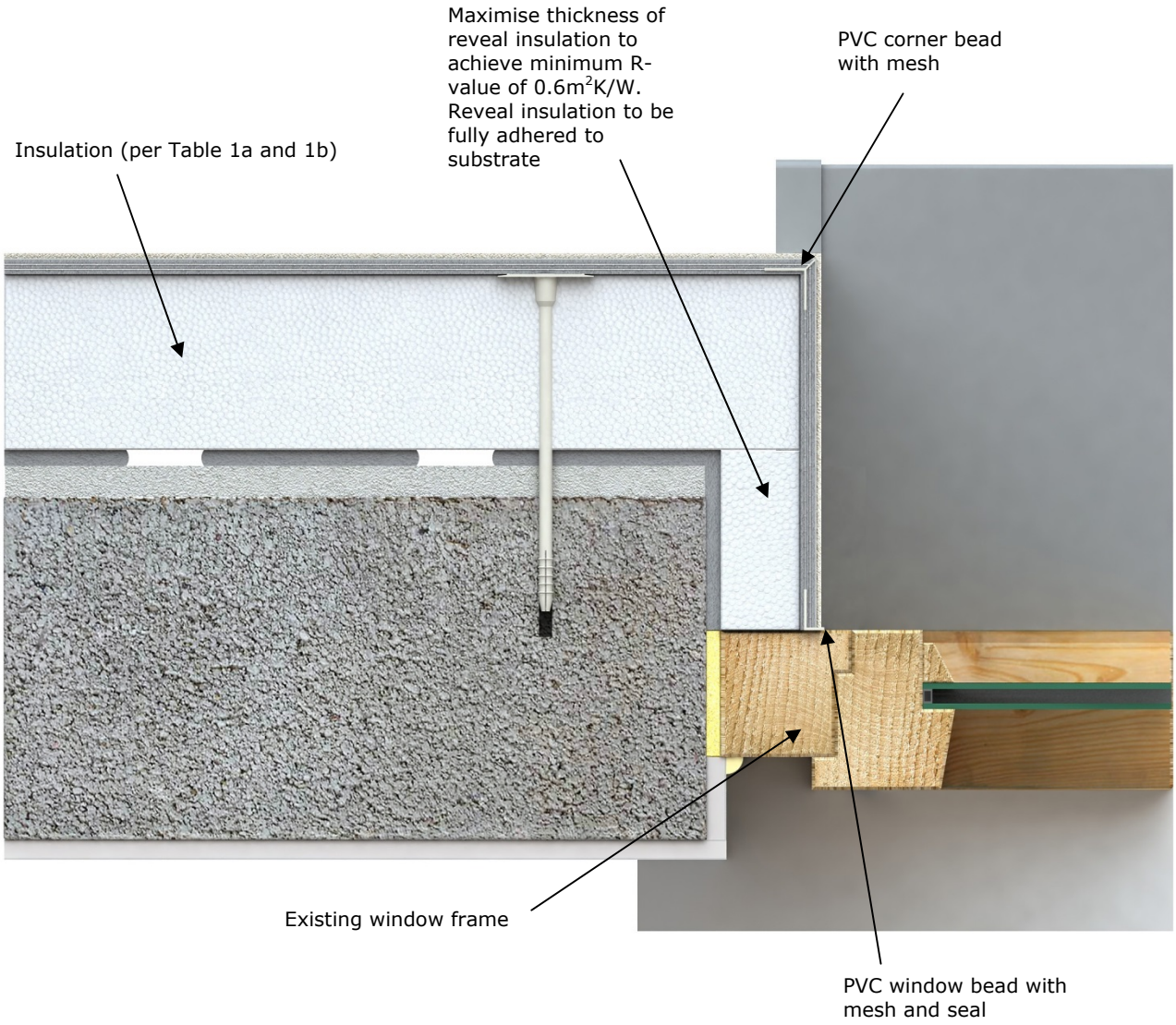

Figure 3: Window Reveal Detail

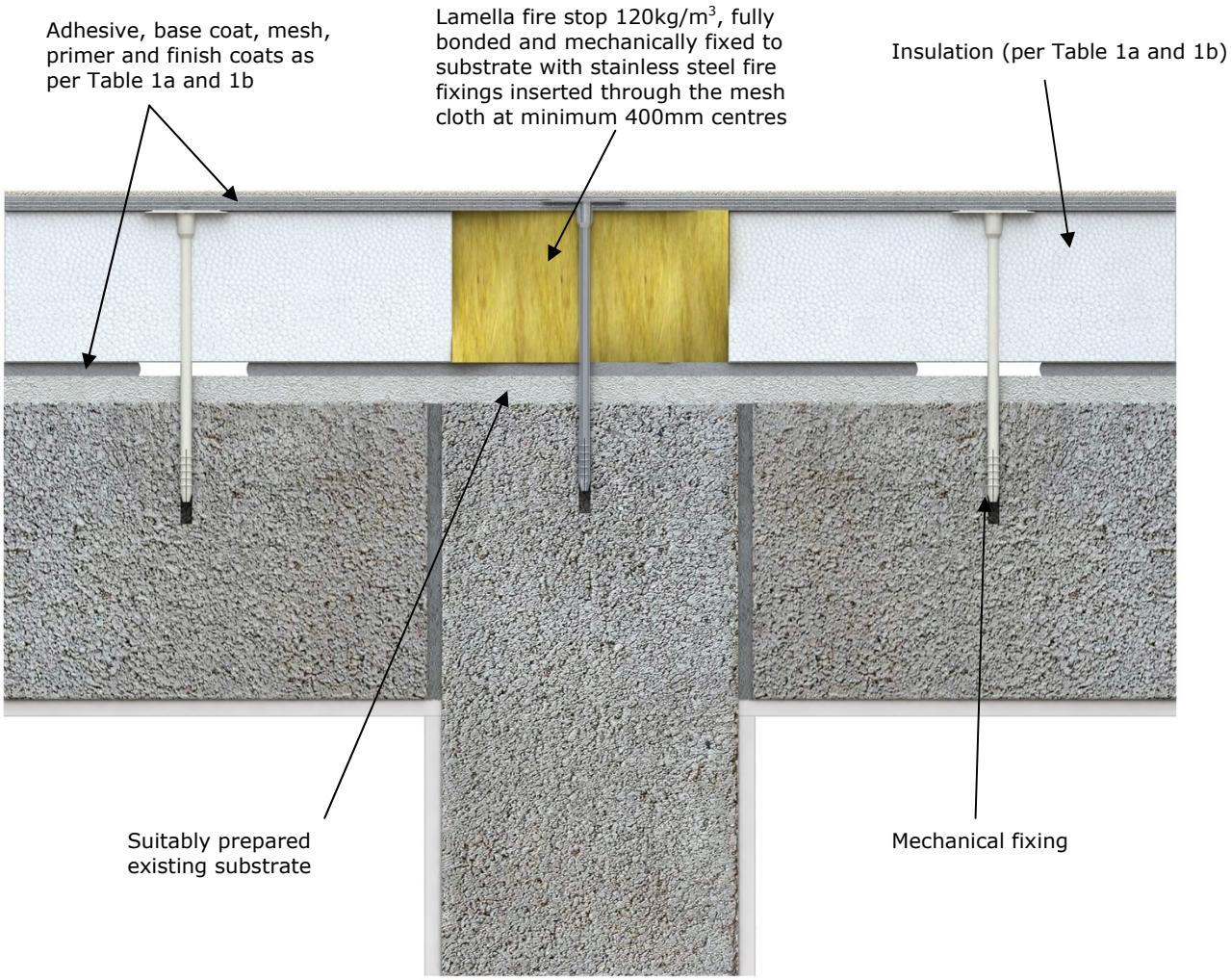

Figure 4: Fire Break Detail

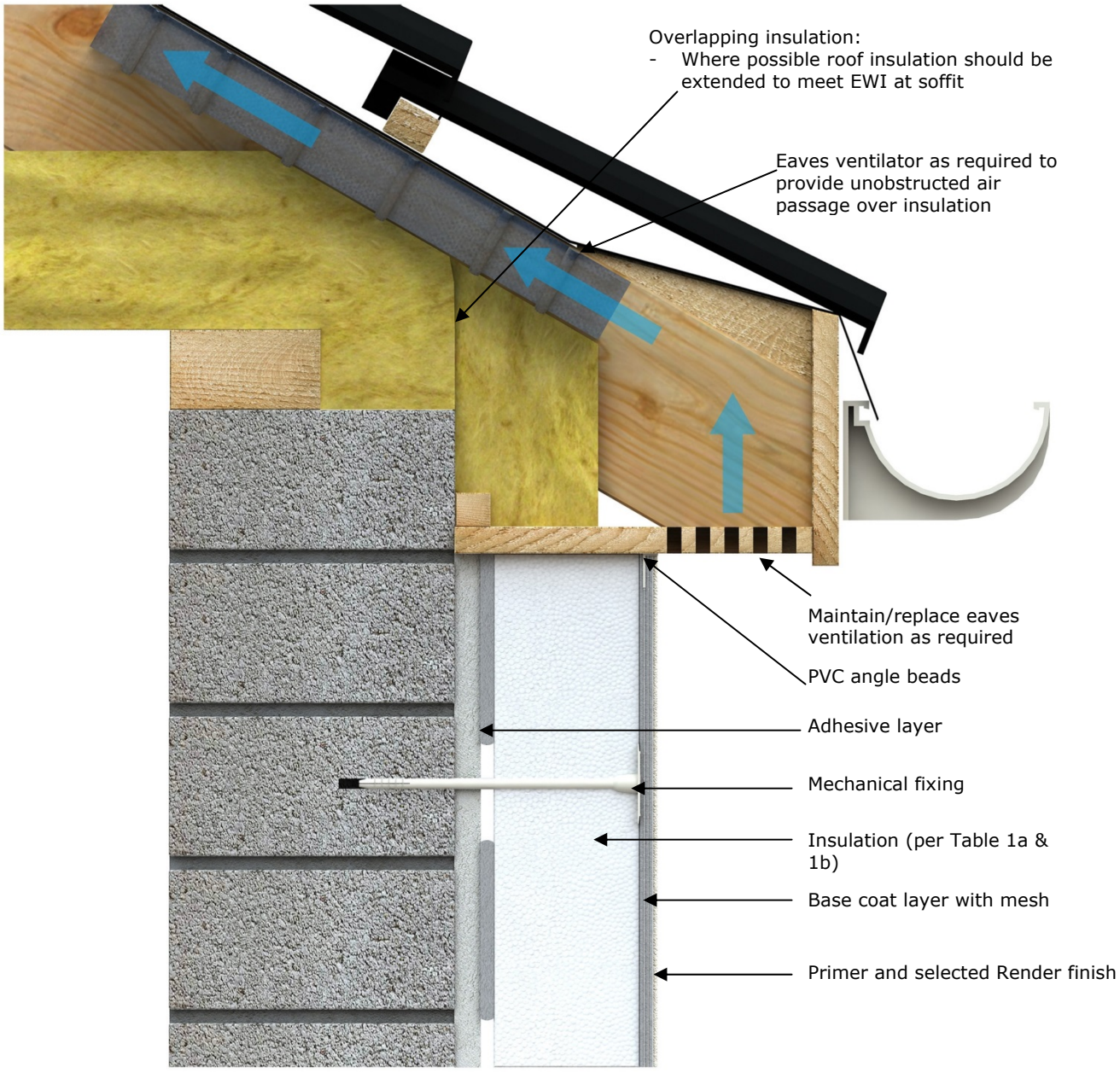

Figure 5: Eaves Detail

Figure 6: Site showing GREINPLAST OEA panels

3. GENERAL

Greinplast External Insulation Systems are designed by Greinplast EWI Ltd on a project specific basis. Where the external insulation system is being applied to improve the thermal performance of an existing building, Greinplast EWI 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, condensation risk analysis, 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 5250:2016 *Code of practice for control of condensation in buildings*. This includes the use of approved detailing as shown in Figures 1 to 5 incorporating the requirements of SR 54:2014 *Code of practice for the energy efficient retrofit of dwellings* and, where possible, meeting all of the Acceptable Construction Details published by the DHPLG.
d) Thermal insulation provision to Part L of the Building Regulations 1997 to 2017.
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 1991-1-4:2005 *Actions on structures – General actions – Wind actions*.
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 home owner'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 2017. 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 the 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.

