

## Addagrip Terraco Ltd

Addagrip House  
Bell Lane Industrial Estate  
Uckfield  
East Sussex TN22 1QL  
Tel: 01825 761333 Fax: 01825 768566  
e-mail: enquiries@terraco.co.uk  
website: www.terraco.co.uk



Agrément Certificate  
**13/5062**  
Product Sheet 2

### TERRACO EIFS ALPHA

### TERRACO EIFS ALPHA EXTERNAL WALL INSULATION SYSTEM (MECHANICALLY FIXED)

This Agrément Certificate Product Sheet<sup>(1)</sup> relates to the Terraco EIFS Alpha External Wall Insulation System (Mechanically Fixed), comprising white or grey EPS insulation boards, mechanically fixed (with supplementary adhesive when necessary), with a reinforced basecoat and render finishes. It is suitable for use on the outside of external walls in new and existing domestic and non-domestic buildings.

(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 system can be used to improve the thermal performance of external walls and can contribute to satisfying the requirements of the national Building Regulations (see section 6).

**Strength and stability** — the system can adequately resist wind loads and impact-damage, depending on the finish chosen (see section 7).

**Behaviour in relation to fire** — the system has a B-s2, d0 reaction to fire classification in accordance with BS EN 13501-1 : 2007 (see section 8).

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

**Durability** — when installed and maintained in accordance with the Certificate holder's recommendations and the terms of this Certificate, the system will remain effective for at least 30 years.

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 First issue: 31 July 2014

John Albon — Head of Approvals  
Energy and Ventilation

Claire Curtis-Thomas  
Chief Executive

*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](http://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.*

British Board of Agrément  
Bucknalls Lane  
Watford  
Herts WD25 9BA

©2014

tel: 01923 665300  
fax: 01923 665301  
e-mail: [customerservices@bba.star.co.uk](mailto:customerservices@bba.star.co.uk)  
website: [www.bbacerts.co.uk](http://www.bbacerts.co.uk)

# Regulations

In the opinion of the BBA, the Terraco EIFS Alpha External Wall Insulation System (Mechanically Fixed), if installed, used and maintained in accordance with the provisions of this Certificate, can satisfy or contribute to satisfying 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)

<b>Requirement:</b> A1	<b>Loading</b>
Comment:	The system can sustain and transmit wind loads to the substrate wall. See section 7.4 of this Certificate.
<b>Requirement:</b> B4(1)	<b>External fire spread</b>
Comment:	The system can meet this Requirement. See sections 8.1 to 8.4 of this Certificate.
<b>Requirement:</b> C2(b)	<b>Resistance to moisture</b>
Comment:	The system provides a degree of protection against rain ingress. See sections 4.4 and 10.1 of this Certificate.
<b>Requirement:</b> C2(c)	<b>Resistance to moisture</b>
Comment:	The system can contribute to minimising the risk of interstitial and surface condensation. See sections 11.1, 11.2 and 11.4 of this Certificate.
<b>Requirement:</b> L1(a)(i)	<b>Conservation of fuel and power</b>
Comment:	The system can contribute to satisfying this Requirement. See sections 6.2 and 6.3 of this Certificate.
<b>Regulation:</b> 7	<b>Materials and workmanship</b>
Comment:	The system is acceptable. See section 13.1 and the <i>Installation</i> part of this Certificate.
<b>Regulation:</b> 26	<b>CO<sub>2</sub> emission rate for new buildings</b>
<b>Regulation:</b> 26A	<b>Fabric energy efficiency rates for new dwellings (applicable to England only)</b>
Comment:	The system can contribute to satisfying these Regulations. See sections 6.2 and 6.3 of this Certificate.



