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Agrément Certificate
96/3243
Product Sheet 3

STRUCTHERM EXTERNAL WALL INSULATION SYSTEMS

STRUCTHERM THERMAPHON NSC2 HIGH BUILD EXTERNAL WALL INSULATION SYSTEMS

This Agrément Certificate Product Sheet⁽¹⁾ relates to Structherm Thermaphon NSC2 High Build External Wall Insulation Systems, comprising mechanically-fixed mineral wool or phenolic insulation boards with a glassfibre reinforced mesh and render finishes, and suitable for use on new and existing buildings. The systems are suitable for buildings over 18 metres height. See section 8.

(1) Hereinafter referred to as 'Certificate'.

CERTIFICATION INCLUDES:

- factors relating to compliance with Building Regulations where applicable
- factors relating to additional non-regulatory information where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production
- formal three-yearly review.

KEY FACTORS ASSESSED

Thermal performance — the systems can be used to improve the thermal performance of external walls and contribute to meeting the requirements of Building Regulations (see section 6).

Strength and stability — the systems can adequately resist wind loads and have sufficient resistance to impact damage depending on the finish chosen (see section 7).

Behaviour in relation to fire — the systems have been tested and meet the performance criteria set out in BRE Report BR 135 : 2003 using mineral wool and 100 mm phenolic insulations (see section 8).

Risk of condensation — the systems can contribute to limiting the risk of interstitial and surface condensation (see section 11).

Durability — with appropriate care, the systems will remain effective for at least 30 years (see section 13).

The BBA has awarded this Certificate to the company named above for the systems described herein. These systems have been assessed by the BBA as being fit for their intended use provided they are installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

A handwritten signature in black ink, appearing to read 'John Albon'.

John Albon — Head of Approvals
Energy and Ventilation

A handwritten signature in black ink, appearing to read 'Greg Cooper'.

Greg Cooper
Chief Executive

Date of First issue: 19 April 2013

Originally certificated on 2 October 1996

Certificate amended on 21 June 2013 to include minor changes to the layout.

The BBA is a UKAS accredited certification body — Number 113. The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at www.bbacerts.co.uk

Readers are advised to check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA direct.

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Regulations

In the opinion of the BBA, Structherm Thermaphon NSC2 High Building External Wall Insulation Systems, If installed, used and maintained in accordance with this Certificate, will meet or contribute to meeting the relevant requirements of the following Building Regulations (the presence of a UK map indicates that the subject is related to the Building Regulations in the region or regions of the UK depicted):



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

Requirement: A1	Loading
Comment:	The systems can sustain and transmit wind loads to the substrate wall. See section 7.4 of this Certificate.
Requirement: B4(1)	External fire spread
Comment:	These systems can meet this Requirement, but classification depends on the insulation used. See sections 8.1 to 8.9 of this Certificate.
Requirement: C2(b)	Resistance to moisture
Comment:	The systems can provide a degree of protection against rain ingress. See sections 4.4 and 10.1 of this Certificate.
Requirement: C2(c)	Resistance to moisture
Comment:	The systems contribute to minimising the risk of interstitial and surface condensation. See sections 11.1, 11.2 and 11.4 of this Certificate.
Requirement: L1(a)(i)	Conservation of fuel and power
Comment:	The systems will enable or contribute to meet this Requirement. See sections 6.2 and 6.3 of this Certificate.
Regulation: 7	Materials and workmanship
Comment:	These systems are acceptable. See section 13 and the <i>Installation</i> part of this Certificate.
Regulation: 26	CO₂ emission rates for new buildings
Comment:	These systems can contribute to meet this Regulation. See sections 6.2 and 6.3 of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation: 8(1)(2)	Fitness and durability of materials and workmanship
Comment:	These systems can contribute to a construction meeting this Regulation. See sections 12.1 and 13 and the <i>Installation</i> part of this Certificate.
Regulation: 9	Building standards applicable to construction
Standard: 1.1	Structure
Comment:	The systems can sustain and transmit wind loads to the substrate wall. See section 7.4 of this Certificate.
Standard: 2.6	Spread to neighbouring buildings
Comment:	The external surfaces of the systems have a 'Class 0' or 'low risk' surface spread of flame classification, with reference to clauses 2.6.1 ⁽¹⁾⁽²⁾ , 2.6.2 ⁽¹⁾⁽²⁾ , 2.6.4 ⁽¹⁾⁽²⁾ , 2.6.5 ⁽¹⁾ and 2.6.6 ⁽²⁾ . See sections 8.1 to 8.9 of this Certificate.
Standard: 2.7	Spread on external walls
Comment:	These systems incorporate materials which would be classed as low risk as defined in this Standard, with reference to clauses 2.7.1 ⁽¹⁾⁽²⁾ , 2.7.2 ⁽²⁾ and Annex 2A ⁽¹⁾ . See sections 8.1 to 8.9 of this Certificate.
Standard: 3.10	Precipitation
Comment:	These systems will contribute to a construction satisfying this Standard, with reference to clauses 3.10.1 ⁽¹⁾⁽²⁾ and 3.15.1 ⁽¹⁾⁽²⁾ . See sections 4.4 and 10.1 of this Certificate.
Standard: 3.15	Condensation
Comment:	These systems can contribute to satisfy this Standard, with reference to clauses 3.10.1 ⁽¹⁾⁽²⁾ and 3.10.6 ⁽¹⁾⁽²⁾ . See sections 4.4, 11.3 and 11.4 of this Certificate.
Standard: 6.1(b)	Carbon dioxide emissions
Standard: 6.2	Building insulation envelope
Comment:	These systems can contribute to satisfy these Standards, with reference to clauses (or parts of) 6.1.1 ⁽¹⁾ , 6.1.2 ⁽¹⁾⁽²⁾ , 6.1.3 ⁽¹⁾ , 6.1.6 ⁽¹⁾ , 6.1.10 ⁽²⁾ , 6.2.1 ⁽¹⁾⁽²⁾ , 6.2.3 ⁽¹⁾ , 6.2.4 ⁽²⁾ , 6.2.5 ⁽²⁾ , 6.2.6 ⁽¹⁾ , 6.2.7 ⁽¹⁾ , 6.2.8 ⁽²⁾ , 6.2.9 ⁽¹⁾⁽²⁾ , 6.2.10 ⁽¹⁾ , 6.2.11 ⁽¹⁾⁽²⁾ , 6.2.12 ⁽²⁾ and 6.2.13 ⁽¹⁾⁽²⁾ . See sections 6.2 and 6.3 of this Certificate.
Standard: 7.1(a)(b)	Statement of sustainability
Comment:	These systems can contribute to meeting 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.
Regulation: 12	Building Standards applicable to conversions
Comment:	All comments given for these systems 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

Regulation: 23	Fitness of materials and workmanship
Comment:	These systems are acceptable. See section 13 and the <i>Installation</i> part of this Certificate.

Regulation:	28(b)	Resistance to moisture and weather
Comment:		These systems will satisfy this Regulation. See sections 4.4 and 10.1 of this Certificate.
Regulation:	29	Condensation
Comment:		These systems will satisfy the requirements of this Regulation. See sections 11.2 and 11.4 of this Certificate.
Regulation:	30	Stability
Comment:		These systems can sustain and transmit wind loads to the substrate wall. See section 7.4 of this Certificate.
Regulation:	36(a)	External fire spread
Comment:		These systems have a 'low risk' surface and can satisfy this Regulation. See sections 8.1 to 8.9 of this Certificate.
Regulation:	39(a)(i) 40	Conservation measures Target carbon dioxide emission rate
Comment:		These systems will contribute to a building satisfying its target emission rate. See sections 6.2 and 6.3 of this Certificate.
Regulation:	23	Fitness of materials and workmanship
Comment:		The systems are acceptable. See sections 11.2 and 11.4 and the <i>Installation</i> part of this Certificate.