4.1 STRENGTH AND STABILITY

4.1.1 Wind Loading

Greinplast External Insulation Systems can be designed to withstand the wind pressures (including suction) and thermal stresses in accordance with the Building Regulations 1997 to 2017. 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 1991-1-4:2005. A general factor of safety of 1.5 is applied to design wind loads.

4.1.2 Impact Resistance

a) The Greinplast External Insulation Systems have been classified as defined in Table 2 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 13501-1:2007 *Fire classification of construction products and building elements – Classification using data from reaction to fire tests* for the Greinplast External Insulation Systems are defined in Table 4 and Table 5.

Systems that achieve a Class A2 or 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 2017.

Systems that achieve a Class C Reaction to Fire Classification are suitable for use up to the maximum storey heights as for Class A2 or 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 2017. Reference should be made to Section 4.1 and 4.2 of TGD to Part B of the Building Regulations 1997 to 2017, and to Sections 4.4 and 4.5 of TGD to Part B Volume 2 of the Building Regulations 1997 to 2017.

The mineral wool board is classified as non-combustible as per Table A8 (d) of TGD to Part B of the Building Regulations 1997 to 2017.

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 2017, and Sections 3.5, 3.6, 3.7 and 4 of TGD to Part B Volume 2 of the Building Regulations 1997 to 2017. 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 2017). 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/m^3), 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 2017 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 2017. 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 2017 can be achieved using the Greinplast External Insulation Systems. The manufacturer's declared thermal conductivity values ($\lambda_{90/90}$) taken from their CE Marking Declarations of Performance are 0.031W/mK for the graphite enhanced grey EPS board, and 0.036W/mK for the mineral wool insulation. These have not been assessed by NSAI Agrément. Table 3 shows typical insulation thicknesses to achieve minimum U-values of 0.27W/m^{2}K (retrofit only) and 0.21W/m^{2}K for different construction types.

Calculation of U-values will be required on individual projects to confirm a U-value of 0.27W/m^{2}K 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, 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 2017.

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 Greinplast 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 2017.

When **all** bridged junctions within a building comply with the requirements of Table D2 of TGD to Part L, the improved 'y' 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 in accordance with BRE IP1/06 *Assessing the effects of thermal bridging at junctions and around openings* and BRE BR 497 *Conventions for calculating linear thermal transmittance and temperature factors* in accordance with Appendix D of TGD to Part L of the Building Regulations 1997 to 2017.

As per Acceptable Construction Details, a minimum thermal resistance of 0.6m^{2}K/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 2017, 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 Greinplast External Wall Insulation Ltd in accordance with BS 5250:2016 and the

design modified as appropriate to reduce the risk of interstitial condensation to acceptable levels.

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 2017, 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.

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.

Necessary repairs should be carried out immediately and must be in accordance with the Certificate holder's instructions. Repairs to plumbing etc. should also be carried out as required to prevent deterioration or damage, and to protect the integrity of the system.

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.