## The Building (Scotland) Regulations 2004 (as amended)

<b>Regulation:</b> 8(1)(2)	<b>Durability, workmanship and fitness of materials</b>
Comment:	The system can contribute to the construction satisfying this Regulation. See sections 12 and 13.1 and the <i>Installation</i> part of this Certificate.
<b>Regulation:</b> 9	<b>Building standards applicable to construction</b>
Standard: 1.1	Structure
Comment:	The system 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 system can meet this Standard, with reference to clauses 2.6.4 <sup>(1)(2)</sup> , 2.6.5 <sup>(1)</sup> and 2.6.6 <sup>(2)</sup> . See sections 8.1 to 8.6 of this Certificate.
Standard: 2.7	Spread on external walls
Comment:	The system can meet this Standard, and is acceptable for use more than one metre from a boundary, with reference to clauses 2.7.1 <sup>(1)(2)</sup> and 2.7.2 <sup>(1)(2)</sup> and Annex 2A <sup>(1)</sup> . See sections 8.1 to 8.6 of this Certificate.
Standard: 3.10	Precipitation
Comment:	The system will contribute to a construction satisfying this Standard, with reference to clauses 3.10.1 <sup>(1)(2)</sup> and 3.10.2 <sup>(1)(2)</sup> . See sections 4.4 and 10.1 of this Certificate.
Standard: 3.15	Condensation
Comment:	The system can contribute to satisfying this Standard, with reference to clauses 3.15.1 <sup>(1)(2)</sup> , 3.15.4 <sup>(1)(2)</sup> and 3.15.5 <sup>(1)(2)</sup> . See sections 11.3 and 11.4 of this Certificate.
Standard: 6.1(b)	Carbon dioxide emissions
Standard: 6.2	Buildings insulation envelope
Comment:	The system can contribute to satisfying these Standards, with reference to clauses (or parts of) 6.1.1 <sup>(1)(2)</sup> , 6.1.2 <sup>(1)(2)</sup> , 6.1.3 <sup>(1)</sup> , 6.1.6 <sup>(1)</sup> , 6.1.10 <sup>(2)</sup> , 6.2.1 <sup>(1)(2)</sup> , 6.2.3 <sup>(1)</sup> , 6.2.4 <sup>(2)</sup> , 6.2.5 <sup>(2)</sup> , 6.2.6 <sup>(1)</sup> , 6.2.7 <sup>(1)</sup> , 6.2.8 <sup>(2)</sup> , 6.2.9 <sup>(1)(2)</sup> , 6.2.10 <sup>(1)</sup> , 6.2.11 <sup>(1)</sup> , 6.2.12 <sup>(2)</sup> and 6.2.13 <sup>(1)(2)</sup> . See sections 6.2 and 6.3 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 product can contribute to a construction meeting a higher level of sustainability as defined in this Standards, with reference to clauses 7.1.4 <sup>(1)(2)</sup> [Aspect 1 <sup>(1)(2)</sup> and 2 <sup>(1)</sup> ], 7.1.6 <sup>(1)(2)</sup> [Aspect 1 <sup>(1)(2)</sup> and 2 <sup>(1)</sup> ] and 7.1.7 <sup>(1)(2)</sup> [Aspect 1 <sup>(1)(2)</sup> ]. See section 6.2 of this Certificate.
<b>Regulation:</b> 12	<b>Building standards applicable to conversions</b>
Comment:	All comments given for the system under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to 0.12.1 <sup>(1)(2)</sup> and Schedule 6 <sup>(1)(2)</sup> . (1) Technical Handbook (Domestic). (2) Technical Handbook (Non-Domestic).



## The Building Regulations (Northern Ireland) 2012

<b>Regulation:</b> 23	<b>Fitness of materials and workmanship</b>
Comment:	The system is acceptable. See section 13.1 and the <i>Installation</i> part of this Certificate.

Regulation:	28(b)	Resistance to moisture and weather
Comment:		Wall insulated with the system will satisfy this Regulation. See sections 4.4 and 10.1 of this Certificate.
Regulation:	29	Condensation
Comment:		Wall insulated with the system will satisfy this Regulation. See sections 11.2 and 11.4 of this Certificate.
Regulation:	30	Stability
Comment:		The system can sustain and transmit wind loads to the substrate wall. See section 7.4 of this Certificate.
Regulation:	36(a)	External fire spread
Comment:		The system can satisfy this Regulation. See sections 8.1 to 8.4 of this Certificate.
Regulation:	39(a)(i)	Conservation measures
Regulation:	40	Target carbon dioxide emission rate
Comment:		The system will contribute to a building satisfying its target emission rate. See sections 6.2 and 6.3 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 and 3.4) of this Certificate.

