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Agrément Certificate

23/7020

Product Sheet 1 Issue 1

KLEIB EXTERNAL WALL INSULATION SYSTEM

KLEIB EPS EXTERNAL WALL INSULATION SYSTEM

This Agrément Certificate Product Sheet⁽¹⁾ relates to the KLEIB EPS External Wall Insulation System, comprising standard white or grey expanded polystyrene (EPS) insulation boards adhesively fixed with supplementary mechanical fixings, and reinforced basecoat and render finishes. The system is suitable for use, with height restrictions, on the outside of external masonry walls in new and existing domestic and non-domestic buildings.

(1) Hereinafter referred to as 'Certificate'.

The assessment includes

Product factors:

- compliance with Building Regulations
- compliance with additional regulatory or non-regulatory information where applicable
- evaluation against technical specifications
- assessment criteria and technical investigations
- uses and design considerations

Process factors:

- compliance with Scheme requirements
- installation, delivery, handling and storage
- production and quality controls
- maintenance and repair

Ongoing contractual Scheme elements†:

- regular assessment of production
- formal 3-yearly review



KEY FACTORS ASSESSED

- Section 1. Mechanical resistance and stability
- Section 2. Safety in case of fire
- Section 3. Hygiene, health and the environment
- Section 4. Safety and accessibility in use
- Section 5. Protection against noise
- Section 6. Energy economy and heat retention
- Section 7. Sustainable use of natural resources
- Section 8. Durability

The BBA has awarded this Certificate to the company named above for the system described herein. This system has been assessed by the BBA as being fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of issue: 20 October 2023

Hardy Giesler
Chief Executive Officer

This BBA Agrément Certificate is issued under the BBA's Inspection Body accreditation to ISO/IEC 17020. Sections marked with † are not issued under accreditation.

The BBA is a UKAS accredited Inspection Body (No. 4345), Certification Body (No. 0113) and Testing Laboratory (No. 0357).

Readers MUST check that this is the latest issue of this Agrément Certificate by either referring to the BBA website or contacting the BBA directly.

The Certificate should be read in full as it may be misleading to read clauses in isolation.

Any photographs are for illustrative purposes only, do not constitute advice and should not be relied upon.

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SUMMARY OF ASSESSMENT AND COMPLIANCE

This section provides a summary of the assessment conclusions; readers should refer to the later sections of this Certificate for information about the assessments carried out.

Compliance with Regulations

Having assessed the key factors, the opinion of the BBA is that the KLEIB EPS External Wall Insulation System, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements of the following Building Regulations:



The Building Regulations 2010 (England and Wales) (as amended)

Requirement:	A1	Loading
Comment:		The system can sustain and transmit wind loads to the substrate wall. See section 1 of this Certificate.
Requirement:	B4(1)	External fire spread
Comment:		The system is restricted by this Requirement. See section 2 of this Certificate.
Requirement:	C2(b)	Resistance to moisture
Comment:		The system can provide a degree of protection against rain ingress. See section 3 of this Certificate.
Requirement:	C2(c)	Resistance to moisture
Comment:		The system can contribute to minimising the risk of interstitial and surface condensation. See section 3 of this Certificate.
Requirement:	L1(a)(i)	Conservation of fuel and power
Comment:		The system can contribute to satisfying this Requirement. See section 6 of this Certificate.
Regulation:	7(1)	Materials and workmanship
Comment:		The system is acceptable. See sections 8 and 9 of this Certificate.
Regulation:	7(2)	Materials and workmanship
Comment:		The system is restricted by this Regulation. See section 2 of this Certificate.
Regulation:	25B	Nearly zero-energy requirements for new buildings
Regulation:	26	CO₂ emission rates for new buildings
Regulation:	26A	Fabric energy efficiency rates for new dwellings (applicable to England only)
Regulation:	26A	Primary energy consumption rates for new buildings (applicable to Wales only)
Regulation:	26B	Fabric performance values for new dwellings (applicable to Wales only)
Regulation:	26C	Target primary energy rates for new buildings (applicable to England only)
Regulation:	26C	Energy efficiency rating (applicable to Wales only)
Comment:		The system can contribute to satisfying these Regulations; however, compensating fabric/services measures may be required. See section 6 of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)(2)	Fitness and durability of materials and workmanship
Comment:		The system can contribute to a construction satisfying this Regulation. See sections 8 and 9 of this Certificate.

Regulation:	8(3)	Fitness and durability of materials and workmanship
Comment:		The system is restricted by this Regulation. See section 2 of this Certificate.
Regulation:	9	Building standards – construction
Standard:	1.1	Structure
Comment:		The system can sustain and transmit wind loads to the substrate wall. See section 1 of this Certificate.
Standard:	2.6	Spread to neighbouring buildings
Comment:		The system is restricted by this Standard, with reference to clauses 2.6.4 ⁽¹⁾⁽²⁾ , 2.6.5 ⁽¹⁾ and 2.6.6 ⁽²⁾ . See section 2 of this Certificate.
Standard:	2.7	Spread on external walls
Comment:		The system is restricted by this Standard, with reference to clause 2.7.1 ⁽¹⁾⁽²⁾ . See section 2 of this Certificate.
Standard:	3.10	Precipitation
Comment:		The system can contribute to a construction satisfying this Standard, with reference to clauses 3.10.1 ⁽¹⁾⁽²⁾ and 3.10.2 ⁽¹⁾⁽²⁾ . See section 3 of this Certificate.
Standard:	3.15	Condensation
Comment:		The system can contribute to satisfying this Standard, with reference to clauses 3.15.1 ⁽¹⁾⁽²⁾ , 3.15.4 ⁽¹⁾⁽²⁾ and 3.15.5 ⁽¹⁾⁽²⁾ . See section 3 of this Certificate.
Standard:	6.1(b)(c)	Energy demand and carbon dioxide emissions
Comment:	(d)	The system can contribute to satisfying this Standard, with reference to clauses (or parts of) 6.1.1 ⁽¹⁾ and 6.1.6 ⁽¹⁾ . See section 6 of this Certificate.
Standard:	6.2	Building insulation envelope
Comment:		The system can contribute to satisfying this Standard, with reference to clauses (or parts of) 6.2.1 ⁽¹⁾⁽²⁾ , 6.2.3 ⁽¹⁾ , 6.2.4 ⁽²⁾ , 6.2.6 ⁽¹⁾ , 6.2.7 ⁽¹⁾⁽²⁾ , 6.2.8 ⁽¹⁾⁽²⁾ , 6.2.9 ⁽¹⁾⁽²⁾ , 6.2.10 ⁽¹⁾⁽²⁾ , 6.2.11 ⁽¹⁾⁽²⁾ , 6.2.12 ⁽¹⁾ and 6.2.13 ⁽¹⁾ . See section 6 of this Certificate.
Standard:	7.1(a)(b)	Statement of sustainability
Comment:		The system can contribute to satisfying the relevant requirements of Regulation 9, Standards 1 to 6, and therefore will contribute to a construction meeting the bronze level of sustainability as defined in this Standard. In addition, the system can contribute to a construction meeting a higher level of sustainability as defined in this Standard with reference to clauses 7.1.4 ⁽¹⁾ , 7.1.6 ⁽¹⁾⁽²⁾ , 7.1.7 ⁽¹⁾ , 7.1.9 ⁽²⁾ and 7.1.10 ⁽²⁾ . See section 6 of this Certificate.
Regulation:	12	Building standards – conversions
Comment:		Comments in relation to the system under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to clause 0.12.1 ⁽¹⁾⁽²⁾ and Schedule 6 ⁽¹⁾⁽²⁾ .
		(1) Technical Handbook (Domestic). (2) Technical Handbook (Non-Domestic).



The Building Regulations (Northern Ireland) 2012 (as amended)

Regulation:	23(1)(a)(i)	Fitness of materials and workmanship
Comment:	(iii)(b)(i)(ii)	The system is acceptable. See sections 8 and 9 of this Certificate.
Regulation:	23(2)	Fitness of materials and workmanship
Comment:		The system is restricted by this Regulation. See section 2 of this Certificate.

Regulation:	28(b)	Resistance to moisture and weather
Comment:		The system provides a degree of protection against rain ingress. See section 3 of this Certificate.
Regulation:	29	Condensation
Comment:		Walls insulated with the system can contribute to satisfy the requirements of this Regulation. See section 3 of this Certificate.
Regulation:	30	Stability
Comment:		The system can sustain and transmit wind loads to the substrate wall. See section 1 of this Certificate.
Regulation:	36(a)	External fire spread
Comment:		The system is restricted by this Regulation. See section 2 of this Certificate.
Regulation:	39(a)(i)	Conservation measures
Comment:		The system can contribute to satisfying this Regulation. See section 6 of this Certificate.
Regulation:	40(2)	Target carbon dioxide emission rate
Regulation:	43(1)(2)	Renovation of thermal elements
Regulation:	43B	Nearly zero-energy requirements for new buildings
Comment:		The system can contribute to satisfying these Regulations; however, compensating fabric/services measures may be required. See section 6 of this Certificate.

Additional Information

NHBC Standards 2023

In the opinion of the BBA, the KLEIB EPS External Wall Insulation System, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements in relation to *NHBC Standards*⁽¹⁾, Part 6 *Superstructure (excluding roofs)*, Chapter 6.9 *Curtain walling and cladding*.

(1) There is a general requirement in *NHBC Standards 2023*, Chapter 6.9, for fire-retardant-treated insulation in accordance with BS EN 13163 : 2012 to be used.

Fulfilment of Requirements

The BBA has judged the KLEIB EPS External Wall Insulation System to be satisfactory for use as described in this Certificate. The system has been assessed as an external wall insulation system, used to reduce the thermal transmittance (U value) of external walls of masonry, normal weight concrete, lightweight concrete, autoclaved concrete and no-fines concrete construction, on new or existing domestic and non-domestic buildings (with or without existing render), as described in this Certificate.

ASSESSMENT

Product description and intended use

The Certificate holder provided the following description for the system under assessment. The KLEIB EPS External Wall Insulation System comprises EPS insulation boards, adhesively fixed (coverage of at least 60% of the surface when boards are pressed against the wall) direct to the external masonry wall, with supplementary mechanical fixings, glass fibre-reinforced basecoat, primer and render finishes (see Figure 1).

The system is suitable for use, with height restrictions, on the outside of external masonry walls of new and existing domestic and non-domestic buildings.

The system comprises of the following components:

Adhesive

- KLEIB C1 — a cementitious mortar powder requiring the addition of 4.5 to 5.0 litres of clean water per 25 kg bag. It is used as adhesive for insulation boards and is applied to the entire surface, to a minimum thickness of 5 mm. On average, the coverage rate is approximately 4.0 to $5.0 \text{ kg}\cdot\text{m}^{-2}$

Insulation⁽¹⁾

- expanded polystyrene (EPS 70 white 038) insulation — 1200 by 600 mm in a range of thicknesses from 50⁽²⁾ to 300 mm, with a nominal density of $15 \text{ kg}\cdot\text{m}^{-3}$, a compressive strength of $70 \text{ kN}\cdot\text{m}^{-2}$ and a minimum tensile strength of 100 kPa. Boards are manufactured to comply with the requirements of BS EN 13163 : 2012
- expanded polystyrene (EPS 70 grey 032) insulation — 1200 by 600 mm in a range of thicknesses from 50⁽²⁾ to 250 mm, with a nominal density of $15 \text{ kg}\cdot\text{m}^{-3}$, compressive strength of $70 \text{ kN}\cdot\text{m}^{-2}$ and minimum tensile strength of 100 kPa. Boards are manufactured to comply with the requirements of BS EN 13163 : 2012

(1) For declared thermal conductivity (λ_D) values, see Table 2.