Sealants shall be subject to regular inspection (at least annually). They should be replaced as required and fully replaced every 18 to 20 years to maintain performance.

GREINPLAST OEA panels and IZOFLEX slips shall be subject to regular inspection as above (at least annually) and also after any severe weather.

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 fixing specifications;
- Joint design;
- Construction details;
- Maintenance requirements.

External render systems can last in excess of 40 years in accordance with BS 7543:2015 *Guide to durability of buildings and building elements, products and components* subject to normal use, regular inspection and maintenance. 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 13914-1:2016 and ongoing care and maintenance as described in Section 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 13914-1:2016 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 Greinplast 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

(i) Existing data on product properties in relation to fire, toxicity, environmental impact and the effect on mechanical strength/stability and durability were assessed.

(ii) 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.

(iii) 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.

(iv) Site visits were conducted to assess the practicability of installation and the history of performance in use of the product.

<table>
<tr><th colspan="5">Greinplast EPS</th></tr>
<tr><td colspan="5">System: EPS board + base coat GREINPLAST K + finishing coats with relevant key coats</td></tr>
<tr><td></td><td colspan="4">Reinforcement</td></tr>
<tr><td>Finishing Coat</td><td>Single standard mesh TG 22, VERTEX 145 / AKE 145 / R117 A101</td><td>Single standard mesh SSA-1363-SM0.5 / SSA-1363-150 SM0.5 / SSA-1363-145</td><td>Single standard mesh TG 15, SSA-1363-160-SM0.5A</td><td>Double standard mesh TG 22, VERTEX 145 / AKE 145 / R117 A101</td></tr>
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<tr><td>GREINPLAST TK</td></tr>
<tr><td>GREINPLAST G/KGP</td><td>Category II</td><td rowspan="11">Category I</td><td rowspan="11">Category I</td></tr>
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<tr><td>GREINPLAST THK</td></tr>
<tr><td>GREINPLAST TXB</td></tr>
<tr><td>GREINPLAST TXK</td></tr>
<tr><td>GREINPLAST TNB</td></tr>
<tr><td>GREINPLAST G-N</td><td colspan="3">Category III</td><td>NPD</td></tr>
<tr><td>GREINPLAST OEA</td><td colspan="4">Category I</td></tr>
<tr><th colspan="5">Greinplast EMW</th></tr>
<tr><td colspan="5">System: MW board + base coat GREINPLAST KW + finishing coats with relevant key coats</td></tr>
<tr><td></td><td colspan="4">Reinforcement</td></tr>
<tr><td>Finishing Coat</td><td colspan="2">Single standard mesh TG15</td><td colspan="2">Single standard mesh VERTEX 145</td></tr>
<tr><td>GREINPLAST TB</td><td colspan="2" rowspan="2">Category III</td><td colspan="2" rowspan="2">Category III</td></tr>
<tr><td>GREINPLAST TK</td></tr>
<tr><td>GREINPLAST TSB</td><td colspan="2" rowspan="4">Category II</td><td colspan="2">Category II</td></tr>
<tr><td>GREINPLAST TSK</td><td colspan="2" rowspan="3">Category III</td></tr>
<tr><td>GREINPLAST TXB</td></tr>
<tr><td>GREINPLAST TXK</td></tr>
</table>

Table 2: Impact Resistance

Insulation	Declared Thermal Conductivity ($\lambda_{90/90}$) of Insulation (W/mK)	Thickness of Insulation (mm)	U-Value (W/m²K)
No external insulation	-	-	1.30
Graphite-enhanced EPS	0.031	100	0.27
		130	0.21
Mineral Wool	0.039	130	0.27
		180	0.21
These values are based on a typical house of 215mm hollow block construction (Building Regulations Part L 2017) with the following construction (internal to external): • 15 mm sand & cement render • Hollow block with 10mm mortar joint – 215mm • Adhesive – 1-2mm • Insulation board – as specified • Render finish with mesh basecoat – 7mm			
Insulation	**Declared Thermal Conductivity ($\lambda_{90/90}$) of Insulation (W/mK)**	**Thickness of Insulation (mm)**	**U-Value (W/m²K)**
No external insulation	-	-	1.30
Graphite-enhanced EPS	0.031	90	0.27
		120	0.21
Mineral Wool	0.039	120	0.27
		170	0.21
These values are based on a typical house of concrete block cavity-wall construction (Building Regulations Part L 2017) with the following construction (internal to external): • 13 mm sand & cement render • Concrete block – 100mm • Unventilated uninsulated air cavity • Concrete block – 100mm • Adhesive – 1-2mm • Insulation board – as specified • Render finish with mesh basecoat			