## Additional Information

### NHBC Standards 2014

NHBC accepts the use of the Terraco EIFS Alpha External Wall Insulation System (Mechanically Fixed), provided it is installed, used and maintained in accordance with this Certificate, in relation to NHBC Standards, Part 6 *Superstructure (excluding roofs)*, Chapter 6.9 *Curtain walling and cladding*.

## Technical Specification

### 1 Description

1.1 The Terraco EIFS Alpha External Wall Insulation System (Mechanically Fixed) (see Figure 1) comprises, from inside to outside:

#### Supplementary Adhesive

- Styrofix — a factory-batched, cement-based resin, supplied as a powder to which clean water is added at a rate of 4:1 by weight, and mixed with a high-speed mixer for 3 to 5 minutes. The render coverage is from 4 to 5 kg·m<sup>-2</sup>.

#### Insulation

- Terraco white expanded polystyrene (EPS) insulation boards and Terraco grey expanded polystyrene (EPS) boards — 1200 mm by 600 mm, in a range of thicknesses between 60 mm and 300 mm, with a minimum compressive strength of 70 kN·m<sup>-2</sup>, a nominal tensile strength perpendicular to the face of 100 kPa and a nominal density of 15 kg·m<sup>-3</sup> and 17 to 20 kg·m<sup>-3</sup> respectively.
- Epsitherm 70E and 90E enhanced expanded polystyrene (EPS) insulation boards — 1200 mm by 600 mm, in a range of thicknesses between 40 mm and 240 mm. The boards are manufactured to comply with the requirements for EPS 70, Class E material to BS EN 13163 : 2012 and have a minimum compressive strength of 70 kN·m<sup>-2</sup> and 90 kN·m<sup>-2</sup> respectively.

#### Mechanical fixings

- mechanical fixings<sup>(1)</sup> — anchors with adequate length to suit the substrate and the insulation thickness and selected from:
  - Bravoll PTH-KZ 60/8-La, Bravoll PTH-KZL 60/8-La, Bravoll PTH-S copolymer polypropylene, galvanized steel pins
  - Ejotharm NT U, Ejotharm NTK U — polyethylene, PE-HD with steel or electro-galvanized pins
  - Ejotharm NTR U, Ejotharm NTR K — polyethylene, PE-HD with steel or electro-galvanized pins
  - Koelner K18M, Koelner TFix 8M; Koelner Fix 8S/8ST — polypropylene, polyamide PA 3.0, galvanized steel pins
  - Termoz KS 8, Termoz 8 SV, Termoz CN; Termoz 8U/8UZ — polypropylene, polyamide GF reinforced.

(1) Other fixings may be used, provided they can be demonstrated to have equal or higher pull out, plate diameter and plate stiffness characteristics.

#### Basecoat

- Styrobond DP — a factory-batched, lime/cement resin-based mortar, supplied as a powder to which clean water is added at a rate of 4:1, by weight. Applied to the board face to an approximate total thickness of 6 mm to 8 mm, with a coverage of 5 to 8 kg·m<sup>-2</sup>.

#### Reinforcement

- Terraco EIFS mesh — alkali and slide resistant glassfibre mesh, with a mass per unit area of approximately 160g·m<sup>-2</sup> and a mesh size of approximately 4.0 mm by 4.0 mm.

## Primer/key coat

- Terraco P Primer — pigmented acrylic resin for use with Terracoat and Terralite, at a coverage of approximately 0.25 l·m<sup>2</sup>
- Silprime — acrylic-siloxane primer for use with Terracoat Sil Excel and Terracoat Sil Granule, at a coverage of approximately 0.15 to 0.2 l·m<sup>2</sup>.