Construction (Design and Management) Regulations 2007

Construction (Design and Management) Regulations (Northern Ireland) 2007

Information in this Certificate may assist the client, CDM co-ordinator, designer and contractors to address their obligations under these Regulations.

See section: 3 *Delivery and site handling* (3.2) of this Certificate.

Additional Information

NHBC Standards 2013

NHBC accepts the use of Structerm Thermaphon NSC2 High Build External Wall Insulation Systems, provided they are installed, used and maintained in accordance with this Certificate, in relation to *NHBC Standards, Chapter 6.9 Curtain walling and cladding*.

Technical Specification

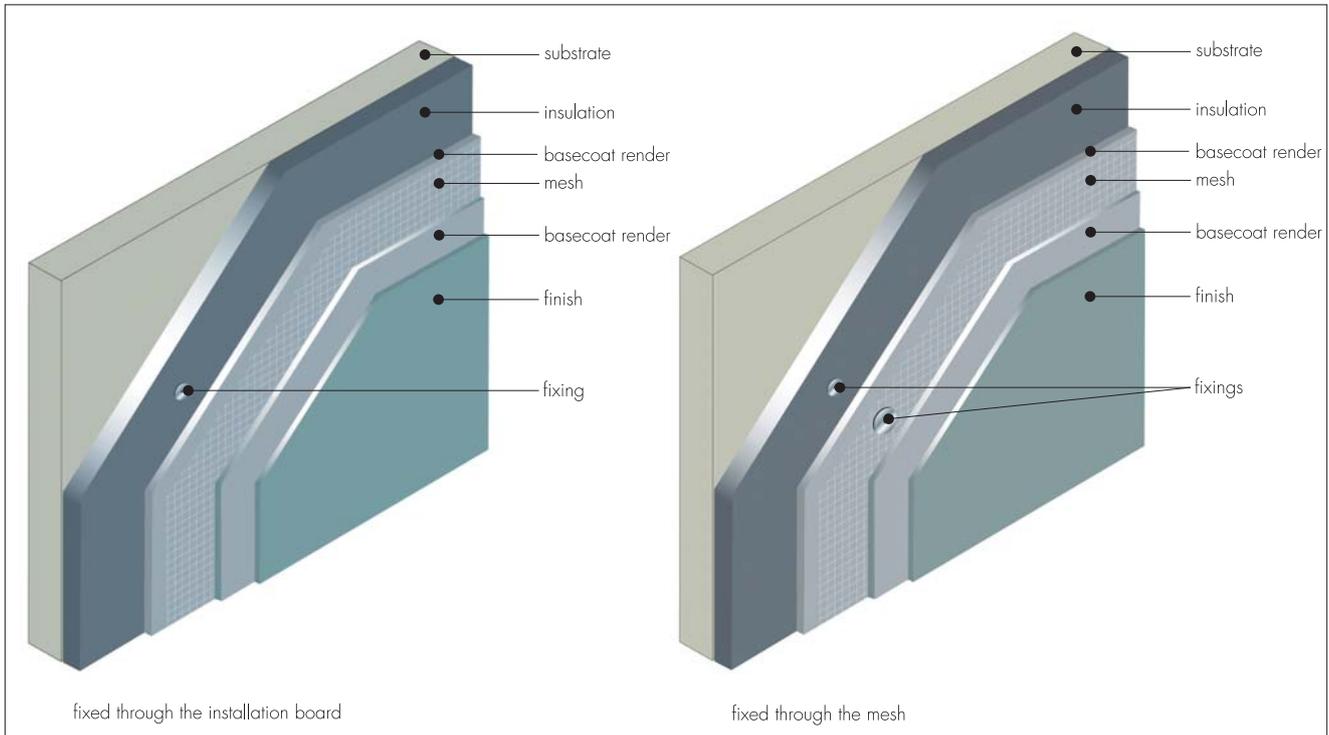
1 Description

1.1 The Structerm Thermaphon NSC2 High Build External Wall Insulation Systems consists of insulation boards mechanically fixed directly to the substrate wall, with an embedded render finish (see Figure 1). They comprise the following components:

- K5 phenolic insulation boards — 1200 mm by 600 mm, thickness 100 mm, nominal density of 40 Kg·m⁻³, a minimum compressive strength of 150 kN·m⁻² and tensile strength perpendicular to the faces of 50 kPa in accordance with BS EN 1607 : 1997
 - mineral wool insulation slabs dual density (MWDD) — 1000 mm by 500 mm in a range of thicknesses between 30 mm and 250 mm, with the 15 mm crust having a nominal density of 160 kg·m⁻³ and the remaining thickness a nominal density of 110 kg·m⁻³, a minimum compressive strength of 40 kPa and a tensile strength perpendicular to the faces of 8 kPa
 - mineral wool fibre insulation slabs (MWF) — 1200 mm by 600 mm in a range of thicknesses between 30 mm and 150 mm, with a nominal density of 140 kg·m⁻³, a minimum compressive strength of 20 kPa, and tensile strength perpendicular to the faces of 10 kPa
 - mechanical fixings⁽¹⁾ — anchors with adequate length to suit the substrate and the insulation thickness, approved and supplied by the certificate holder, and selected from:
 - Ejot NTU — Polyethylene, PE-HD with steel or electro-galvanized nails
 - Ejot STR U — Polyethylene, PE-HD with steel or electro-galvanized nails
 - Hilti HRD-10 — Polyamide with steel or electro-galvanized nails with IT/Z and BSL140 washers
 - Ejot SDFS — Polyamide with steel or electro-galvanized nails
- (1) Other fixings may be used provided they can be demonstrated to have equal or higher pull out and plate stiffness characteristics.
- Structerm HP High Polymer Thin Basecoat Render — a factory batched, pre-mixed, high polymer modified sand/cement thin basecoat mortar supplied as a powder to which clean water is added at a rate of 4 to 5 litres per 25 kg bag. It is applied to the board face in two coats to an approximate total thickness of 4 mm to 6 mm
 - reinforcement mesh — a one metre wide mesh of multi-stranded alkali-resistant glassfibre, with a polymer coating and a nominal weight of 160 g·m⁻², installed after the first application of basecoat render and overlapped as application proceeds, covering the whole rendered area (see Figure 6)
 - Structerm Silicone Primer — resin based, through coloured, vapour permeable, liquid primer used directly or diluted with the addition of 5% clean water and applied to finished basecoats by brush, roller or spray

- Structherm Silicone Decorative Finish — a decorative polymerised silicone finish coat supplied in paste form containing colour pigments and marble grit for application directly over primed basecoat renders by trowel and float. Available in 1 mm, 1.5 mm and 2 mm particle sizes.

Figure 1 Structherm Thermaphon NSC2 High Build components



1.2 Ancillary items supplied with the systems but outside the scope of this Certificate

- profiles — a range of standard profiles such as bellcast, stop end, and corner beads
- expansion joint beads
- connection plates
- pipe and parapet capping and flashing sections
- profile fixings — driven pins with plastic expansion sleeves
- sealant — silicone sealant.

Phenolic

1.3 The phenolic insulation boards are mechanically fixed to the external surface of the substrate. Basecoat render is trowel-applied to the board face to an approximate thickness of 3 mm, with the reinforcing mesh embedding immediately and a further stainless steel fixing added per board, then a further basecoat render is applied to a total thickness of approximately 6 mm. When dry, the surface is primed for the application of the selected silicone/acrylic textures followed by the decorative finish coat.

Mineral wool

1.4 The mineral wool insulation boards are mechanically fixed to the external surface of the substrate using one fixing with a 140 mm extension washer per board. Basecoat render is trowel applied to the board face to an approximate thickness of 3 mm; the reinforcing mesh is embedded immediately whilst still wet and four additional fixings per board are applied through the mesh. A further 3 mm of basecoat render is applied to a total thickness of approximately 6 mm. When dry, the surface is primed for the application of the selected textured decorative finish coat.