(2) Insulation thicknesses of 20, 30 and 40 mm are also available, but are generally used in reveals.

Mechanical fixings (supplementary)

- Mechanical fixings — fixing anchors, with various lengths to suit the substrate and insulation thickness, approved and supplied by the Certificate holder, and selected from:
 - Ejot STR U 2G — a polyethylene anchor sleeve, with stainless steel or electro-galvanized pins
 - Ejot H1 eco — a polyethylene anchor sleeve, with stainless steel or electro-galvanized pins
 - Ejot H2 eco — a polyethylene anchor sleeve, with polyamide, stainless steel or electro-galvanized pins
 - Ejot H3 — a polyethylene anchor sleeve, with polyamide pins
 - Ejot H4 eco — a polyethylene anchor sleeve, with stainless steel or electro-galvanized pins
 - Klimas LTX-8, LMX-8, LTX-10, LMX-10 — a polyethylene anchor sleeve, with polyamide or electro-galvanized steel pins
 - Klimas WK THERMØ8 — a polyethylene anchor sleeve, with a carbon electro-galvanized steel pin including a polyamide cover
 - Klimas Fixplug-08, Fixplug-10 — a polyethylene anchor sleeve, with polyamide pins

Basecoat

- KLEIB C2 — a cementitious mortar powder requiring the addition of 4.5 to 5.0 litres of clean water per 25 kg bag. It is used as a basecoat to secure reinforcing mesh over the surface of insulation boards. Applied to a thickness between 3 to 5 mm with a coverage rate of approximately 3.0 to $4.0 \text{ kg}\cdot\text{m}^{-2}$

Reinforcement

- reinforcing mesh — available in rolls, either 1.0 or 1.1 m wide standard mesh (various grid sizes and mass per unit area) of multi-strength glass fibre with a polymer coating, selected from:
 - GG-145 — 4.7 by 3.8 mm, with a mass per unit of $145 \text{ g}\cdot\text{m}^{-2}$
 - GG-150 — 4.5 by 3.8 mm, with a mass per unit of $150 \text{ g}\cdot\text{m}^{-2}$
 - OMFA 122 — 4 by 4 mm, with a mass per unit of $165 \text{ g}\cdot\text{m}^{-2}$
 - SSA-1363-145 — 4.3 by 3.6 mm, with a mass per unit of $150 \text{ g}\cdot\text{m}^{-2}$
 - SSA-1363-160 — 3.8 by 3.6 mm, with a mass per unit of $160 \text{ g}\cdot\text{m}^{-2}$
 - SSA-0606-165 — 6.2 by 6 mm, with a mass per unit of $165 \text{ g}\cdot\text{m}^{-2}$
 - SSA-1111-340-SM — 4.3 m by 3.6 mm, with a mass per unit of $150 \text{ g}\cdot\text{m}^{-2}$
 - SSA-6810 — 7.8 by 7.7 mm, with a mass per unit of $222 \text{ g}\cdot\text{m}^{-2}$

Primer

- KLEIB C3SIL — a ready to use primer for use with the silicone finishing coat, with a coverage rate of approximately 0.25 to $0.35 \text{ kg}\cdot\text{m}^{-2}$

Finishing coats⁽¹⁾

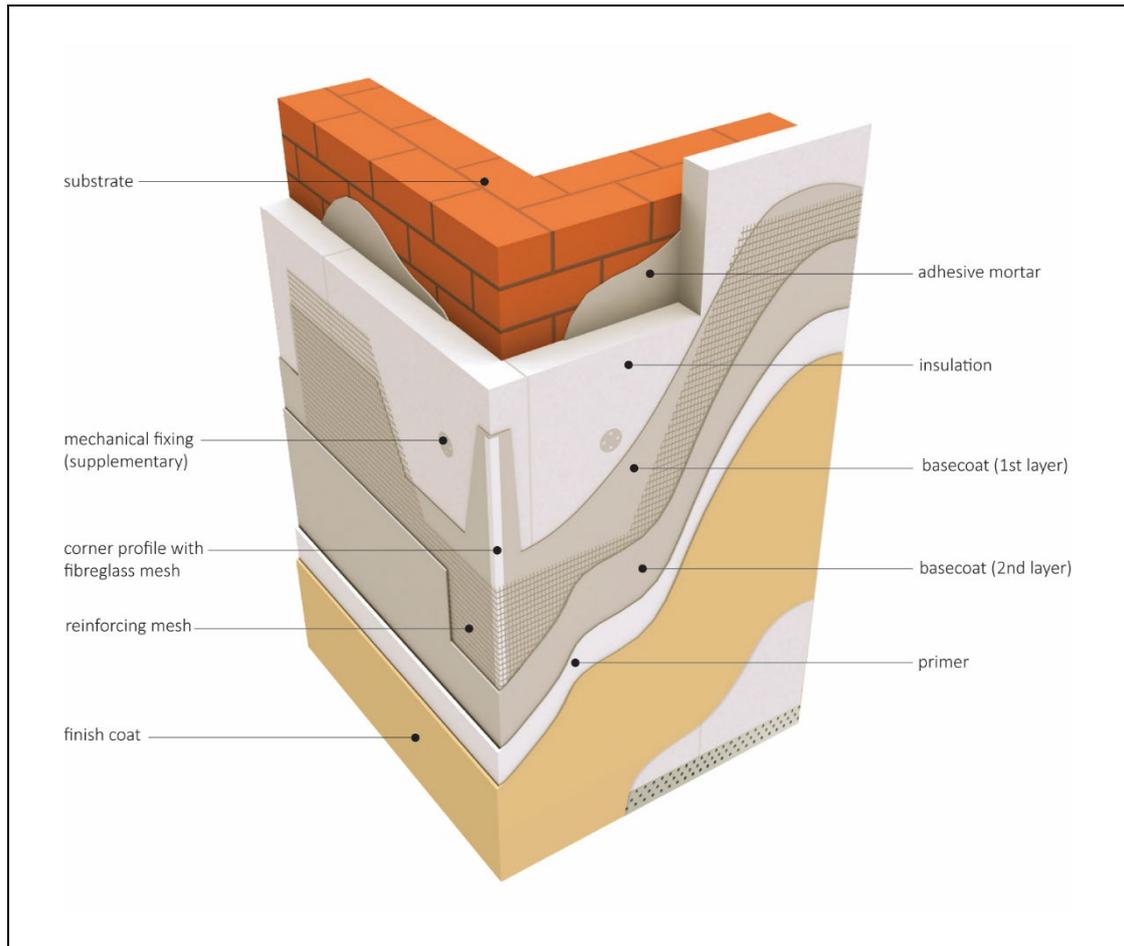
- KLEIB C7 — a ready to use silicone-acrylic paste, available in particle sizes of 1.0, 1.5 and 2.0 mm, with a coverage rate of 1.7 to 2.5 kg·m⁻², 2.2 to 2.7 kg·m⁻² and 3.0 to 3.4 kg·m⁻² respectively

(1) The thickness of the finish coat is regulated by the particle size.

Optional decorative coat

- KLEIB Q3 — a ready to use silicone coating, which can be used with the KLEIB C7 finishing coat with a coverage rate of approximately 0.25 to 0.35 kg·m⁻².

Figure 1 KLEIB EPS External Wall Insulation System



Ancillary items

The Certificate holder recommends the following ancillary items for use with the system, but these materials have not been assessed by the BBA and are outside the scope of this Certificate:

- a range of aluminium, PVC-U or stainless-steel profiles, comprising:
 - base profile
 - edge profile
 - corner profile with optional PVC-U nosing
 - render stop profile
 - movement joint
 - expansion joint
- profile connectors and fixings
- fungicidal wash
- silicone sealant
- expansion foam
- cavity barriers and fire stopping.

Product assessment – key factors

The system was assessed for the following key factors, and the outcome of the assessments is shown below. Conclusions relating to Building Regulations apply to the whole of the UK unless otherwise stated.

1 Mechanical resistance and stability

Data were assessed for the following characteristics (see sections 9.1.18 to 9.1.22).

1.1 Wind loading

1.1.1 Bond strength — the bond resistance between the insulation and render interface derived from test results must be taken as the value given in Table 1. The design resistance of the bond between the insulation and render (N_{RD1}) must be taken as the bond resistance divided by a partial factor of 9.

Table 1 Bond strength

System assessed	Assessment method	Requirement	Result
KLEIB EPS External Wall Insulation System	EAD 040083-00-0404, Section 2.2.20	To be at least 80 kPa with cohesive or adhesive rupture or The rupture occurs in the thermal insulation product (100% cohesive rupture) if resistance is lower than 80 kPa	80 kN·m ⁻²

1.1.1.2 Insulation tensile strength perpendicular to the faces — the tensile resistance of the insulation material must be taken as the value given in Table 2 and must be divided by a partial material factor of 2.5 to establish the ultimate design resistance of the insulation ($R_{d,ins}$).

Table 2 Bond strength

Product assessed	Assessment method	Requirement	Result
EPS 70 (white or grey) insulation boards	EN 1607 : 2013	≥ 100 kN·m ⁻²	100 kN·m ⁻²

1.1.3 Bond strength — the bond resistance between the adhesive and the insulation derived from test results must be taken as the value given in Table 3. The design resistance of the bond between the adhesive and insulation (N_{RD2}) must be taken as this value divided by a partial factor of 9.

Table 3 Bond strength⁽¹⁾

System assessed	Assessment method	Requirement	Result
KLEIB EPS External Wall Insulation System	EAD 040083-00-0404, Section 2.2.11.3	For adhesive rupture or cohesive rupture in the adhesive: <ul style="list-style-type: none"> – $\geq 80 \text{ kN}\cdot\text{m}^{-2}$ (dry conditions)⁽²⁾ – $\geq 30 \text{ kN}\cdot\text{m}^{-2}$ (2 hours after removing the samples from water) – $\geq 80 \text{ kN}\cdot\text{m}^{-2}$ (7 days after removing the samples from water)⁽²⁾ <hr/> For cohesive rupture in the insulation: <ul style="list-style-type: none"> – $\geq 30 \text{ kN}\cdot\text{m}^{-2}$ (dry conditions) 	$80 \text{ kN}\cdot\text{m}^{-2}$

(1) The minimum bonded surface area (A_{\min}) must not be less than 40%.

(2) One single value lower than $80 \text{ kN}\cdot\text{m}^{-2}$ but higher than $60 \text{ kN}\cdot\text{m}^{-2}$ is admissible.

1.1.4 Bond strength — the bond resistance results between the substrate and the adhesive derived from test results are given in Table 4.

Table 4 Bond strength⁽¹⁾

System assessed	Assessment method	Requirement	Result
KLEIB EPS External Wall Insulation System	EAD 040083-00-0404 Section 2.2.11.2	<ul style="list-style-type: none"> – $\geq 250 \text{ kN}\cdot\text{m}^{-2}$ (dry conditions)⁽²⁾ – $\geq 80 \text{ kN}\cdot\text{m}^{-2}$ (2 hours after removing the samples from water)⁽³⁾ – $\geq 250 \text{ kN}\cdot\text{m}^{-2}$ (7 days after removing the samples from water)⁽²⁾ 	Pass

(1) The minimum bonded surface area (A_{\min}) must not be less than 40%.

(2) One single value lower than $250 \text{ kN}\cdot\text{m}^{-2}$ but higher than $200 \text{ kN}\cdot\text{m}^{-2}$ is admissible.

(3) One single value lower than $80 \text{ kN}\cdot\text{m}^{-2}$ but higher than $60 \text{ kN}\cdot\text{m}^{-2}$ is admissible.

1.1.5 The results from tests carried out on site for the bond (while the adhesive is curing) between the substrate and the adhesive, must be at least equal to $80 \text{ kN}\cdot\text{m}^{-2}$. The design resistance of the bond between the substrate and the adhesive (N_{RD4}) must be taken as the resistance divided by a partial factor of $\gamma^{(1)(2)(3)}$.