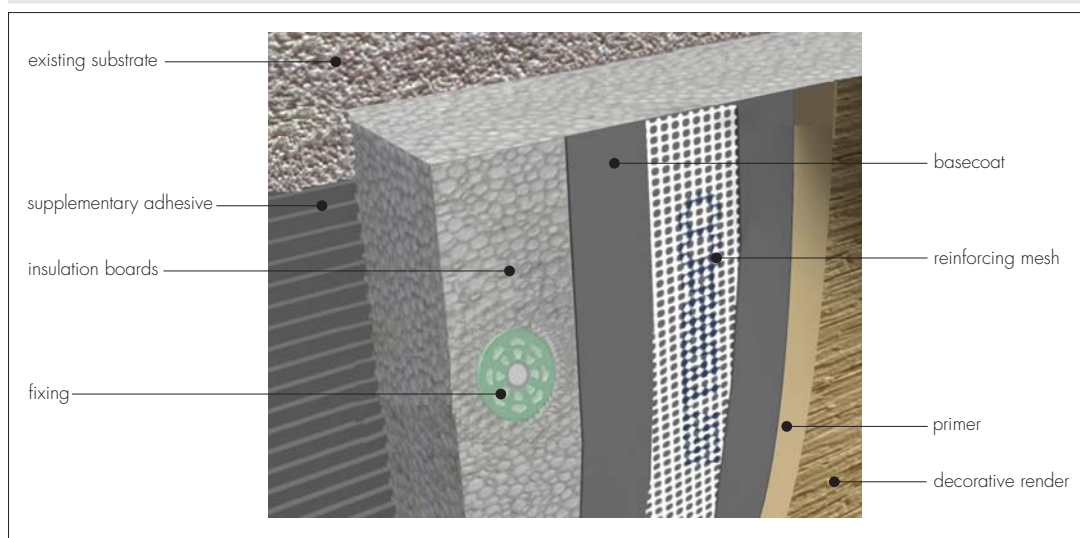
## Finishes

- Terracoat Excel and Terracoat Granule — factory-batched, acrylic finishing coats, supplied as a ready to use paste, applied to the primer basecoat to an approximate total thickness of 1.5 mm to 2.5 mm. Available in particle sizes 2 mm and 3 mm (Terracoat Excel) and 1 mm and 2 mm (Terracoat Granule)
- Terracoat Sil Excel and Terracoat Sil Granule — factory-batched, silicone finishing coats, ready to use paste, applied to the basecoat to an approximate total thickness of 1.5 mm to 2.5 mm. Available in particle sizes 2 mm and 3 mm (Terracoat Sil Excel) and 1 mm and 2 mm (Terracoat Sil Granule)
- Terralite — a factory-batched, ready-to-use acrylic finishing coat. Applied to the basecoat to an approximate total thickness of 2 mm to 3 mm
- Terol Granule and Terol Decor — factory-batched, mineral finishing coats, consisting of cement resin based powder requiring the addition of approximately 20% water, and applied to the basecoat to an approximate total thickness of 2 mm to 3 mm. Available in particle sizes 1 mm and 2 mm (Terol Granule), and 2 mm and 3 mm (Terol Decor)
- Terracoat Stain — a factory-batched, optional colour coat for top coating Terol Granule and Terol Decor.

1.2 Ancillary materials also used with the system but outside of 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.

Figure 1 Alpha External Insulating Finishing System Mechanical System — components



1.3 The insulation boards are fixed to the external surface of the wall using mechanical fixings with supplementary Styrofix adhesive. The insulation boards are protected by a basecoat containing a glassfibre reinforcement mesh. After allowing the basecoat to dry, primer and topcoat is applied to the required thickness. When all the boards have been secured to the wall, the basecoat is trowel-applied to the insulation boards to a minimum thickness of 4 mm to 6 mm. A further layer of basecoat render is applied over the embedded reinforcing mesh to a total thickness of approximately 6 mm to 8 mm. When dry, the surface is primed for the application of the selected render finish coat.