2 Manufacture

2.1 As part of the assessment and ongoing surveillance of product quality, the BBA has:

- agreed with the manufacturer the quality control procedures and product testing to be undertaken
- assessed and agreed the quality control operated over batches of incoming materials
- monitored the production process and verified that it is in accordance with the documented process
- evaluated the process for management of nonconformities
- checked that equipment has been properly tested and calibrated
- 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.

2.2 The management system of Structherm Ltd has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 (Certificate CP 000183) and BS EN ISO 14001 : 2004 (Certificate CPE 00027 by CPC — Construction Products Certification).

3 Delivery and site handling

3.1 The insulation boards are delivered to site shrink-wrapped in polythene. Each pack carries the product identification and batch numbers.

3.2 Components are delivered to site in the packaging and quantities listed in Table 1. Each package carries the product identification, manufacturer's batch number and the BBA logo incorporating the number of this Certificate.

Table 1 Component supply details

Component	Quantity and package
Insulations	shrink wrapped in polythene
Strucherm (HP) High Polymer Thin Basecoat Render	25 kg bag
Strucherm mechanical fixings	boxed by manufacturer, 100 per box
Strucherm reinforcement mesh	1 m x 50 m rolls
Strucherm Silicone Primer	25 kg plastic drum
Strucherm Silicone Decorative Finish	25 kg plastic drum

3.3 The insulation should be protected from prolonged exposure of sunlight and contact with solvent and bitumen. In addition, the insulation must be stored on a firm, clean, level base, off the ground and under cover until required for use. Care must be taken when handling the insulation to avoid damage. The phenolic boards must not be exposed to open flame or other ignition sources.

3.4 The basecoat and topcoat must be stored in dry conditions within 5°C and 30°C, off the ground, and protected from moisture. Contaminated material must be discarded.

3.5 The primer should be stored in a safe area, under cover and protected from excessive heat and frost at all times.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on the Strucherm Thermaphon NSC2 High Build External Wall Insulation Systems.

Design Considerations

4 General

4.1 Strucherm Thermaphon NSC2 High Build External Wall Insulation Systems, when installed in accordance with this Certificate, are effective in reducing the thermal transmittance (U value) of the walls of new and existing buildings. 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 the systems. Only details specified by the Certificate holder should be used.

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

4.3 The systems are for application to the outside of external walls of masonry, or dense or no-fines concrete construction on new or existing domestic and non-domestic buildings. Prior to installation of the systems, the wall surfaces should comply with section 14 of this Certificate.

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

- BS 8000-3 : 2001
- BS EN 1996-1-2 : 2005
- BS EN 1996-2 : 2006, in that the designer should select a construction appropriate to the local wind-driven rain index, paying due regard to the design detailing, workmanship and materials to be used
- BS EN 1996-3 : 2006.

4.5 Other new buildings not subject to regulatory requirements, should also be built in accordance with the standards identified in section 4.4.

4.6 The effect of the installation of the insulation systems on the acoustic performance of a construction is outside the scope of this Certificate

4.7 The fixing of rainwater goods, satellite dishes, clothes lines, hanging baskets and similar items is outside the scope of this Certificate.

4.8 It is essential that these systems are installed and maintained in accordance the conditions set out in this Certificate.

5 Practicability of installation

The system should be installed only by specialised contractors who have successfully undergone training and registration by the Certificate Holder.

Note: The BBA operates a UKAS Accredited Approved Installer Scheme for external wall insulation; details of installer companies approved are included on the BBA's website (www.bbacerts.co.uk).

6 Thermal performance

6.1 Calculations of thermal transmittance (U value) should be carried out in accordance with BS EN ISO 6946 : 2007 and BRE Report BR 443 : 2006, using the thermal conductivity ($\lambda_{90/90}$ value) of the insulations given in Table 2.

Table 2 Thermal conductivity values

Insulation	Board thickness range (mm)	Lambda value ($\text{W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$)
Phenolic (PH)	15 to 24	0.023
	25 to 44	0.021
	45 to 100	0.020
Mineral Wool (MWDD)	30 to 250	0.036
Mineral Wool (MWF)	30 to 150	0.038

6.2 The U value of a completed wall will depend on the selected insulation thickness and fixing method, the insulating value of the substrate masonry and its internal finish. Calculated U values for sample constructions in accordance with the Building Regulations, are given in Table 3 and are based on eight fixings per m^2 , with the thermal conductivities given in Table 2.

Table 3 Insulation thickness required to achieve design U values given in national Building Regulations

U value ⁽¹⁾ ($\text{W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$)	Insulation type	Insulation thickness ⁽²⁾ (mm)
0.19	MWDD	–
	MWF	–
	PH	110
0.26	MWDD	190
	MWF	190
	PH	80
0.28	MWDD	170
	MWF	180
	PH	70
0.30	MWDD	160
	MWF	170
	PH	70

(1) Wall construction using 200 mm dense concrete block with a thermal conductivity of $1.75 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$, 13 mm thick dense plaster with a thermal conductivity of $0.57 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ and 8 capped galvanized fixings per m^2 with a point thermal transmittance of $0.002 \text{ W}\cdot\text{K}^{-1}$ per phenolic and a diameter of 8 mm for mineral wool.

(2) Based upon incremental insulation thickness of 10 mm.

6.3 The systems can contribute to maintaining continuity of thermal insulation at junctions between elements and openings. For Accredited Construction Details the corresponding psi values in BRE Information Paper IP 1/06, Table 3, may be used in carbon emission calculations in Scotland and Northern Ireland. Detailed guidance for other junctions and on limiting heat loss by air infiltration can be found in:

England and Wales — Approved Documents to Part L and for new thermal elements to existing buildings, Accredited Construction Details (version 1.0). See also SAP 2009 Appendix K and the *iSBEM User Manual* for new-build

Scotland — Accredited Construction Details (Scotland)

Northern Ireland — Accredited Construction Details (version 1.0).

7 Strength and stability

7.1 When installed on suitable walls, the systems can adequately transfer to the wall the self-weight and negative (suction and pressure) wind loads normally experienced in the UK.

7.2 Positive wind load (pressure) is transferred to the substrate wall directly via bearing and compression of the render and insulation.

7.3 Negative wind pressure (suction) is resisted by the bond between each component. The insulation boards are retained by the external wall insulation systems anchors.



7.4 The wind loads on the walls should be calculated in accordance with BS EN 1991-1-4 : 2005. Special consideration should be given to locations with high wind-load pressure coefficients, as additional fixings may be necessary. In accordance with BS EN 1990 : 2002, it is recommended that a load factor of 1.5 is used to determine the ultimate wind load to be resisted by the systems.

7.5 Assessment of structural performance for individual installations should be carried out by a suitably qualified and experienced person to confirm that:

- the substrate wall has adequate strength to resist additional loads that may be applied as a result of installing the systems, ignoring any contribution from the insulation systems
- the proposed systems and associated fixing layout (see Figures 3 and 4) provide adequate resistance to negative wind loads (based on the results of site investigation and test results given in section 7.7 and 7.8)

7.6 The number and centres of fixings should be determined by the system designer. Provided the substrate wall is suitable and an appropriate fixing is selected, the mechanical fixings will adequately support and transfer the weight of the render insulation systems to the substrate wall at the minimum spacing given in this Certificate. Typical characteristic pull-out strengths for the fixings taken from the European Technical Approval (ETA) are given in Table 4. However, these values are dependent on the substrate and the fixing must be selected to suit the loads and substrate concerned.