(1) The bond between the substrate and the adhesive from the test must have a minimum failure resistance of $250 \text{ kN}\cdot\text{m}^{-2}$ after the adhesive has fully cured and in dry conditions, in accordance with EAD 040083-00-0404 : 2019, Section 2.2.11.2. The minimum failure resistance value is based on a minimum 28-day curing time of the test sample.

(2) The results from tests carried out on site for the bond (while the adhesive is curing) between the substrate and the adhesive, must be at least equal to $80 \text{ kN}\cdot\text{m}^{-2}$.

(3) The minimum bonded surface area (A_{\min}) must be at least 40%.

1.1.6 The number and spacing of the supplementary fixings must be determined by the Certificate holder. Provided the substrate wall is suitable and the supplementary fixings are covered by an appropriate ETA, they will initially transfer the weight of the insulation system to the substrate wall while the adhesive is curing. However, since the characteristic pull-out resistance values are dependent on the substrate type, the fixing must be selected to suit the specific loads and substrate⁽¹⁾.

(1) To qualify as suitable data, the age and condition of the substrate must be equivalent to that used to establish the values in the ETA. If this is not the case, site-specific pull-out tests must be carried out.

1.1.7 The data obtained from sections 1.1.1 to 1.1.6 must be assessed against the design wind load and the following expression must be satisfied⁽¹⁾⁽²⁾:

For safe design:

$$R_d \geq W_e$$

$$R_{d,b.ins/render} = A_r * N_{RD1}$$

$$R_{d,t.ins} = \text{tensile strength of insulation}/2.5$$

$$R_{d,b.adh/ins} = A_{min} * N_{RD2}$$

$$R_{d,b.sub/adh} = A_{min} * N_{RD3}$$

Where:

R_d is the design ultimate resistance ($\text{kN}\cdot\text{m}^{-2}$) taken as the minimum of $R_{d,b.ins/render}$, $R_{d,t.ins}$, $R_{d,b.adh/ins}$ and $R_{d,b.sub/adh}$

W_e is the maximum design wind load ($\text{kN}\cdot\text{m}^{-2}$)

$R_{d,b.ins/render}$ is the bond design resistance between the insulation and render ($\text{kN}\cdot\text{m}^{-2}$)

A_r is the reinforced basecoat bond area (based on % area covered)

N_{RD1} is the design adhesive bond resistance between the insulation and render based on tests ($\text{kN}\cdot\text{m}^{-2}$)

$R_{d,t.ins}$ is determined by using a safety factor of 2.5

$R_{d,b.adh/ins}$ is the bond design resistance between the insulation and adhesive ($\text{kN}\cdot\text{m}^{-2}$)

A_{min} is the minimum bonded surface area (based on % area covered)

N_{RD2} is the design bond resistance between insulation and adhesive based on tests ($\text{kN}\cdot\text{m}^{-2}$)

$R_{d,b.sub/adh}$ is the design bond resistance between the substrate and adhesive ($\text{kN}\cdot\text{m}^{-2}$)

N_{RD3} is the design bond resistance between the substrate and adhesive based on tests ($\text{kN}\cdot\text{m}^{-2}$).

(1) If the minimum design resistance (R_d) calculated in sections 1.1.1 to 1.1.5 is less than the design wind pressure, the bonded surface area (A_{min}) must be increased.

(2) If the minimum bonded surface area required to resist the design wind load is higher than 100%, the system would need to be mechanically fixed and therefore must not be installed: mechanically fixed system requirements have not been assessed with this Certificate.

1.2 Resistance to impact

1.2.1 Hard body impact tests were carried out in accordance with EAD 040083-00-0404, Section 2.2.8. On the basis of the data assessed, the system is suitable for use in the Use Categories up to and including those specified in Table 5 of this Certificate.

Table 5 System impact resistance

System assessed	Category ⁽¹⁾
Reinforcement basecoat (KLEIB C2) + primer where required + finishing coat (all particle sizes), as indicated below:	Reinforcing mesh: Single-layer mesh
KLEIB C7 (silicate-acrylic finishing coat)	Category II

(1) The Use Categories are defined in EAD 040083-00-0404 : 2019 as:

- Category I — a zone readily accessible at ground level to the public and vulnerable to hard body impacts but not subjected 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.

2 Safety in case of fire

Data were assessed for the following characteristics.

2.1 Reaction to fire

2.1.1 The reaction to fire classification of the system is given in Table 6. The classification and permissible areas of use of other constructions must be established in accordance with the documents supporting the national Building Regulations.

Table 6 Reaction to fire classification

System assessed	Assessment method	Classification report ⁽¹⁾	Fire classification
Substrate: Classification of A1 or A2-s1, d0 to BS EN 13501-1 : 2018	PN EN 13501-1 : 2019	Classification report issued by: Lukaszewicz Research Network Institute of Ceramics and Building Materials	B-s1, d0
Adhesive: KLEIB C1		Report No: KG-21/20/N Issue 3, dated 30 June 2023	
Insulation: EPS boards with density $\leq 25 \text{ kg}\cdot\text{m}^{-3}$			
Basecoat: KLEIB C2 Thickness range 3 to 5 mm			
Reinforcing mesh: with a mass per unit of $165 \text{ g}\cdot\text{m}^{-2}$			
Primer: KLEIB C3SIL			
Finishing coats: KLEIB C7 1.0, 1.5 and 2.0 mm particle sizes			
Decorative coat: KLEIB Q3			

(1) Copies available from the Certificate holder on request.

2.1.2 The fire classification given in Table 6 applies to the full range of insulation thicknesses and colours covered by this Certificate.

2.1.3 The insulation components in isolation have a reaction to fire classification of E to EN 13501-1 : 2018.

2.1.4 In England, the system must not be used on buildings with a storey 18 m or more in height, or on residential buildings that are more than 11 m in height.

2.1.5 In Wales and Northern Ireland, the system must not be used on buildings with a storey 18 m or more in height.

2.1.6 In Scotland, the system must not be used on buildings with a storey 11 m or more in height, or 1 m or less from a boundary, or on some entertainment, assembly, hospital and residential care buildings. These constructions must also be included in calculations of unprotected area.

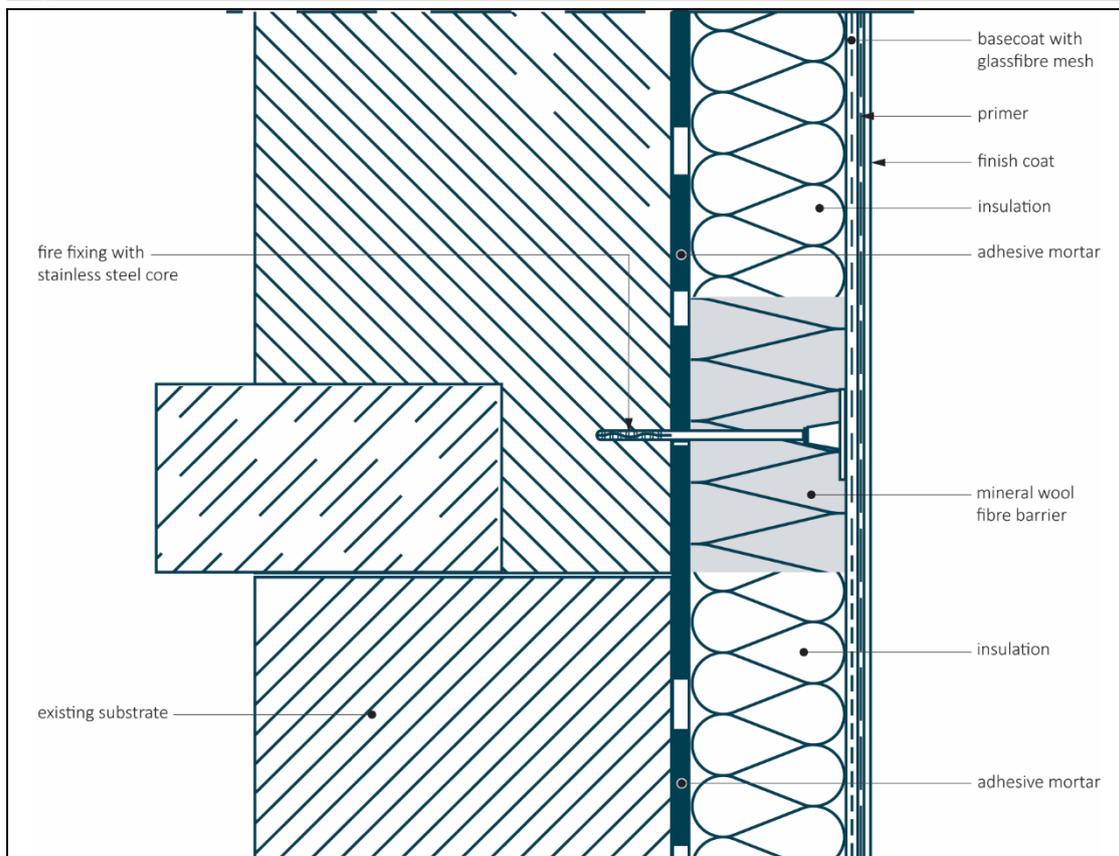
General

2.1.7 For application to second storey walls and above, the designer must consider at least one stainless steel fixing per square metre and fire barriers in line with compartment walls and floors, as given in BRE Report BR 135 : 2013 (see Figure 2 of this Certificate).

2.1.8 NHBC Standards require in all cases that a minimum of one non-combustible fixing through the reinforcing mesh, per square metre or per insulation board, whichever provides the greater number, must be provided, in addition to the other fixings.

2.1.9 Designers must refer to the documents supporting the national Building Regulations for detailed conditions of use, particularly in respect of requirements for substrate fire performance, cavity barriers, service penetrations and combustibility limitations for other materials and components used in the overall wall construction.

Figure 2 Fire barrier detail



3 Hygiene, health and the environment

Data were assessed for the following characteristics.

3.1 Water vapour permeability

3.1.1 The water vapour resistance factor (μ) and equivalent air layer thicknesses (s_d) of the system components are shown in Table 7.

Table 7 Equivalent air layer thickness (s_d) — reinforcement basecoats and finish coats

System assessed	Assessment method	Requirement	Result
Expanded polystyrene insulation:			
EPS 70 white 038 (60 to 300 mm)	BS EN 12524 : 2000	–	$\mu = 20 - 40^{(1)}$
EPS 70 grey 032 (60 to 250 mm)			
Rendering system:			
Basecoat ⁽²⁾ + primer + finish coat (particle size) + decorative coat as indicated below:			
KLEIB C2 + KLEIB C3SIL + KLEIB C7 (2 mm) + KLEIB Q3	EAD 040083-00-0404, Section 2.2.9	$s_d \leq 2$ metre	$s_d = 0.2$ metre

(1) These values are taken from BS EN 12524 : 2000. It is recommended that the lower figure is used when assessing the interstitial condensation risk.

(2) Applied to a thickness of between 3 to 5 mm.

3.2 Condensation

Interstitial condensation

3.2.1 The BBA has assessed the system for the risk of interstitial condensation, and the following must be implemented:

3.2.1.1 Designers must ensure that an appropriate condensation risk analysis has been carried out for all parts of the construction, including openings and penetrations at junctions between the insulation product and windows, to minimise the risk of condensation. The recommendations of BS 5250 : 2021 must be followed.

3.2.2 Walls incorporating the system will adequately limit the risk of interstitial condensation when they are designed and constructed in accordance with BS 5250 : 2021, and section 3.1 of this Certificate.

4 Safety and accessibility in use

Not applicable.

5 Protection against noise

Not applicable.

6 Energy economy and heat retention

Data were assessed for the following characteristics.