Table 3: Typical U-values (W/m²K)

Greinplast EPS			
Configuration	**Maximum declared organic content**	**Declared flame retardant content**	**Reaction to fire class according to EN 13501-1**
Adhesives: GREINPLAST KS GREINPLAST K	≤ 2.5%	0%	B – s2, d0
Base coat: GREINPLAST K	≤ 2.5%		
Finishing coats (with relevant key coats): GREINPLAST TK GREINPLAST TB GREINPLAST TSB GREINPLAST TSK GREINPLAST TAB GREINPLAST TAK	≤ 7%		
Decorative coats: GREINPLAST FX GREINPLAST FA GREINPLAST FS	≤ 14%		
Adhesives: GREINPLAST KS GREINPLAST K	≤ 3.7%	0%	B – s2, d0
Base coat: GREINPLAST K	≤ 3.7%		
Key coats: GREINPLAST F GREINPLAST SP GREINPLAST XP	≤ 9.2%		
Finishing coats: GREINPLAST TB GREINPLAST TK GREINPLAST TSB GREINPLAST TSK GREINPLAST TXB GREINPLAST TXK GREINPLAST TNB	≤ 10%		
Decorative coats: GREINPLAST FA GREINPLAST FH GREINPLAST FS GREINPLAST FX GREINPLAST FNX	≤ 18.9%		
Adhesives: GREINPLAST KS GREINPLAST K	≤ 2.5%	0%	C – s2, d0
Base coat: GREINPLAST K	≤ 2.5%		
Finishing coats (with relevant key coats): GREINPLAST G/KGP GREINPLAST G-N	≤ 8%		
Adhesives: GREINPLAST KS GREINPLAST K	≤ 2.5%	0%	C – s3, d0
Base coat: GREINPLAST K	≤ 2.5%		
Finishing coats (with relevant key coats): GREINPLAST TAN	≤ 9%		
Decorative coats: GREINPLAST FX GREINPLAST FA	≤ 14%		

Table 4 – Reaction to Fire – Greinplast EPS

Greinplast MW			
Configuration	**Maximum declared organic content**	**Declared flame retardant content**	**Reaction to fire class according to EN 13501-1**
Adhesives: GREINPLAST KWP GREINPLAST KW	≤ 4.38%	0%	A2 – s2, d0
Base coat: GREINPLAST KW	≤ 4.38%		
Finishing coats (with relevant key coats): GREINPLAST TK GREINPLAST TB GREINPLAST TSB GREINPLAST TSK GREINPLAST TXB GREINPLAST TXK	≤ 9%		
Decorative coats: GREINPLAST FS GREINPLAST FX	≤ 11%		

Table 5 – Reaction to Fire – Greinplast MW

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 2017 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.

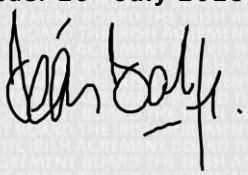
5.6 The NSAI is not responsible to any person or body for loss or damage including personal injury arising as a direct or indirect result of the use of this product or process.

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. **18/0396** is accordingly granted by the NSAI to **Greinplast sp zo.o** on behalf of NSAI Agrément.

Date of Issue: **16th July 2018**

Signed 

Seán Balfe
Director of NSAI Agrément

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