Table 4 Fixings — typical characteristic pull-out strengths

Fixing Type	ETA number	Substrate	Drill diameter (mm)	Embedment depth (mm)	Typical pull-out strength (kN)
Ejot NTU	05/0009	Concrete/brickwork	8 mm	25 mm	1.2/1.5
Ejot STR U	04/0023	Concrete/brickwork	8 mm	25 mm	1.5/1.5
Ejot SDFS	10/0305	Concrete/brickwork	10 mm	40 mm	4.5/2.0
Hilti HRD-10	07/0219	Concrete/brickwork	10 mm	50 mm	4.5/2.0

7.7 The pull-through resistance determined by BBA from tests on anchors are given in Table 5.

Table 5 Typical calculation to establish the pull through resistances

Factor (unit)	Insulation ⁽¹⁾
	PH ⁽¹⁾
Fixings plate diameter (mm)	60
Fixings types	See Table 4
Insulation thickness (mm)	>60
Characteristic pullthrough resistance ⁽²⁾ per fixing (N)	682
Factor of safety ⁽³⁾	2.5
Design pull-through resistance per fixing (N)	273

(1) Calculation based upon Phenolic insulation slab 1200 mm by 600 mm (total area 0.72 m²) attached by five fixings.

(2) Characteristic pull through resistance of insulation over the head of the fixing, in accordance with BS EN 1990 : 2002, Annex D7.2.

(3) The safety factor of 2.5 is applied and based on the assumption that all insulation boards are quality control tested to establish tensile strength perpendicular to the face of the slab.

7.8 The mineral wool system is mechanically fixed through the reinforcement mesh and the design strength is suitable for the expected wind load expected in the UK. It is recommended that an appropriate number of site-specific pull-out tests are conducted on the substrate of the building to determine the minimum resistance to failure of the fixings. The characteristic pull-out resistance should be determined in accordance with the guidance given in ETAG 014 : 2011, Annex D

Impact resistance

7.9 Hard body impact tests were carried out in accordance with ETAG 004 : 2011. The systems are suitable for use in category I and category II⁽¹⁾ depending on the finish used.

(1) These categories are as follows:

- Category I — a zone readily accessible at ground level to the public and vulnerable to hard body 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 systems 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.

8 Behaviour in relation to fire



8.1 The systems are classified as class 0 or 'low risk' as described in the National Building Regulations. This rating applies to the lightest colour range.

8.2 The phenolic insulation material is classified as combustible.

8.3 The mineral wool insulation materials are classified as non-combustible.

8.4 The systems may be used in accordance with the provisions of:

England and Wales — Approved Document B, Volume 1, paragraph 8.4, and Volume 2, paragraph 12.6 (see also Approved Document B, Volume 2, Diagram 40)

Scotland — Mandatory Standards 2.6 and 2.7, clauses 2.6.1⁽¹⁾⁽²⁾ to 2.6.5⁽¹⁾, 2.6.6⁽²⁾, 2.6.7⁽²⁾, 2.7.1⁽¹⁾⁽²⁾ and 2.7.2⁽²⁾, and Annexes 2.C⁽¹⁾ and 2.E⁽²⁾

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

Northern Ireland — Technical Booklet E, paragraph 5.1 (see also Diagram 5.1).

8.5 The behaviour in fire of external wall insulation is the subject of recommendations by the Building Research Establishment which, for these systems, makes no restriction on the height nor boundary, provided the installed thicknesses used are 100 mm when using phenolic insulation. There is no restriction in height for the mineral wool systems. For other thicknesses see clause 1.1 of this Certificate.

8.6 The documents listed in section 8.4 give full details of permissible heights and boundary conditions of domestic and non-domestic and the relevant guidance with regard to external wall claddings of external wall insulation systems with render surfaces. However, the following information is offered for guidance purposes:

England and Wales

- for buildings one metre or more from a boundary, the systems are acceptable
- for buildings less than one metre from a boundary, the systems can be acceptable provided the wall meets the fire resistance requirements in Tables A1 and A2, from both sides
- the systems can be acceptable, subject to the aforementioned conditions, for use on a building which is 18 m or more above ground level

Scotland

- domestic and non-domestic use — for buildings more than one metre from a boundary, and 18 m or more above ground level, the systems can be acceptable. The phenolic system is not classified as non-combustible; therefore, calculations for unprotected areas apply⁽¹⁾

(1) Combustible cladding need not be included in the calculation for unprotected areas where it is attached to the structure of the building and the external wall does not contain openings other than the small openings described in Mandatory Standard 2.6.2, clause 2.6.2b, and the wall behind the cladding has the appropriate fire-resistance duration from the inside. In Mandatory Standard 2.6, clause 2.6.2b, an unprotected area is defined as an area of not more than 0.1 m² which is at least 1.5 m from any other unprotected area in the same wall.

Northern Ireland

- for buildings one metre or more from a boundary, the system is acceptable
- for buildings less than one metre from a boundary, the system can be acceptable provided the wall meets the fire resistance requirements given in Tables 4.1 and 4.2, from both sides
- the system is acceptable, subject to the aforementioned conditions, for use on a building which is 18 m or more above ground level.

8.7 External wall insulation systems for use above 18 m in height should be designed and constructed in accordance with the recommendations of BRE Report BR 135 : 2003. The specific insulation systems covered in this Certificate do not incorporate cavities between the insulation and the substrate and were successfully tested in accordance with BRE Report BR 135 : 2003, Annex A without fire barriers.

8.8 In multi-storey applications, a minimum of one 8 mm diameter stainless steel anchor per board is required. The anchor is applied to prevent collapse should the insulation be lost to fire and must be designed to resist the bending and shear stresses resulting from the dead load from the render.

8.9 In buildings not subject to the Building Regulations, it is recommended that designers should consider the guidance given in sections 8.6 and 8.7.

9 Proximity of flues

When the systems are installed in close proximity to certain flue pipes the relevant provisions of the national Building Regulations should be met:

England and Wales — Approved Document J

Scotland — Mandatory Standard 3.19, clause 3.19.4⁽¹⁾⁽²⁾

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

Northern Ireland — Technical Booklet L.

10 Weathertightness



10.1 The systems will provide a degree of protection against rain ingress. However, care should be taken to ensure that walls are adequately weathertight prior to its application. The insulation systems 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.

10.2 Designers and installers should take particular care in detailing around openings, penetrations and movement joints to minimise the risk of rain ingress.

10.3 For externally insulated single leaf masonry walls, guidance is given in BS EN 1996-1-1 : 2005 and BS EN 998-2 : 2010 on the minimum thickness of render required for the different exposure categories.

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

10.5 At the tops of walls, the systems should be protected by an adequate overhang or other detail designed for use with these types of systems (see section 16.21).

11 Risk of condensation



11.1 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 systems, to minimise the risk of condensation. The recommendations of BS 5250 : 2011 should be followed.

Surface condensation



11.2 Walls will limit the risk of surface condensation adequately 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 6.3.



11.3 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. Guidance may be obtained from BS 5250 : 2011, section 4 and Annex G, and BRE Report BR 262 : 2002.

Interstitial condensation



11.4 Walls incorporating the systems will adequately limit the risk of interstitial condensation when they are designed and constructed in accordance with BS 5250 : 2011 (Section 4, Annexes D and G).

11.5 If the systems are to be used on the external walls of rooms expected to have continuous high humidities, care must be taken in the design of the rooms to avoid possible problems from the formation of interstitial condensation in the wall.

12 Maintenance and repair



12.1 Regular checks should be made on the installed insulation systems, particularly at joints with other elements, to ensure that ingress of water does not occur. This should verify that architectural details for shedding water clear of the building are present and functioning, and that external plumbing fittings are in good condition. Maintenance schedules should include the replacement and resealing of joints, for example between the insulation systems and window and door frames. The interval between inspections should be considered for each building taking into consideration such factors as the building location and height. Necessary repairs should be carried out immediately and the sealant of joints at window and door frames replaced at regular intervals.

12.2 The designer should ensure suitable access is available to enable maintenance inspections to take place safely.

12.3 Damaged areas must be repaired using the appropriate components and the procedures detailed in the Certificate holder's technical literature. The Certificate holder should be consulted on the appropriate measures for a particular installation.

12.4 Textured finishes may become soiled in time, the rate depending on locality and original colour. The appearance may be restored by a suitable powerwash or, if required, by the application of a compatible paint; however, great care should be taken not to adversely affect the water vapour or fire resistance characteristics of the systems. If necessary, the advice of the Certificate holder should be sought.