6.1 Thermal conductivity

6.1.1 Calculations of thermal transmittance (U value) must be carried out in accordance with BS EN ISO 6946 : 2017 and BRE Report BR 443 : 2019, using the declared thermal conductivity (λ_D) values of the insulation given in Table 8.

Table 8 Declared thermal conductivity (λ_D) values and available thicknesses

Insulation types	Thickness (mm)	Thermal conductivity ($W \cdot m^{-1} \cdot K^{-1}$)
EPS 70 white 038	50 to 300	0.038
EPS 70 grey 032	50 to 250	0.032

6.2 Thermal performance

6.2.1 The U value of a completed wall will depend on the selected insulation type and thickness, fixing method and type and number of fixings (supplementary), and the insulating value of the substrate masonry and its internal finish. Calculated U values for sample constructions in accordance with the national Building Regulations are given in Table 9, and are based on the thermal conductivity given in Table 8.

Table 9 Insulation thickness required to achieve design U values⁽¹⁾⁽²⁾ given in the national Building Regulations

U value ⁽⁴⁾ (W·m ⁻² ·K ⁻¹)	Insulation thickness ⁽³⁾ requirement (mm)			
	215 mm brickwork, $\lambda = 0.56 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$		200 mm dense blockwork, $\lambda = 1.75 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$	
	EPS 70 white 038	EPS 70 grey 032	EPS 70 white 038	EPS 70 grey 032
0.13	300	— ⁽⁵⁾	— ⁽⁵⁾	— ⁽⁵⁾
0.15	260	220	270	220
0.17	220	190	230	200
0.18	210	180	220	180
0.21	170	150	180	150
0.26	140	110	140	120
0.28	120	110	130	110
0.30	110	100	120	100

(1) Wall construction inclusive of 13 mm plaster ($\lambda = 0.57 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$), brickwork (protected) with 17.1% mortar or dense blockwork with 6.7% mortar ($\lambda = 0.88 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$). Declared thermal conductivity (λ_D) values of insulation are as shown in Table 8. A 6 mm thick layer of adhesive (with $\lambda = 0.43 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$) covering 60% of the insulation surface (after the boards have been pressed against the wall), and a board emissivity of 0.9, together with an external render thickness of 6 mm (with $\lambda = 1 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$), is also included.

(2) Calculations based on a bonded system that included 4.2 fixings per square metre (3 fixings per board) with a point thermal transmittance (X_p) of $0.004 \text{ W}\cdot\text{K}^{-1}$ per galvanized steel pin. Use of other types of fixings must be calculated in accordance with BS EN ISO 6946 : 2017. A gap correction (ΔU) of zero is assumed.

(3) Based upon an incremental insulation thickness of 10 mm.

(4) When applying the maximum available insulation thickness, these walls can achieve a U value of 0.14 to 0.17 $\text{W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$.

(5) See section 9.1.2.

6.2.2 Care must be taken in the overall design and construction of junctions with other elements and openings, to minimise thermal bridges and air infiltration. Detailed guidance can be found in the documents supporting the national Building Regulations.

7 Sustainable use of natural resources

Not applicable.

8 Durability

8.1 The potential mechanisms for degradation and performance characteristics of the materials used on the system were assessed.

8.2 Specific test data were assessed as shown in Table 10.

Table 10 Watertightness – hygrothermal behaviour

System assessed	Assessment method	Requirement	Result
KLEIB EPS External Wall Insulation System	EAD 040083-00-0404, Section 2.2.6 Watertightness of the EWIS: Hygrothermal behaviour	<ul style="list-style-type: none"> - No blistering or peeling of any finishing coat - No detachment of the rendering system - No failure or cracking associated with joints between insulation boards - No cracking allowing water penetration to the insulating layer (normally ≤ 0.2 mm) 	Pass

8.3 Service life

8.3.1 Under normal service conditions, the system will have a service life of at least 30 years, provided any damage to the surface finish is repaired immediately and regular maintenance is undertaken, as described in section 9 of this Certificate.

8.3.2 Any render containing cement may be subject to lime bloom. The occurrence of this may be reduced by avoiding application in adverse weather conditions. The effect is transient and less noticeable on lighter colours.

8.3.3 The render may become discoloured with time, the rate depending on the initial colour, the degree of exposure and atmospheric pollution, as well as the design and detailing of the wall. In common with traditional renders, discoloration by algae and lichens may occur in wet areas. The appearance may be restored by a suitable power wash or, if required, by over coating.

8.3.4 To maintain a high quality aesthetic appearance, it may be necessary to periodically overcoat the building using system-compatible coatings recommended by the Certificate holder and in accordance with BS EN 1062-1 : 2004. Care must be taken not to adversely affect the water vapour transmission or fire characteristics of the system. The advice of the Certificate holder should be sought as to the suitability of a particular product, but such advice and materials are outside the scope of this Certificate.

PROCESS ASSESSMENT

Information provided by the Certificate holder was assessed for the following factors.

9 Design, installation, workmanship and maintenance

9.1 Design

General

The design process was assessed, and the following requirements apply in order to satisfy the performance assessed in this Certificate.

9.1.1 It is essential that the detailing techniques specified in this Certificate are carried out to a high standard if the ingress of water into the insulation is to be avoided and the full thermal benefit obtained from treatment with the system (eg the insulation must be protected by an overhang, and window sills must be designed and installed so as to direct water away from the building).

9.1.2 For improved thermal/carbon-emissions performance of the structure, the designer must consider additional/alternative fabric and/or services measures.

9.1.3 New walls subject to the national Building Regulations must be constructed in accordance with the relevant recommendations of:

- BS EN 1992-1-1 : 2004 and its UK National Annex
- BS EN 1996-1-1 : 2005 and its UK National Annex
- BS EN 1996-2 : 2006 and its UK National Annex
- BS 8000-0 : 2014
- BS 8000-2.2 : 1990
- BS 8000-3 : 2001
- PD 6697 : 2019.

9.1.4 New walls not subject to regulatory requirements must also be built in accordance with the Standards identified in section 9.1.3.

9.1.5 Movement joints must be incorporated into the system in line with existing movement joints in the building structure and in accordance with the Certificate holder's recommendations for the specific installation.

9.1.6 The designer must select a construction appropriate to the local wind-driven rain index, paying due regard to the design detailing, workmanship and materials to be used.

9.1.7 The system will improve the weather resistance of a wall and provide a decorative finish. However, for existing buildings, they must only be installed where there are no signs of dampness on the inner surface of the wall other than those caused solely by condensation.

9.1.8 The effect of the system on the acoustic performance of a construction is outside the scope of this Certificate.

9.1.9 The fixing of sanitary pipework, plumbing, rainwater goods, satellite dishes, clothes lines, hanging baskets and similar items to the system is outside the scope of this Certificate.

9.1.10 External pipework and ducts must be removed before installation, and alterations made to underground drainage to accommodate repositioning of the pipework to the finished face of the system. The Certificate holder may advise on suitable fixing methods, but such advice and methods are outside the scope of this Certificate.

9.1.11 The detailed provisions given in the documents supporting the national Building Regulations when the system is installed in close proximity to certain flue pipes and/or heat-producing appliances must be followed.

Surface condensation

9.1.12 In England and Wales, walls will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed $0.7 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$ at any point and the junctions with other elements and openings comply with section 6.2.2 of this Certificate.

9.1.13 In Scotland, walls will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed $1.2 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$ at any point.

Resistance to weather

9.1.14 The system will provide a degree of protection against water ingress. However, care must be taken to ensure that substrate walls are adequately weather resistant prior to application of the system. The system must only be installed where there are no signs of dampness on the inner surface of the substrate other than those caused solely by condensation.

9.1.15 Designers and installers must take particular care in detailing around openings, penetrations and movement joints to minimise the risk of water ingress.

9.1.16 The guidance given in BRE Report BR 262 : 2002 must be followed in connection with the weathertightness of solid wall constructions. The designer must select a construction appropriate to the local wind-driven rain index, paying due regard to the design detailing, workmanship and materials to be used.

9.1.17 At the top of walls, the system must be protected by an adequate overhang or other detail designed for use with this type of system (see Annex A of this Certificate). On flat roofs and parapet walls, waterproofing and drainage must be adequate and in good condition.

Structural performance

9.1.18 The Certificate holder is ultimately responsible for the design of the system and it is the responsibility of the company installing the system to accurately follow the installation instructions. The Certificate holder must also verify that a suitably experienced and qualified individual (with adequate professional indemnity) establishes that:

- the wind loads on the different zones of the building's elevation for the specific geographical location have been calculated correctly (see section 9.1.20)
- the system can adequately resist and safely transfer the calculated loads, accounting for all possible failure modes, to the substrate wall and supporting structure (see sections 9.1.20 to 9.1.22).

9.1.19 The substrate and supporting structure must be capable of transferring all additional loading due to the installation of the system to the ground in a satisfactory manner. The adequacy of the substrate and supporting structure must be verified by the person or party responsible for the global stability of the building to which the system is applied. Any defects must be made good prior to the system being installed.

9.1.20 The wind loads on the walls must be calculated, taking into account all relevant factors such as location and topography, in accordance with BS EN 1991-1-4 : 2005 and its UK National Annex. All of the factors affecting wind load on each elevation and specific zones of the building must be considered. In accordance with BS EN 1990 : 2002 and its UK National Annex, a partial factor of 1.5 must be applied to the calculated characteristic wind pressure values to establish the design wind load to be resisted by the system.

9.1.21 Installations correctly designed in accordance with this Certificate will safely accommodate the applied loads due to the self-weight of the system, wind and impact.

9.1.22 Negative wind load is transferred to the substrate wall via⁽¹⁾:

- the bond between the insulation and render system (see section 1.1.1)
- the tensile strength of the insulation (see section 1.1.2)
- the bond between the adhesive and the insulation interface⁽²⁾ (see section 1.1.3)
- the bond between the substrate and adhesive interface⁽²⁾ (see section 1.1.4).

(1) For adhesively fixed system with supplementary mechanical fixings, the contribution of the fixings is not considered when calculating resistance to wind load.

(2) The percentage of adhesive coverage must be considered.

9.2 Installation

9.2.1 Installation instructions provided by the Certificate holder were assessed and judged to be appropriate and adequate.

9.2.2 Installation must be carried out in accordance with this Certificate and the Certificate holder's instructions. A summary of instructions and guidance is provided in Annex A of this Certificate.

9.3 Workmanship

Practicability of installation was assessed on the basis of the Certificate holder's information. To achieve the performance described in this Certificate, the system must only be installed by installers who have been trained and approved by the Certificate holder. Details of Approved Installers are available from the Certificate holder. Such an installer is a company:

- employing operatives who have been trained and approved by the Certificate holder to install the system
- which has undertaken to comply with the Certificate holder's application procedure, containing the requirement for each application team to include at least one member-operative trained by the Certificate holder
- subject to at least one inspection per annum by the Certificate holder to ensure suitable site practices are being employed. This may include unannounced site inspections.

9.4 Maintenance and repair

9.4.1 An initial inspection must be made within 12 months and regularly thereafter to include:

- visual inspection of the render for signs of damage. Cracks in the render exceeding 0.2 mm must be repaired
- examination of the sealant around openings and service entry points
- visual inspection of architectural details designed to shed water to confirm that they are performing properly
- visual inspection to ensure that water is not leaking from external downpipes or gutters; such leakage could penetrate the rendering
- necessary repairs effected immediately and any sealant joints at window and door frames replaced at regular intervals
- maintenance schedules, which must include the replacement and resealing of joints (for example, between the insulation system and window and door frame).

9.4.2 Damaged areas must be repaired using the appropriate components and procedures detailed in the Certificate holder's installation instructions and in accordance with BS EN 13914-1 : 2016.