## 2 Manufacture

2.1 Components are manufactured by the Certificate holder or bought-in from suppliers, to an agreed specification.

2.2 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.

2.3 The management system of the Terraco production facility (Eskisehir, 26110, Turkey) has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 (Certificate 52286) by UDEM.

### 3 Delivery and site handling

3.1 The insulation boards are delivered in sealed packs. Each package carries the product identification, manufacturer's batch number and the BBA logo incorporating the number of this Certificate.

3.2 The components are delivered to site in the packaging and quantities listed in Table 1.

*Table 1 Component supply details*

Component	Quantity and package
Styrofix — adhesive	25 kg bag
Insulation boards	shrink-wrapped in polythene
Mechanical fixings	boxed by manufacturer
Styrobond DP — basecoat render	25 kg bag
Terraco EIFS mesh	1 m x 50 m rolls
Terraco P Primer, Silprime — primers	20 l plastic pail
Terracoat Excel, Sil Excel, Terracoat Granule, Terracoat Sil Granule, Terralite — finishes	25 kg plastic pail
Terol Decor, Terol Granule — finishes	25 kg bag
Terracoat Stain — finish	20 kg plastic pail

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

3.4 The insulation should be protected from prolonged exposure to sunlight and contact with solvent and bitumen. The boards must not be exposed to open flame or other ignition sources.

3.5 The powder adhesive, basecoat and topcoat must be stored in dry conditions, off the ground, and protected from moisture and frost. Contaminated materials should be discarded.

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

3.7 Bagged aggregate should be stored in a dry location.

## Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on the Terraco EIFS Alpha External Wall Insulation System (Mechanically Fixed).


### Design Considerations

#### 4 General

4.1 Terraco EIFS Alpha External Wall Insulation System (Mechanically Fixed), when installed in accordance with this Certificate, is effective in reducing the thermal transmittance (U value) of external masonry 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 system. Only details specified by the Certificate holder should be used.

4.2 The system will improve the weather resistance of a wall and provide a decorative finish. However, it 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 system is 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 up to 18 metres in height. Prior to installation of the system, the wall should comply with section 14 of this Certificate.

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

- 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 8000-3 : 2001.

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 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 External plumbing should also be removed before installation and alterations made to underground drainage, where appropriate, to accommodate repositioning of the plumbing to the finished face of the system.

4.9 It is essential that the insulation system is installed and maintained in accordance with the conditions set out in this Certificate.

## 5 Practicability of installation

The system should only be installed by specialised contractors who have successfully undergone training and registration by the Certificate holder (see section 1.5).

Note: The BBA operates a UKAS Accredited Approved Installer Scheme for external wall insulation; details of approved installer companies are included on the BBA's website ([www.bbacerts.co.uk](http://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 443 : 2006, using the thermal conductivity ( $\lambda_D$  value) of the insulations, given in Table 2.

Table 2 Thermal conductivity value

Insulation	Insulation grade	$\lambda_D$ value ( $W \cdot m^{-1} \cdot K^{-1}$ )
Terraco white EPS	EPS 70	0.038
Epsitherm 70E	EPS 70	0.032
Epsitherm 90E	EPS 90	0.030
Terraco white EPS	EPS 200	0.034
Terraco grey EPS	EPS 70	0.031

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 the thermal conductivities given in Table 2.

Table 3 Insulation thickness required to achieve design U values<sup>(1)(2)</sup> given in the national Building Regulations

	Thickness of Insulation (mm) <sup>(3)</sup>									
	215 mm brickwork, $\lambda = 0.56 W \cdot m^{-1} \cdot K^{-1}$					200 mm dense blockwork, $\lambda = 1.75 W \cdot m^{-1} \cdot K^{-1}$				
	White EPS 70	Epsitherm 70	Epsitherm 90	White EPS 200	Grey EPS 70	White EPS 70	Epsitherm 70	Epsitherm 90	White EPS 200	Grey EPS 70
0.19	210	180	170	190	170	220	190	180	200	180
0.25	150	130	120	140	120	160	140	130	140	130
0.26	140	120	120	130	110	150	130	120	140	130
0.28	130	110	110	120	100	150	120	110	130	120
0.30	120	100	100	110	90	130	110	100	120	110
0.35	100	90	80	90	80	110	90	90	100	90