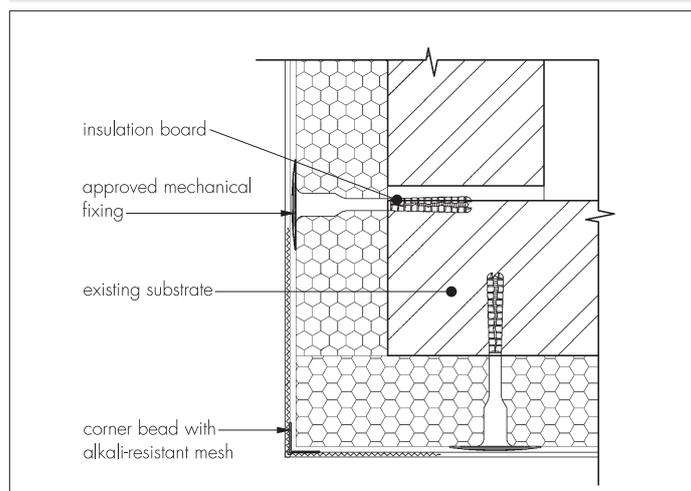
13 Durability



The systems should remain effective for at least 30 years, provided any damage to the surface finish is repaired immediately, and regular maintenance is undertaken including checks at joints in the systems to identify leakage of rainwater into the systems as described in section 12.

14 Site survey and preliminary work

Figure 2 External corner detail



14.1 A pre-installation survey of the property is carried out to determine suitability for treatment and any repairs necessary to the building structure undertaken before application of a 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
- areas where flexible sealants must be used
- any alterations to external plumbing where required
- where required, the position of fire barriers.

14.2 A survey is carried out, which should include tests conducted on the walls of the building by the Certificate holder or their approved suppliers, to determine the pull-out resistance of the proposed mechanical fixings. An assessment and recommendation is made on the type and number of fixings required to withstand the building's expected wind loading based on calculations using the test data, the relevant wind speed data for the site and, in the absence of a formal requirement, a safety factor of 3.

14.3 All necessary repairs to the building structure are completed before installation of the systems is commenced.

14.4 Surfaces should 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 1 m, must be made good prior to installation to ensure that the insulation boards are installed with a smooth, in-plane finished surface.

14.5 On existing buildings, purpose-made sills must be fitted to extend beyond the finished face of the systems. New buildings should incorporate suitably deep sills.

14.6 It is recommended that the external plumbing be removed and alterations made to underground drainage, where appropriate, to accommodate repositioning of the plumbing on the finished face of the systems.

14.7 Internal wet work, eg screeding or plastering, should be completed and allowed to dry prior to the application of a system.

15 Approved installers

15.1 Application of the systems, within the context of this Certificate, is carried out by approved installers recommended or recognised by the Certificate holder. Such an installer is a company:

- employing operatives who have been trained and approved by the Certificate holder to install the systems
- 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.

15.2 Firms may also be approved to install the systems under the *BBA's Assessment and Surveillance Scheme for Installers of External Wall Insulation Systems*. In addition to the requirements given in section 15.1, these installers will be subject to site and office inspections by the BBA prior to approval and while they remain approved.

16 Procedure

General

16.1 Application is carried out in accordance with the Certificate holder's current installation instructions.

16.2 Weather conditions should 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, nor if exposure to frost is likely, and the coating must be protected from rapid drying.

16.3 All rendering should be in accordance with the relevant recommendations of BS EN 13914-1 : 2005.

16.4 Before installation takes place, the building designer must confirm where items such as rainwater goods, satellite dishes, clothes lines and hanging baskets will be placed. The fixing points for these items must be specifically designated and built into the systems as the insulation is installed. This is outside the scope of this Certificate.

Positioning and securing insulation boards

16.5 The base profile is secured to the external wall above the dpc using the approved profile fixings at approximately 300 mm centres. Base rail connectors are inserted at all rail joints. Extension profiles are fixed to the front of the base rail or stopend channel where appropriate.

16.6 Care must be taken to ensure that all insulation boards are butted tightly together, and alignment should be checked as work proceeds (see Figures 3, 4 and 11). Allowance should be made where either existing render is on the wall or dubbing out render has been used to align the boards as the effective embedment will be reduced.

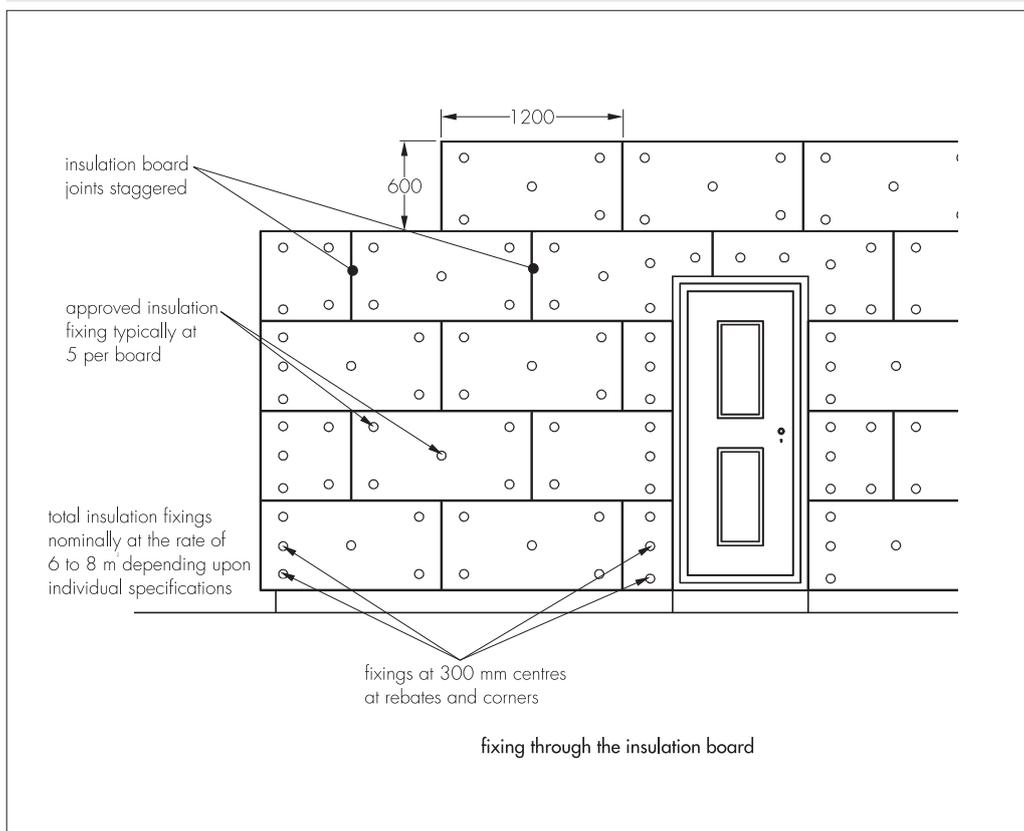
16.7 To fit around details such as doors and windows, insulation boards may be cut with a sharp knife or a fine-tooth saw. If required, purpose-made window sills are fitted. They are designed to prevent water ingress and incorporate drips to shed water clear of the systems.

16.8 Installation continues until the whole wall is completely covered including, where appropriate, the building soffits and eaves. Care should be taken in the detailing around openings and projections (see Figures 2 and 8).

Phenolic system

16.9 The first run of insulation is positioned on the base profile and holes are drilled into the substrate to the required depth through the insulation at the corners of each phenolic slab and at positions which will allow for a nominal seven to eight fixings per square metre (see Figure 3). Around openings, additional fixings should be used at 300 mm centres. The mechanical fixings are inserted and tapped or screwed firmly into place, securing the insulation to the substrate. Subsequent rows of boards are positioned so that 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.