10 **Manufacture**

10.1 The production processes for this system have been assessed and provide assurance that the quality controls are satisfactory according to the following factors:

10.1.1 The manufacturer has provided documented information on the materials, processes, testing and control factors.

10.1.2 The quality control operated over batches of incoming materials has been assessed and deemed appropriate and adequate.

10.1.3 The quality control procedures and testing to be undertaken have been assessed and deemed appropriate and adequate.

10.1.4 The process for management of non-conformities has been assessed and deemed appropriate and adequate.

10.1.5 An audit of each production location was undertaken, and it was confirmed that the production process was in accordance with the documented process, and that equipment has been properly tested and calibrated.

† 10.2 The BBA has undertaken to carry out the above measures on a regular basis through a surveillance process, to verify that the specifications and quality control operated by the manufacturer are being maintained.

11 Delivery and site handling

11.1 The Certificate holder stated that the system components are delivered to site in the packaging and quantities listed in Table 11. Each package carries the product identification and batch number.

Table 11 System component supply details

Component	Quantity and package
KLEIB C1 adhesive	25 kg bags
Expanded polystyrene (white & grey) insulation boards	Wrapped in polythene
Mechanical fixings (supplementary)	Boxed by manufacturer
KLEIB C2 basecoat	25 kg bags
Reinforcing mesh (various types)	Roll, either 1.0 or 1.1 m wide by 50 m lengths
KLEIB C3SIL primer	Plastic tub of 15 kg
KLEIB C7 finishing coat (silicone-acrylic)	Plastic tub of 15 kg
KLEIB Q3 decorative coat (silicone)	4 and 10 litre plastic containers

11.2 Delivery and site handling must be performed in accordance with the Certificate holder's instructions and this Certificate, including:

11.2.1 The insulation must be stored off the ground on a firm, clean, level base and under cover until required for use. Care must be taken when handling to avoid damage.

11.2.2 The insulation must be protected from prolonged exposure to sunlight, either by storing opened packs under cover or re-covering with opaque polythene sheeting. The insulation must not be exposed to open flame or other ignition sources. Care must be taken when handling the insulation to avoid contact with solvents or materials containing volatile organic components.

11.2.3 The powder and paste components must be stored off the ground in a safe area in dry conditions and protected from moisture and frost. Contaminated material must be discarded.

11.2.4 The other components of the system must be stored in a safe area, under cover and protected from excessive heat and frost at all times.

Supporting information in this Annex is relevant to the system but has not formed part of the material assessed for the Certificate.

Construction (Design and Management) Regulations 2015

Construction (Design and Management) Regulations (Northern Ireland) 2016

Information in this Certificate may assist the client, designer (including Principal Designer) and contractor (including Principal Contractor) to address their obligations under these Regulations.

CLP Regulations

The Certificate holder has taken the responsibility of classifying and labelling the system under the *GB CLP Regulation* and the *CLP Regulation (EC) No 1272/2008 - classification, labelling and packaging of substances and mixtures*. Users must refer to the relevant Safety Data Sheets.

Management Systems Certification for production

The management system of the manufacturer has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2015 by DQS (Certificate 003651 QM15).

Additional information on installation

Installation must be in accordance with the Certificate holder's instructions and this Certificate. A summary of precautions and ancillary system components is provided below:

General guidelines

A.1 Site survey and preliminary work

A.1.1 A pre-installation survey of the property must be carried out to determine suitability for treatment and the need for any necessary repairs to the building structure before application of the system. A specification is prepared for each elevation of the building indicating:

- the position of beads
- detailing around windows, doors and at eaves
- damp-proof course (DPC) level
- exact position of expansion joints, if required
- where required, additional corner mesh and reinforcement
- areas where flexible seal must be used
- any alterations to external plumbing, if required
- the position of fire barriers.

A.1.2 The survey must include tests conducted on the walls of the building by the Certificate holder or their approved installers (see section 9.3), to determine the bond strength between the adhesive and the substrate, and demonstrate that the pull-out resistance of the proposed supplementary mechanical fixings from the substrate is adequate. An assessment and recommendation should be made on the minimum bond strength and type and number of fixings required to withstand the building's expected wind loading based on calculations using the test site data in accordance with section 1.

A.1.3 Surfaces must be sound, clean and free from loose material. The flatness of surfaces must be checked; this may be achieved using a straight edge spanning the storey height. Any excessive irregularities, ie greater than 10 mm in one metre, must be made good prior to installation to ensure that the insulation boards are installed with a smooth, in-plane finished surface.

A.1.4 Where surfaces are covered with an existing render, it is essential that the bond between the background and the render is adequate. All loose areas must be hacked off and reinstated.

A.1.5 On existing buildings, purpose-made window sills must be fitted to extend beyond the finished face of the system. New buildings must incorporate suitably deep sills (see Figure 11).

A.1.6 In new buildings, internal wet work (eg screed or plastering) must be completed and allowed to dry prior to the application of the system.

A.1.7 All modifications, such as alterations to external plumbing and necessary repairs to the building structure, must be completed before installation of the system commences.

A.2 Installation

A.2.1 Installation of the system must be carried out in accordance with the Certificate holder's current installation instructions and this Certificate.

A.2.2 Weather conditions must be monitored to ensure correct application and curing conditions. Application of coating materials must not be carried out at temperatures below 5°C or above 30°C, or if exposure to frost is likely, and the coating must be protected from rapid drying. Installation must not take place during rainfall or if rain is anticipated. In addition, cementitious-based renders must not be applied if the temperature is likely to fall below 0°C.

A.2.3 The planarity of the substrate must be checked, and any protrusions exceeding 10 mm removed.

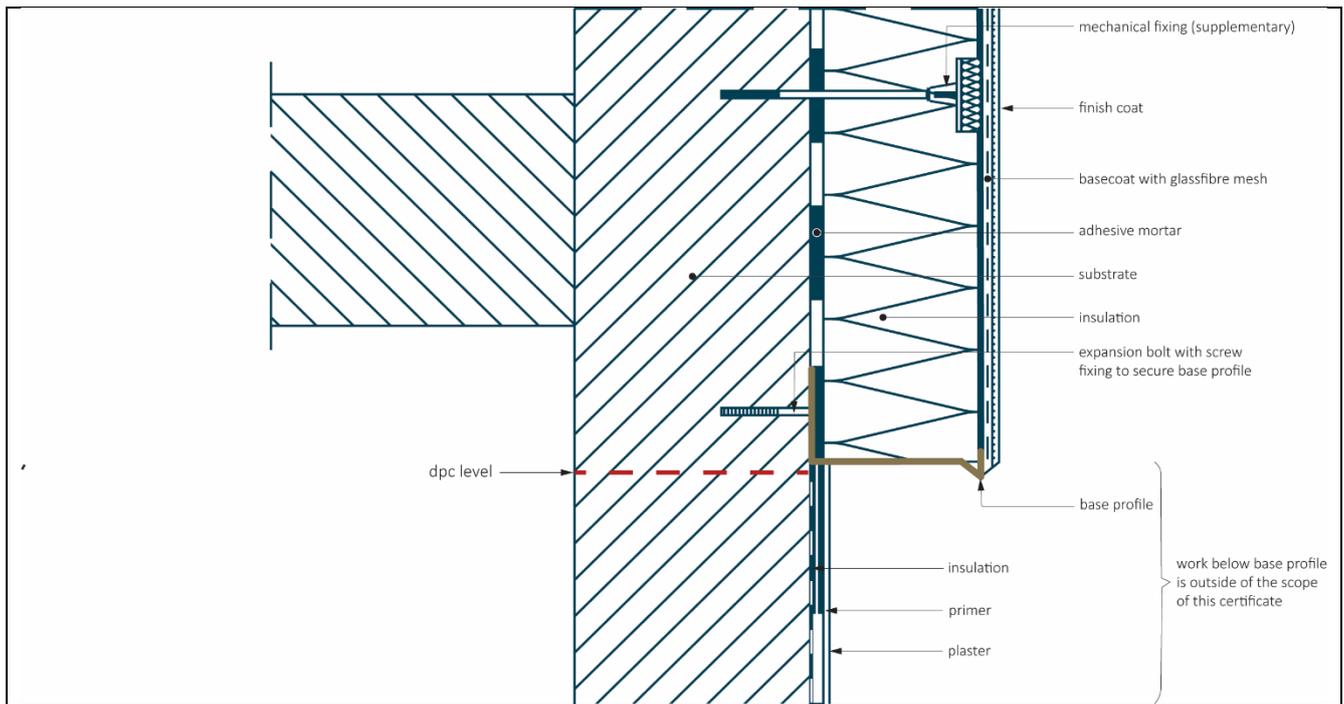
A.2.4 The primer should always be used, and diluted if required.

A.2.5 All rendering must be in accordance with the relevant recommendations of BS EN 13914-1 : 2016. The render must be protected from rapid drying and must not be applied on elevations in direct sunlight or where the substrate is hot.

Positioning and securing insulation boards

A.2.6 The base profile is secured to the external wall above the DPC using profile fixings at approximately 300 mm centres (see Figure 3). Base rail connectors are installed at all rail joints. Extension profiles are fixed to the front lip of the base profile.

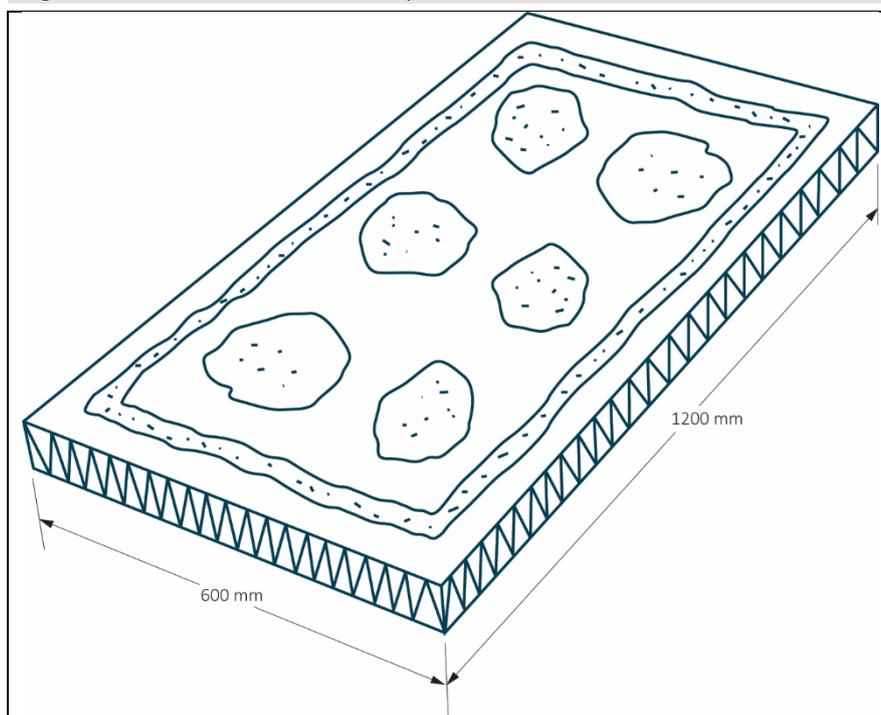
Figure 3 Typical section of base profile



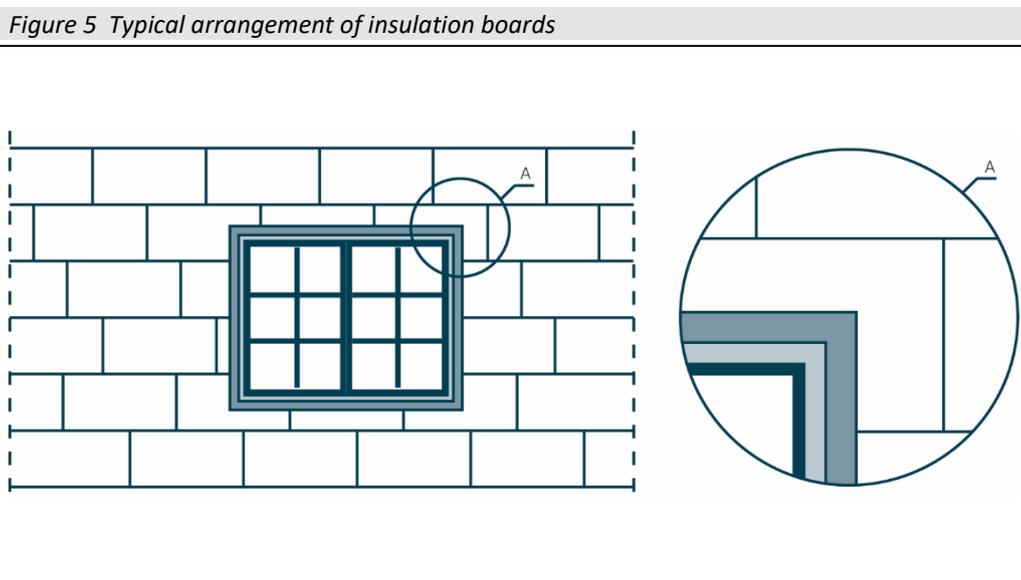
A.2.7 The adhesive is prepared by thoroughly mixing each bag with the required amount of clean water in a suitable container for at least five minutes using a paddle mixer to create a paste-like mortar in accordance with the Certificate holder's instructions. After allowing the adhesive to rest for 5 minutes, it is stirred again to the required consistency.