(1) Wall construction inclusive of 13 mm plaster ( $\lambda = 0.57 W \cdot m^{-1} \cdot K^{-1}$ ), 5 mm render ( $\lambda = 1.0 W \cdot m^{-1} \cdot K^{-1}$ ), brickwork (protected) with 17.1% mortar or blockwork (protected) with 6.7% mortar ( $\lambda = 0.88 W \cdot m^{-1} \cdot K^{-1}$ ).

(2) Calculation based on a bonded system that included seven steel fixings, with 8 mm diameter and ( $X_p = 0.004 W \cdot K^{-1}$ ) per m<sup>2</sup>. Use of other types of fixings should be calculated in accordance with BS EN ISO 6946 : 2007.

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

6.3 The system can maintain, or contribute to maintaining, continuity of thermal insulation at junctions between external walls and junctions. Details shown in section 1.6 will allow use of the default  $\psi$ -values (Psi) for Accredited Construction Details in Emission Rate calculations to SAP 2009 or the Simplified Building Energy Model (SBEM). Guidance on limiting heat loss at junctions 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

### General

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

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

7.3 Negative wind pressure is resisted by the bond between each component. The insulation boards are retained by the external wall insulation system 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 system.

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

- the substrate wall has adequate strength to resist the additional loads that may be applied as a result of installing the system, ignoring any positive contribution that may occur from the system itself
- the proposed system and associated fixing layout provides adequate resistance to negative wind loads, based on the results of site investigation and test results
- 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.

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 system to the substrate wall at the minimum spacing given in this Certificate.

7.7 Typical characteristic pull-out strengths for the fixings taken from the corresponding 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.

Fixing type	ETA number	Substrates	Drill diameter (mm)	Embedment depth (mm)	Typical pull-out strength <sup>(1)</sup> (N)
Bravoll PTH-KZ 60/8-La	05/0055			25	0.9/0.9
Bravoll PTH-KZL 60/8-La	05/0055	Concrete/brick	8	55	0.9/0.9
Bravoll PTH-S	08/0267			45	1.5/1.5
Ejotherm NT U, NTK U	05/0009				
Ejotherm NTR U, NTR K	04/0023	Concrete/brick	8	25	1.2/1.5
Koelner K18M					
Koelner TFix 8M	06/0191	Concrete/brick	8	40	1.2/1.2
Koelner Fix 8S/8ST					
Termoz KS 8	04/0114			30	1.5/1.5
Termoz 8 SV	06/0180			30	1.5/1.5
Termoz CN	09/0394	Concrete/brick	8	35	0.9/0.9
Termoz 8U	02/0019			70	1.5/1.5
Termoz 8UZ	02/0019			30	1.2/1.5

7.8 The resistance forces data given in Table 5 are the results of calculations based upon pull-through resistances determined by the BBA from tests on anchors with 60 mm and 90 mm diameter plates.

Table 5 Design pull-through resistances

Factor	Insulation	
	Graphite enhanced/white EPS	
Thickness (mm)	≥60	≥90
Tensile resistance of insulation (kPa)	≥100	≥100
Plate diameter of anchor (mm)	60	90
Characteristic pull-through resistance <sup>(1)</sup> per anchor (N)	387	384
Factor of safety	2.5	2.5
Design pull-through resistance <sup>(2)</sup> (N)	155	192

(1) Pull-through resistance of insulation over the head of the fixing.