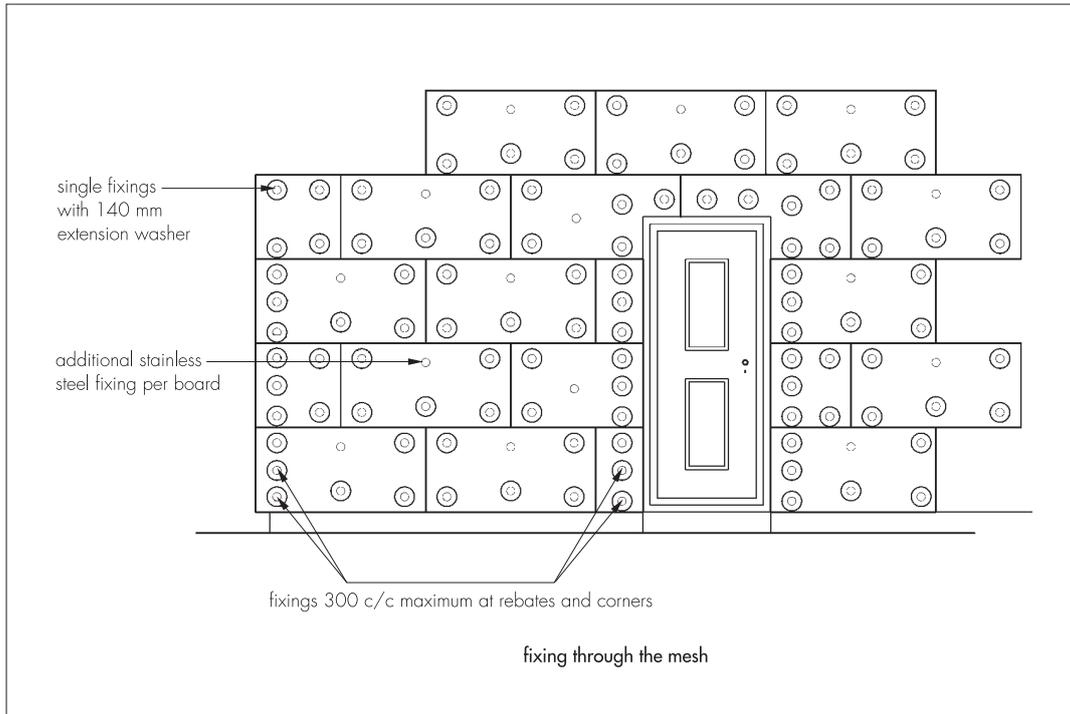
Figure 3 Typical fixing pattern — phenolic system



Mineral wool system

16.10 The first run of insulation is positioned on the base profile and holes are drilled into the substrate to the required depth through the insulation at the corners of each mineral wool slab and at positions which will allow for a nominal eight fixings per square metre (see Figure 4). Around openings, additional fixings should be used at 300 mm centres. The mechanical fixings are inserted through the reinforcing mesh and tapped firmly into place, securing the insulation board to the substrate. The fixings are either hammered or screwed in depending on the type specified.

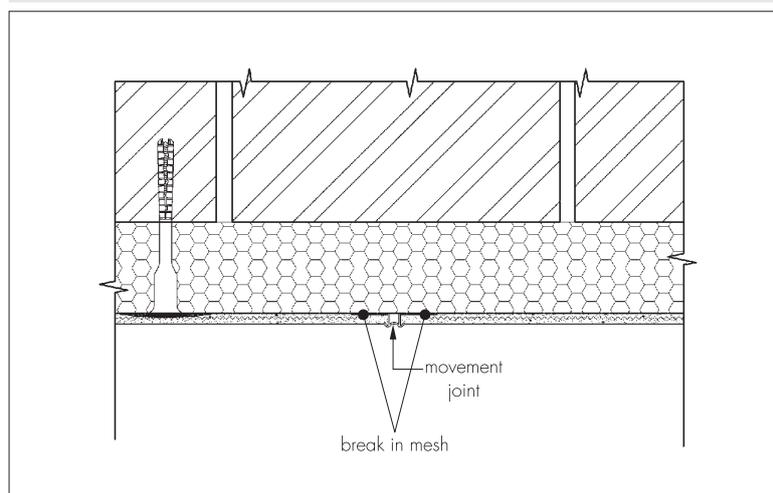
Figure 4 Typical fixing pattern — mineral wool system



Movement joints

16.11 Movement joints in the substrate must be continued through the systems or render when applied. The joint detail using purpose-made trims is illustrated in Figure 5.

Figure 5 Vertical movement joint

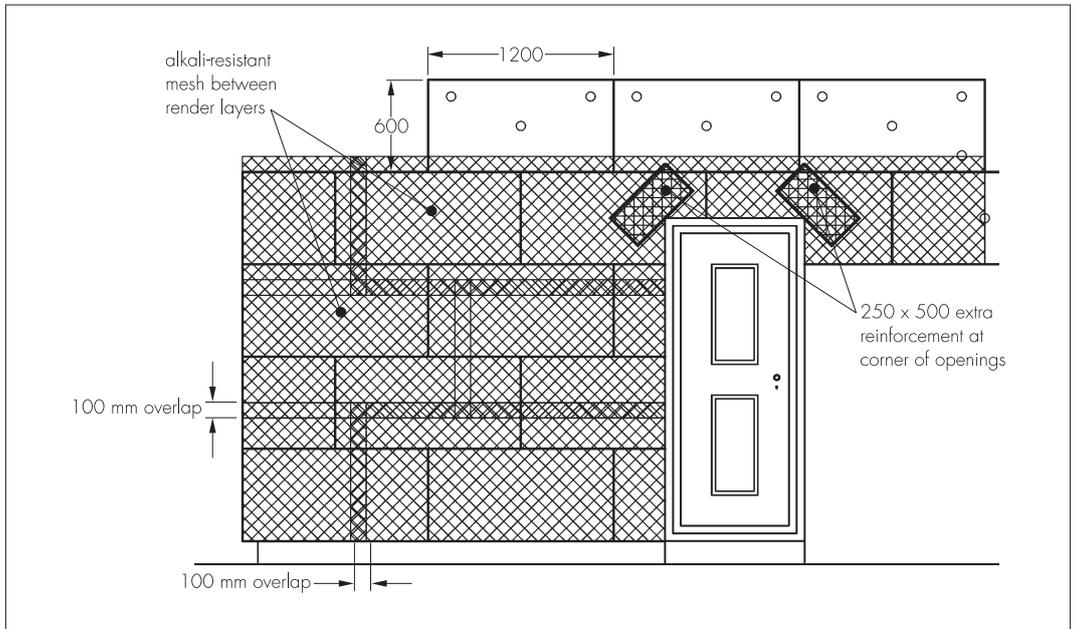


Reinforcing

16.12 The basecoat render is prepared by mixing the contents of each 25 kg bag with approximately 4 to 5 litres of cold, clean water, using a suitable drill with a whisk attachment for at least five minutes after the addition of the last bag of render to allow an even dispersion of the resins then allowed to stand for at least 3 minutes then re-mixed. This allows the chemical additive to dissolve and reactivate.

16.13 The basecoat render is trowel-applied to the surface of the dry insulation boards, initially to an approximate thickness of 3 mm. The mesh is bedded into the adhesive with 100 mm laps at joints and a further coat is applied. The overall basecoat thickness is approximately 6 mm. Additional pieces of reinforcing mesh are used diagonally at the corners of openings, as shown in Figure 6.

Figure 6 Additional reinforcement at openings



16.14 Prior to the render coat, a bead of silicone rubber mastic is gun-applied at window and door frames, overhanging eaves, gas and electric meter boxes, wall vents or where the render abuts any other building material or surface.

16.15 Angle beads are fixed to all building corners and to door and window heads and jambs.

16.16 Expansion beads are fixed vertically in agreed positions. These beads are positioned at approximately seven metre centres along a building, the centres depending on the individual design and requirements of each job. The Certificate holder should be consulted for further information regarding provision for expansion in the systems.