A.2.8 For uneven surfaces, the adhesive is applied in a continuous line around the perimeter of the insulation board (approximately 50 mm from the edges and at least 50 mm wide) with six additional dabs of adhesive (approximately 120 mm in diameter) distributed uniformly on the rest of board surface (see Figure 4). The amount of adhesive applied should cover at least 60% of the surface after the boards have been pressed against the wall. Alternatively, for even surfaces the adhesive can be applied over the entire face of the insulation board using a notched trowel.

Figure 4 Insulation board adhesive pattern



A.2.9 The first run of insulation boards is placed on the base profile with adhesive applied. The boards must be pressed firmly against the wall and butted tightly together and aligned to achieve a level finish. Subsequent rows of boards are positioned so that the vertical board joints are staggered and overlapped at the building corners and so that the board joints do not occur within 200 mm of the corners of openings (see Figure 5). Joints between the boards up to 10 mm can be filled with foam filler approved by the Certificate holder. Gaps greater than this can be filled with slivers of insulation board. Any high spots or irregularities are removed by lightly planing with a rasp over the whole surface. Alignment should be checked as work proceeds.



A.2.10 After the adhesive has fully set (after 48 hours), the mechanical fixings (supplementary) are applied through the insulation board into the substrate wall, as described in section A.2.11.

A.2.11 Holes are drilled through the insulation boards into the substrate wall to the required depth. For a typical installation, three fixings are applied per insulation board, one fixing in the centre of the board and one on either side of this fixing, in a horizontal line (these fixings should be placed approximately 150 mm from the edges). Around openings and at the end zones of the building, additional fixings should be installed as determined by the system designer. The mechanical fixings are inserted and tapped firmly into place, securing the boards to the substrate.

A.2.12 To fit around details such as doors and windows, insulation boards may be cut with a sharp knife or a fine-tooth saw. If required, purpose-made window sills are fitted, which are designed to prevent water ingress and incorporate drips to shed water clear of the system (see Figure 11). However, their performance is outside the scope of this Certificate.

A.2.13 Installation continues until the whole wall is completely covered including, where appropriate, the building soffits.

A.2.14 Window and door reveals should be insulated to minimise the effects of cold bridging. Where clearance is limited, strips of approved insulation should be installed to suit available margins and details (see Figure 9).

A.2.15 Prior to the application of the render system, the relevant seals are positioned and installed at all openings (or a bead of joint sealant is gun-applied at window and door frames), overhanging eaves, gas and electric meter boxes, and wall vents, or where the render abuts any other building material or surface. This helps to reduce the risk of water ingress into the structure.

A.2.16 All corners are fixed with mesh angles installed with adhesive mortar. Where appropriate, application-specific profiles are installed, to allow the rainwater to drain away.

Movement joints

A.2.17 Generally, movement joints are not required in the system but, if an expansion joint is incorporated in the substrate, a movement joint must be provided in the insulation system (see Figures 6a and 6b).

Figure 6a Vertical movement joint details

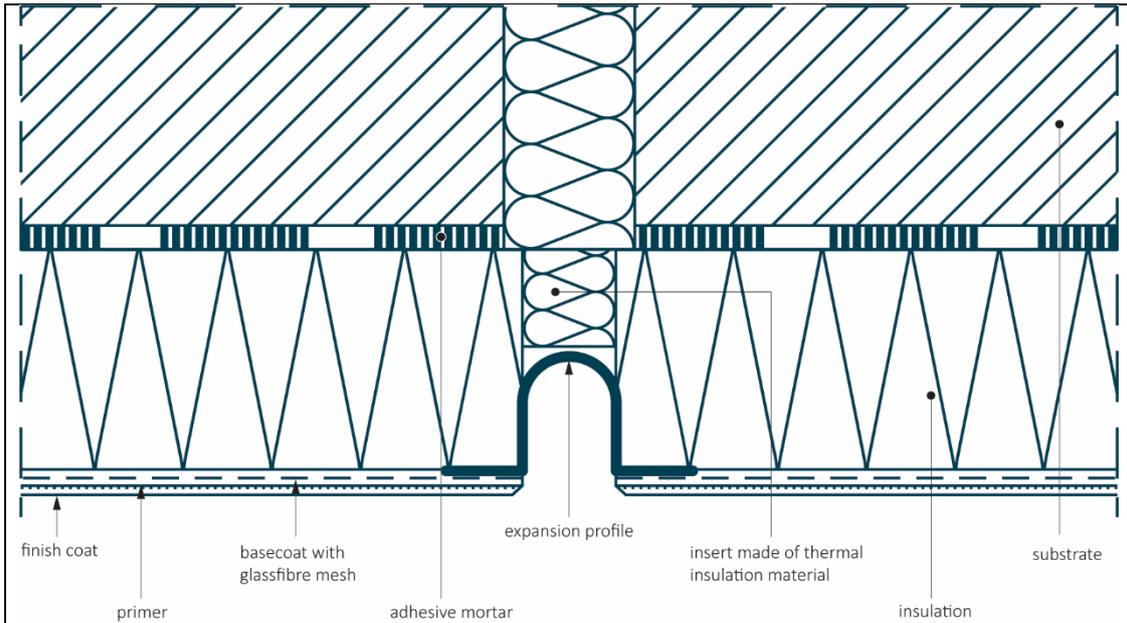
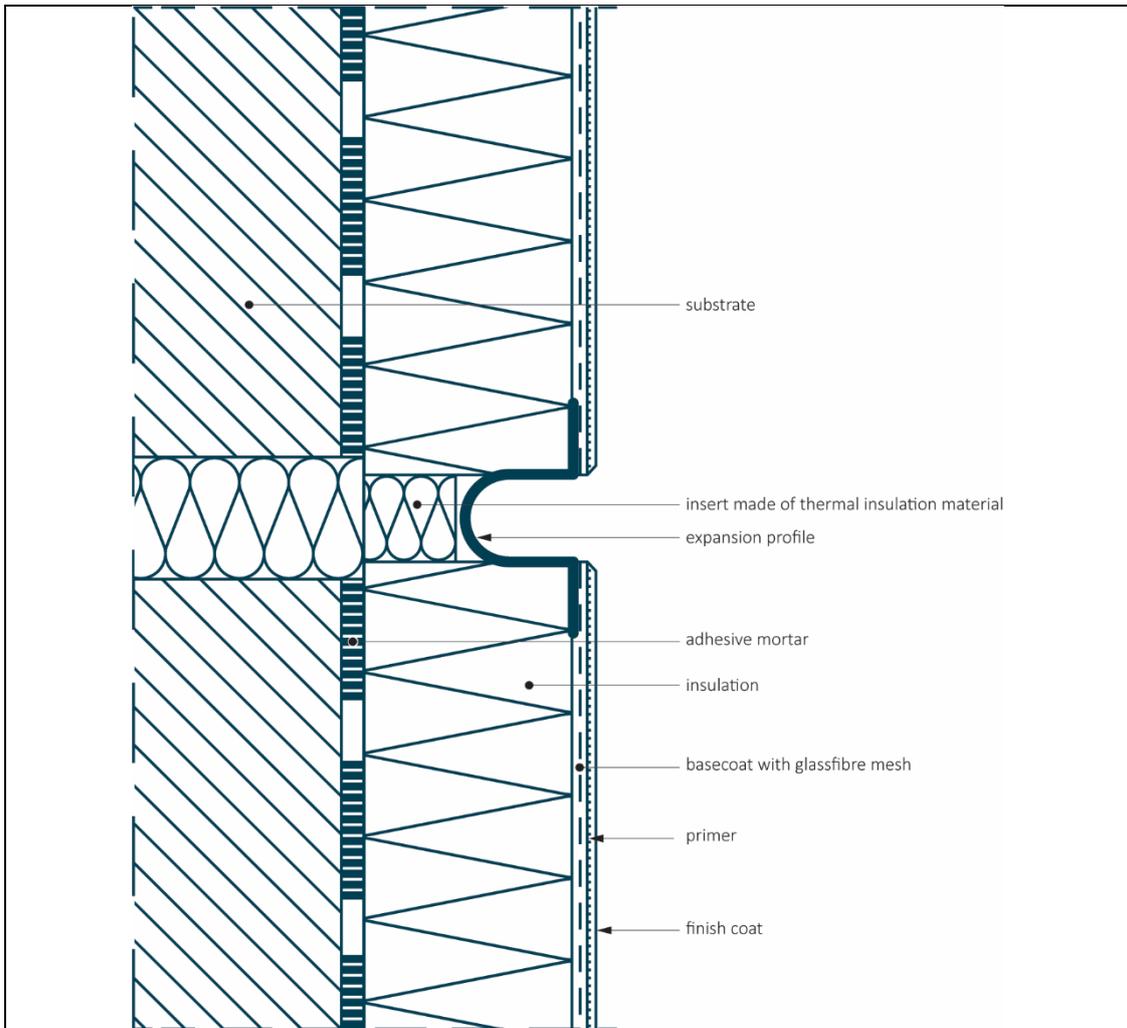


Figure 6b Horizontal movement joint details



Application of basecoat and reinforcing mesh

A.2.18 The basecoat is prepared by thoroughly mixing each bag with the required amount of clean water in a suitable container for at least five minutes using a paddle mixer to create a paste-like mortar in accordance with the Certificate holder's instructions. After allowing the adhesive to rest for 5 minutes, it is stirred again to the required consistency.

A.2.19 To provide the necessary reinforcement, stress patches of reinforcing mesh (approximate size 350 by 250 mm) are applied with basecoat, diagonally over the insulation boards at the corners of openings (see Figure 7).