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

## Impact resistance

7.9 Hard body impact tests were carried out in accordance with ETAG 004 : 2013. The system can be classed as having Use Categories I to III<sup>(1)</sup>, as follows:


Table 6 Use Categories

Base coat	Finishing Coat	Terraco EIFS Alpha/Alpha Graphite			
		Reinforcement	Category <sup>(1)</sup>		
			Render Thickness <6 mm	Render Thickness >6 mm	
Styrobond DP	Acrylic	Terracoat Granule	Terraco EIFS Mesh	II	I
		Terracoat Excel	Terraco EIFS Mesh	II	I
		Terralite		II	I
Styrobond DP	Silicone	Terracoat Sil Granule	Terraco EIFS Mesh	II	I
		Terracoat Sil Excel	Terraco EIFS Mesh	II	I
Styrobond DP	Mineral	Terol Granule	Terraco EIFS Mesh	N/A	II
		Terol Decor	Terraco EIFS Mesh	N/A	II

(1) Use categories are defined in ETAG 004 : 2013 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.


## 8 Behaviour in relation to fire

 8.1 The reaction to fire classification is class B-s2, d0 in accordance with BS EN 13501-1 : 2007.

 8.2 The fire classification applies to the full range of thicknesses covered by this Certificate.

8.3 The system is restricted for use in buildings up to 18 metres in height.

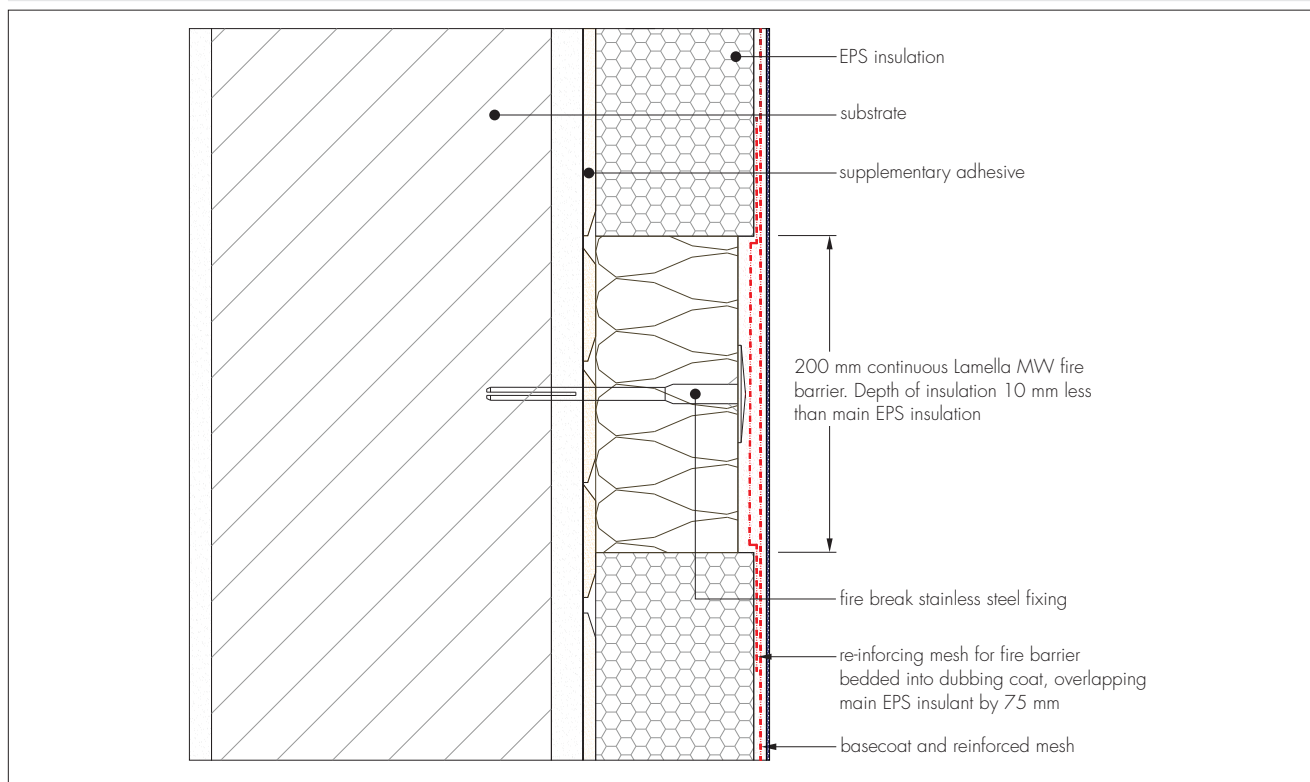
8.4 For houses in Scotland, and for all buildings in England and Wales and Northern Ireland, the system is suitable for use on, or at any distance from, the boundary.