16.17 Stop beads are positioned vertically, eg at party wall positions where the adjoining property does not require treatment.

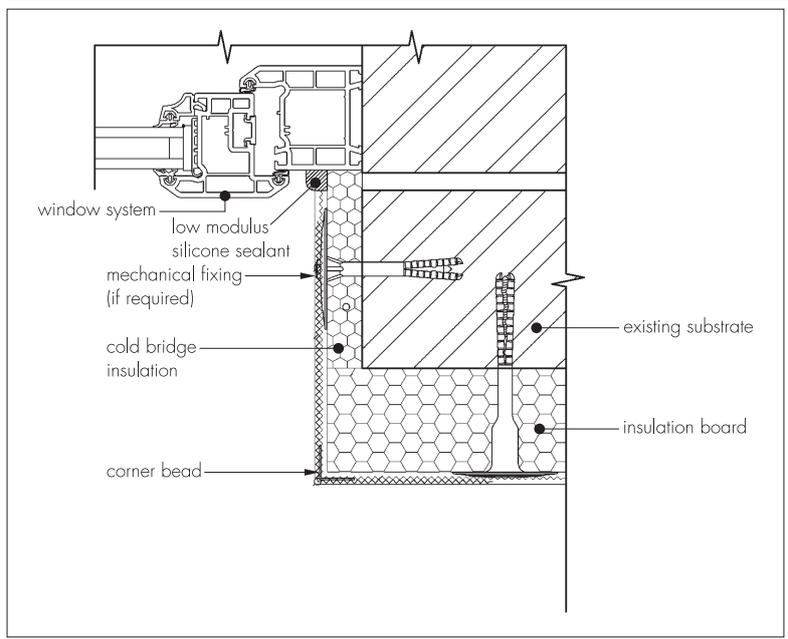
Rendering and finishing

16.18 The drying period of any render will depend on the applied thickness and weather conditions; however, the basecoat must be left to harden for at least 24 hours, depending on the prevailing temperature and weather conditions before application of the topcoat and any contaminants such as grease and chalking removed before finishes are applied.

16.19 Strucherm Silicone textured finishes should be mixed gently with a paddle mixer before application over the dried basecoat. Finishes are spread out evenly over the surface using a stainless steel float trowel and smooth float finished with a plastic trowel before a surface film has formed.

16.20 At the tops of walls the systems should be protected by an adequate overhang or by an adequately sealed purpose-made flashing (see Figure 10).