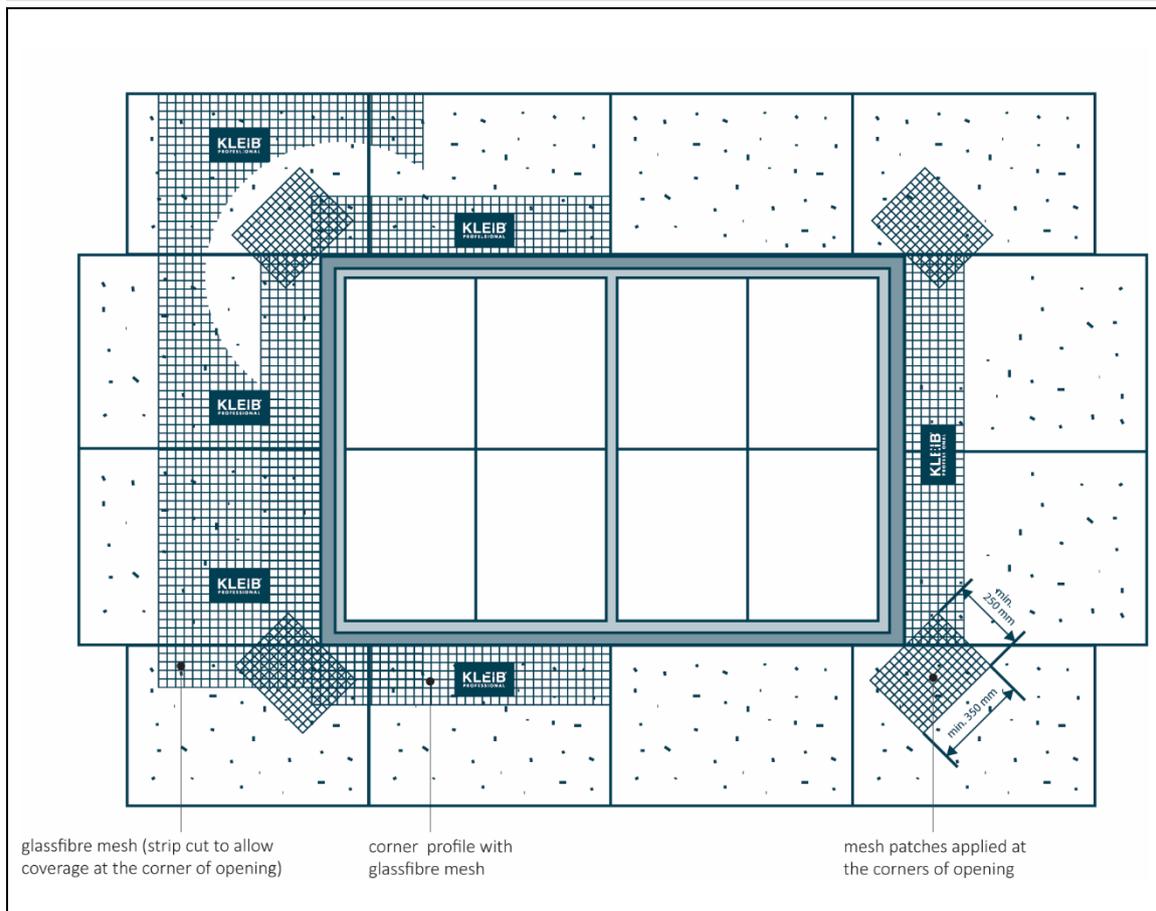
A.2.20 Basecoat is applied over the insulation boards using a stainless steel trowel (use of a notched trowel is recommended to maintain the correct depth), and floated with a Darby float to an approximate thickness of 3 mm. The reinforcing mesh (with its concave surface to the wall) is applied and immediately embedded into the basecoat by trowelling from the centre to the edge; an additional light coat of basecoat is applied (whilst the first coat is still wet) to ensure the mesh is free of wrinkles.

A.2.21 Further basecoat to a thickness of 1 to 2 mm is then applied, to ensure the mesh is completely covered and the required minimum thickness of basecoat is achieved, whilst ensuring that the mesh is placed in the top one third of basecoat.

A.2.22 The basecoat is applied progressively, working in one-metre sections in a vertical or horizontal direction. Overlapping at all mesh joints should not be less than 100 mm.

A.2.23 Once the whole wall is completed, the reinforced basecoat is left to dry thoroughly before the application of primer and the finish coat. The basecoat drying time will depend upon the conditions, but at least 48 hours should elapse.

Figure 7 Additional reinforcement at openings



Primer

A.2.24 After the basecoat has dried, the primer coat is roller-applied, sprayed or applied with a long-hair brush, first making sure the basecoat is free from any irregularities (trowel-marks, exposed mesh, etc). The primer drying time will depend upon the conditions, but at least 12 hours should elapse.

Finish coat

A.2.25 Once the primer is thoroughly dry, the finish coat can be applied.

A.2.26 The render finishes are applied to the required thicknesses as regulated by the particle size, using a stainless steel trowel and finished with a plastic trowel to create a textured finish. The drying time is dependent on conditions, but at least 24 hours should be allowed.

KLEIB C7 finish coat and decorative coat

A.2.27 The silicone-acrylic finish, KLEIB C7, is applied over the reinforced basecoat to a thickness of 1, 1.5 or 2 mm, depending on the product selected. Where required, decorative coat, KLEIB Q3 is applied over the finish coat, after the finish coat has completely dried (drying time will vary depending on conditions, but at least 48 hours should elapse).

General guidelines

A.2.28 Care should be taken in the detailing of the system at eaves, around openings and projections (see Figures 8 to 11) to ensure adequate protection against water ingress and to limit the risk of water penetrating the system.

A.2.29 Stop profiles are positioned vertically, eg at party wall positions where the adjoining house does not require treatment.

A.2.30 All corners are fixed with mesh angles installed with adhesive mortar to building corners, door and window heads and jambs (see Figure 12) before applying basecoat to form the corners in accordance with the Certificate holder's instructions. Where appropriate, the PVC angle with drip mesh is installed, to allow the rainwater to drain away.

A.2.31 Continuous surfaces must be completed without a break, eg working to a wet edge. Care should be taken to prevent the basecoats and finish coats from either drying too rapidly or freezing.

A.2.32 At the top of walls, the system should be protected by an adequate overhang or by an adequately sealed purpose-made flashing.