Figure 7 Window Reveal Detail



16.21 Care should be taken in the detailing of the systems around openings and projections (see Figures 7 to 10).

Figure 8 Window head detail

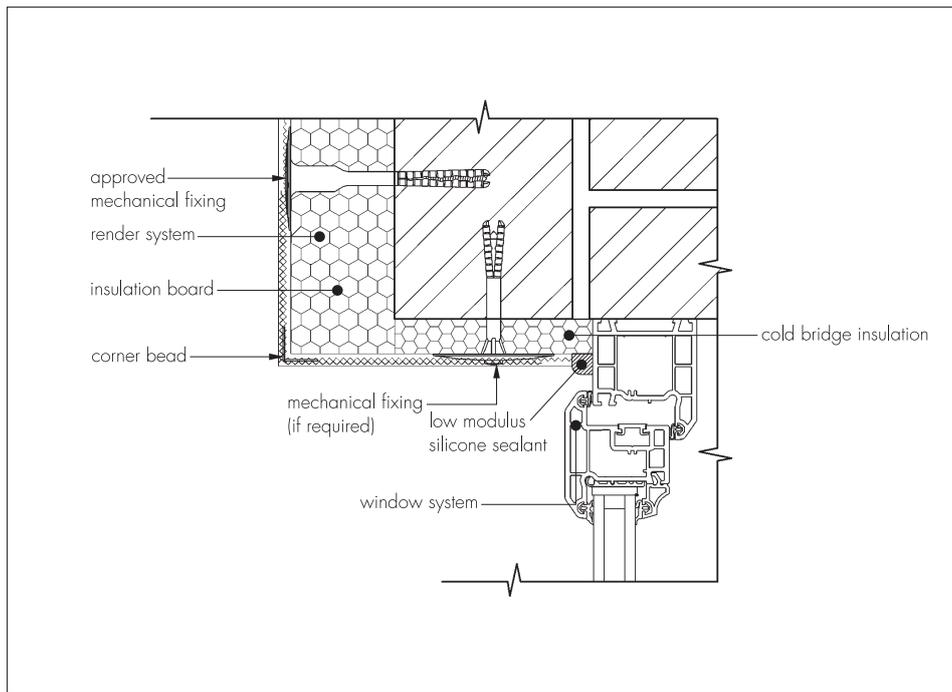


Figure 9 Extended window sill detail

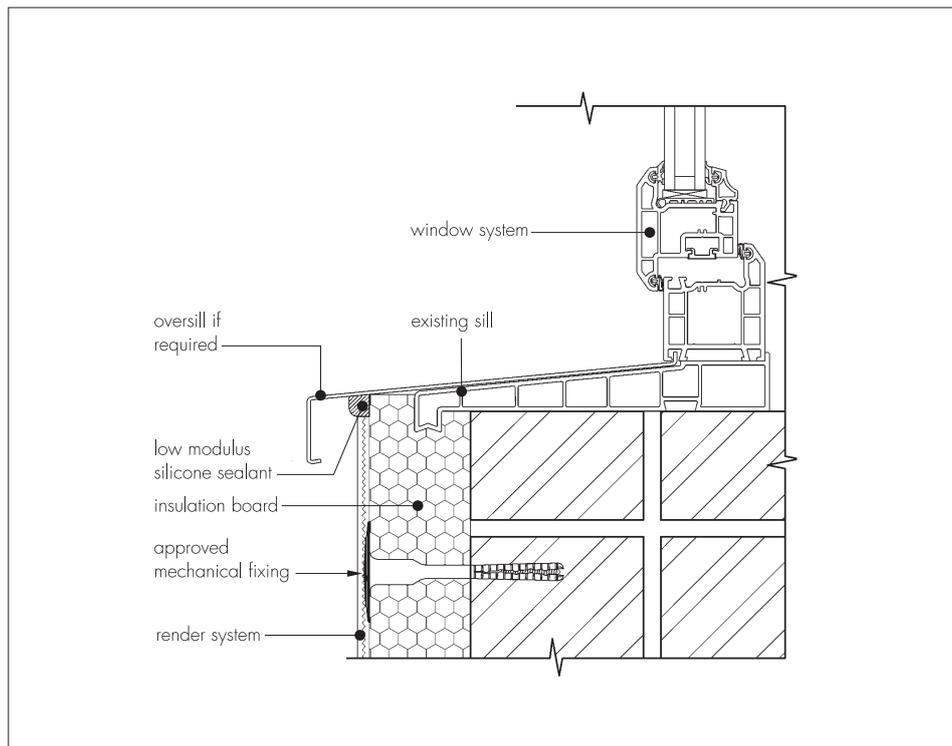


Figure 10 Roof eave details

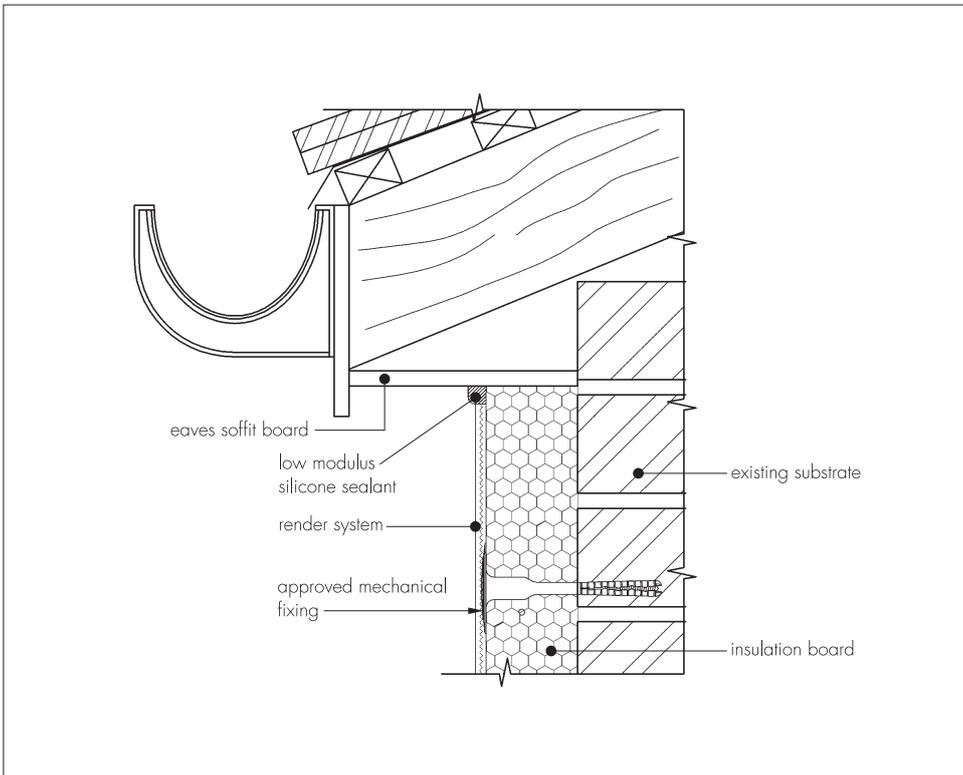
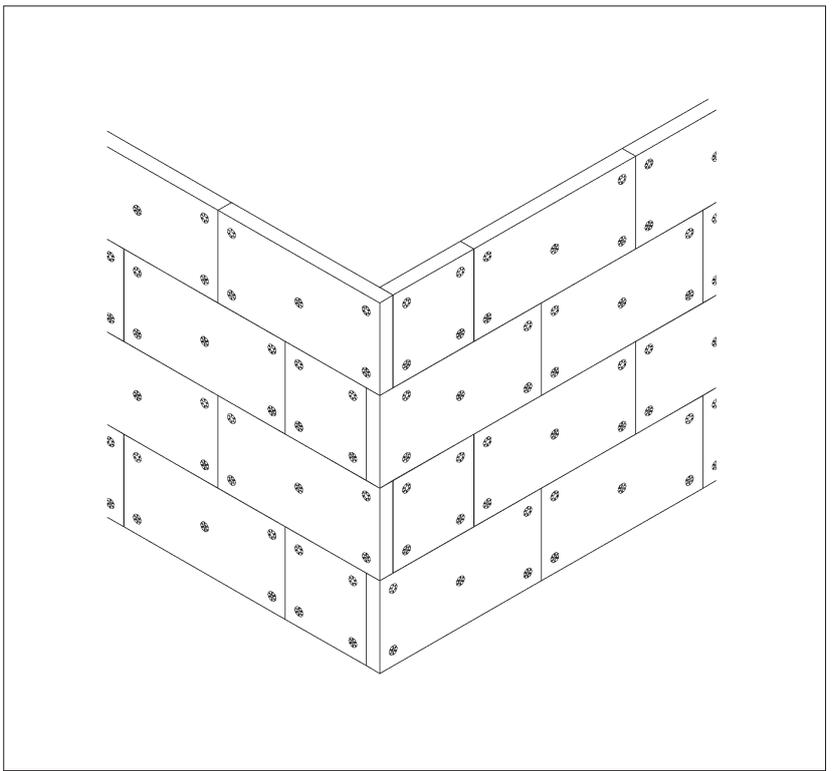


Figure 11 Board Installation Detail



16.22 On completion of the installation, external fittings, eg rainwater goods, are re-fixed through the systems into the substrate.

17 Investigations

17.1 The systems were examined and assessed to determine:

- fire performance
- bond strength
- hygrothermal performance
- resistance to frost
- resistance to impact
- water vapour permeability.

17.2 An examination was made of data relating to:

- fire propagation tests to BS 476-6 : 1989 and BS 8414-1 : 2002
- BRE Report BR 135 : 2003
- surface spread of flame tests
- thermal conductivity.

17.3 The manufacturing process, the methods adopted for quality control of manufactured and bought-in components, and details of the quality and composition of the materials used, were examined.

Bibliography

- BS 476-6 : 1989 *Fire tests on building materials and structures — Method of test for fire propagation for products*
- BS 5250 : 2011 *Code of practice for control of condensation in buildings*
- BS 8000-3 : 2001 *Workmanship on building sites — Code of practice for masonry*
- BS 8414-1 : 2002 *Fire performance of external cladding systems — Test methods for non-loadbearing external cladding systems applied to the face of a building*
- BS EN 998-2 : 2010 *Specification for mortar for masonry — Masonry mortar*
- BS EN 1607 : 1997 *Thermal insulating products for building applications — Determination of tensile strength perpendicular to faces*
- BS EN 1990 : 2002 *Eurocode — Basis of structural design*
- BS EN 1991-1-4 : 2005 *Eurocode 1 : Actions on structures — General actions — Wind actions*
- BS EN 1996-1-1 : 2005 *Eurocode 6 : Design of masonry structures — General rules for reinforced and unreinforced masonry structures*
- BS EN 1996-1-2 : 2005 *Eurocode 6 — Design of masonry structures — General rules — Structural fire design*
- BS EN 1996-2 : 2006 *Eurocode 6 : Design of masonry structures — Design considerations, selection of materials and execution of masonry*
- BS EN 1996-3 : 2006 *Eurocode 6 — Design of masonry structures — Simplified calculation methods for unreinforced masonry structures*
- BS EN 13914-1 : 2005 *Design, preparation and application of external rendering and internal plastering — External rendering*
- BS EN ISO 6946 : 2007 *Building components and building elements — Thermal resistance and thermal transmittance — Calculation method*
- BS EN ISO 9001 : 2008 *Quality management systems — Requirements*
- BS EN ISO 14001 : 2004 *Environmental management systems — Requirements with guidance for use*
- BRE Information Paper IP 1/06 *Assessing the effects of thermal bridging at junctions and around openings*
- BRE Report (BR 135 : 2003) *Fire Performance of External Insulation For Walls of Multi-Storey Buildings*
- BRE Report (BR 262 : 2002) *Thermal insulation: avoiding risks*
- BRE Report (BR 443 : 2006) *Conventions for U-value calculations*
- ETAG 004 : 2011 *Guideline for European Technical Approval of External Thermal Insulation Composite Systems with Rendering*
- ETAG 014 : 2011 *Guideline for European Technical Approval of Plastic Anchors for fixing of External Thermal Insulation Composite Systems with Rendering*

18 Conditions

18.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page — no other company, firm, organisation or person may hold or claim that this Certificate has been issued to them
- is valid only within the UK
- has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English Law.

18.2 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

18.3 This Certificate will remain valid for an unlimited period provided that the product/system and its manufacture and/or fabrication, including all related and relevant parts and processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

18.4 The BBA has used due skill, care and diligence in preparing this Certificate, but no warranty is provided.

18.5 In issuing this Certificate, the BBA is not responsible and is excluded from any liability to any company, firm, organisation or person, for any matters arising directly or indirectly from:

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product/system or any other product/system
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product/system
- actual installations of the product/system, including their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the product/system is installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the product/system, including its manufacture, supply, installation, use, maintenance and removal
- any claims by the manufacturer relating to CE marking.

18.6 Any information relating to the manufacture, supply, installation, use, maintenance and removal of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used, maintained and removed. It does not purport in any way to restate the requirements of the Health and Safety at Work etc. Act 1974, or of any other statutory, common law or other duty which may exist at the date of issue or reissue of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care.