Figure 8 Roof eaves details

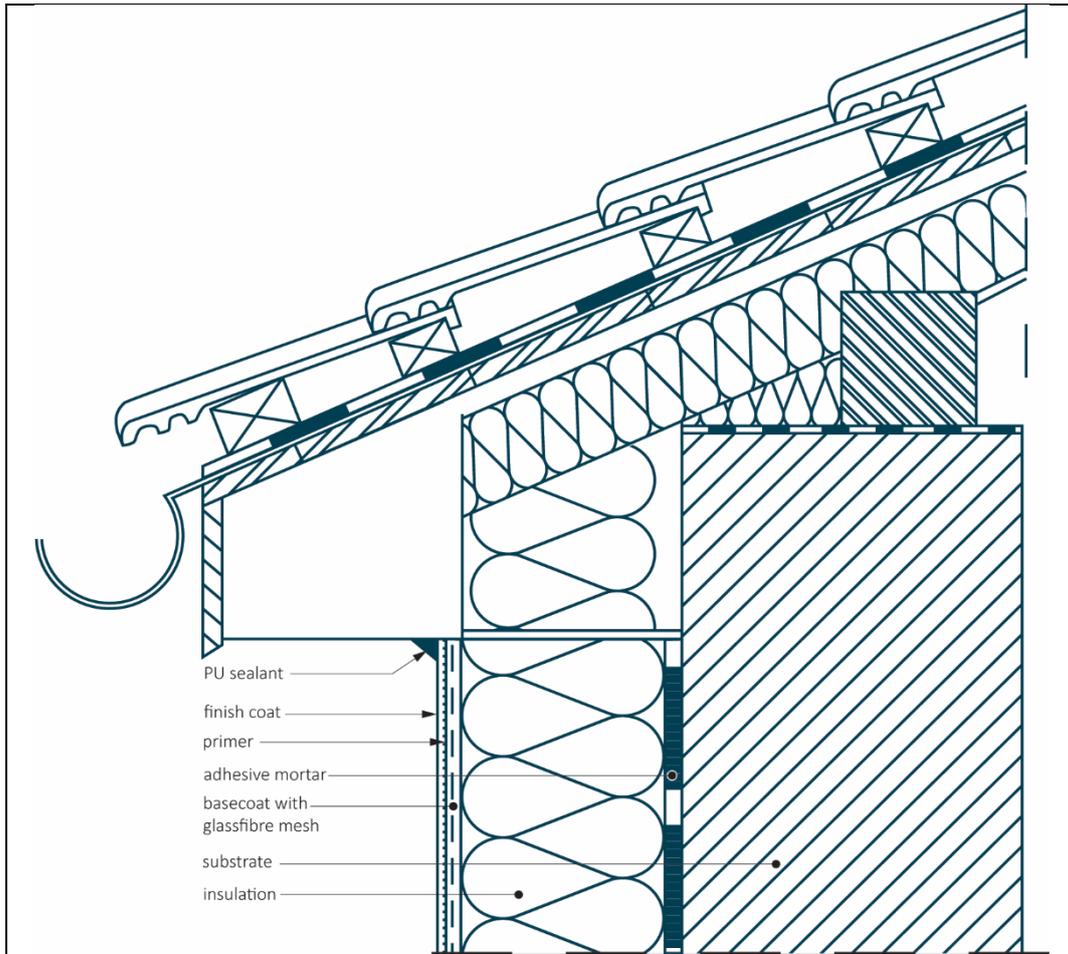


Figure 9 Insulation window reveal details

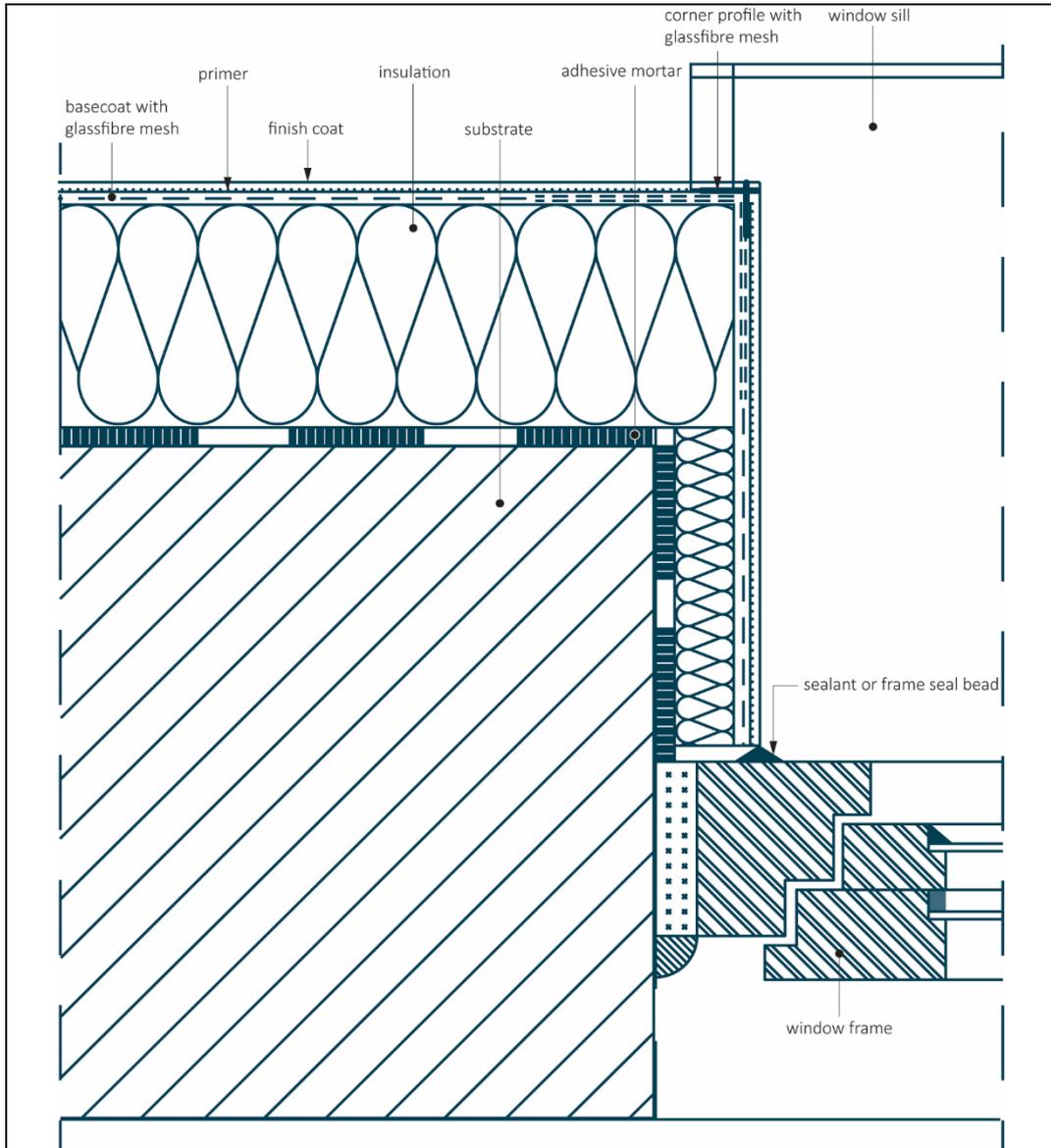


Figure 10 Insulated window head details

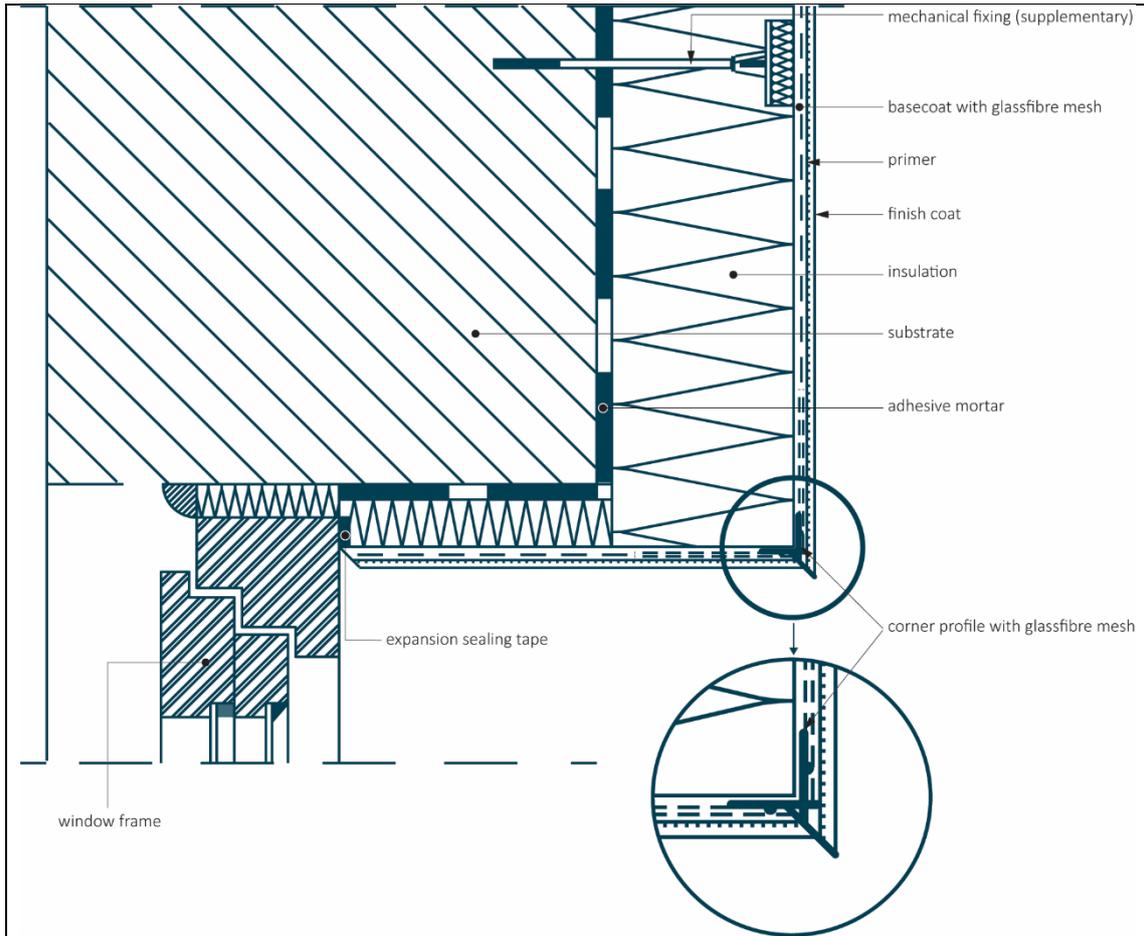


Figure 11 Window sill details

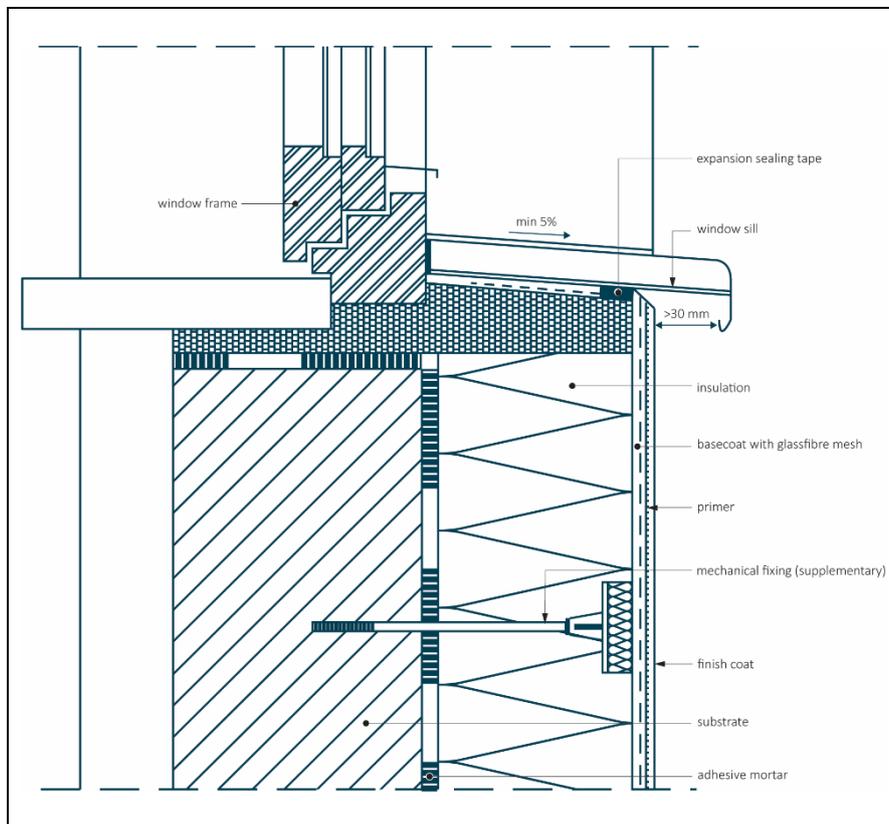
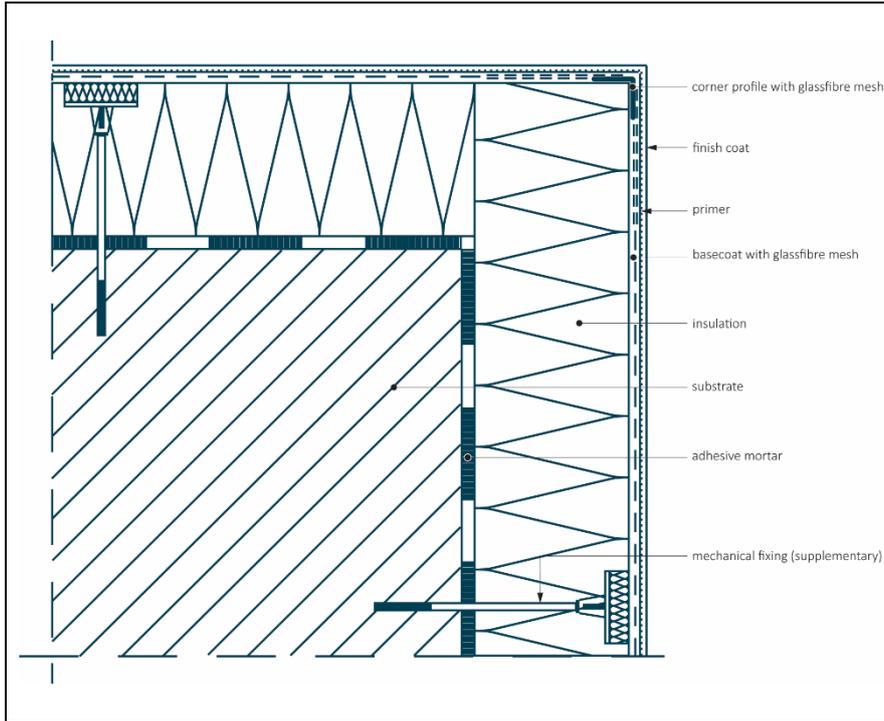


Figure 12 Building corner detail



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BS 8000-2.2 : 1990 *Workmanship on building sites – Code of practice for concrete work – Sitework with in situ and precast concrete*

BS 8000-3 : 2001 *Workmanship on building sites – Code of practice for masonry*

BS EN 1990 : 2002 + A1 : 2005 *Eurocode – Basis of structural design*

NA to BS EN 1990 : 2002 + A1 : 2005 UK National Annex to *Eurocode – Basis of structural design*

BS EN 1991-1-4 : 2005 + A1 : 2010 *Eurocode 1 : Actions on structures – General actions – Wind actions*

NA to BS EN 1991-1-4 : 2005 + A1 : 2010 UK National Annex to *Eurocode 1 : Actions on structures – General actions – Wind actions*

BS EN 1992-1-1 : 2004 + A1 : 2014 *Eurocode 2 : Design of concrete structures – General rules and rules for buildings*

NA to BS EN 1992-1-1 : 2004 + A1 : 2014 UK National Annex to *Eurocode 2: Design of concrete structures – General rules and rules for buildings*

BS EN 1996-1-1 : 2005 + A1 : 2012 *Eurocode 6 – Design of masonry structures – General rules for reinforced and unreinforced masonry structures*

NA to BS EN 1996-1-1 : 2005 + A1 : 2012 UK National Annex to *Eurocode 6 – Design of masonry structures – General rules for reinforced and unreinforced masonry structures*

BS EN 1996-2 : 2006 *Eurocode 6 : Design of masonry structures – Design considerations, selection of materials and execution of masonry*

NA to BS EN 1996-2 : 2006 UK National Annex to *Eurocode 6 : Design of masonry structures – Design considerations, selection of materials and execution of masonry*

BS EN 13163 : 2012 *Thermal insulation products for buildings – Factory made products of expanded polystyrene (EPS) – Specification*

PN EN 13501-1 : 2019 *Fire classification of construction products and building elements – Classification using test data from reaction to fire tests*

BS EN 13914-1 : 2016 *Design, preparation and application of external rendering and internal plastering – External rendering*

BS EN ISO 6946 : 2017 *Building components and building elements – Thermal resistance and thermal transmittance – Calculation method*

BS EN ISO 9001 : 2015 *Quality management systems – Requirements*

EAD 040083-00-0404 : 2019 *Guideline for European Technical Approval of External Thermal Insulation Composite Systems (ETICS) with Rendering*

PD 6697 : 2019 *Recommendations for the design of masonry structures to BS EN 1996-1-1 and BS EN 1996-2*

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Conditions

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