 8.5 For flats and maisonettes and non-domestic buildings in Scotland, the system is suitable only for use more than one metre from the boundary.

8.6 The system is not classified as 'non-combustible', therefore calculations for unprotected areas may apply dependent on the fire resistance characteristics of the wall.

8.7 For application to second storey walls and above, it is recommended that the designer considers at least one stainless steel fixing per square metre and fire barriers in line with compartment walls and floors as advised in BRE Report BR 135 : 2013 (see Figure 2).

Figure 2 Fire barrier details



## 9 Proximity of flues and appliances

Where a system is 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<sup>(1)(2)</sup>

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

**Northern Ireland** — Technical Booklet L.

## 10 Water resistance



10.1 The system will provide a degree of protection against rain ingress. However, care should be taken to ensure that walls are adequately watertight 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.

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 Guidance given in BRE Report 262 : 2002 should be followed in connection with the watertightness of solid wall constructions. 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.

10.4 At the tops of walls, the system should be protected by an adequate overhang or other detail designed for use with this type of system (see section 16).

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

### Surface condensation



11.2 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 6.3 of this Certificate.



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 BRE Report 262 : 2002.

## Interstitial condensation



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

11.5 The equivalent air layer thickness ( $S_d$ ) and water vapour resistance ( $\mu$ ) factors for the insulation boards and finishes are as given in Table 7.

Table 7 Equivalent air layer thickness ( $S_d$ ) and water vapour resistance ( $\mu$ ) factors

	$(S_d)$	$(\mu)$
Expanded polystyrene 70 and 90 (white/grey)	—	60 <sup>(1)</sup>
Expanded polystyrene 200 (white)	—	60 <sup>(1)</sup>
Terraco Styrobond DP + Terracoat Excel + Primer Terraco Styrobond DP + Terracoat Granule + Primer	0.3	—
Terraco Styrobond DP + Terracoat Sil Excel + Primer Terraco Styrobond DP + Terracoat Sil Granule + Primer	0.2	—

(1) The water vapour resistance factor ( $\mu$ ) is taken from BS EN ISO 10456 : 2007, Table 4.

## 12 Maintenance and repair



12.1 Regular checks should be made on the installed system, including:

- 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 the sealant joints at window and door frames replaced at regular intervals
- maintenance schedules, which should include the replacement and resealing of joints, for example between the insulation systems and window and door frame.

12.2 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 : 2005.

## 13 Durability



13.1 The system will remain effective for at least 30 years, provided any damage to the surface finish is repaired immediately and regular maintenance is undertaken, as described in section 12 of this Certificate.

13.2 Any render containing Portland 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 is less noticeable on lighter colours.

13.3 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.

13.4 To maintain a high quality aesthetic appearance, it may be necessary to periodically overcoat the building using a suitable masonry coating (ie one covered by a valid BBA Certificate for this purpose).. Care should 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.

## Installation

### 14 Site survey and preliminary work

14.1 A pre-installation survey of the property must be carried out to determine suitability for treatment and any repairs necessary to the building structure 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
- the position of fire barriers.

14.2 The survey should include tests conducted on the walls of the building by the Certificate holder or their approved installers 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 and pull-out resistance (see section 7).

14.3 All necessary repairs to the building structure must be completed before installation of the system commences.

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

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

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

Application of the system, within the context of this Certificate, must be carried out by installers approved by the Certificate holder. A Certificate holder approved installer is a company:

- employing operatives who have been trained and approved by the Certificate holder to install the system and has operatives who, upon completion of their training, have been issued with an appropriate identification card by the Certificate holder
- 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.

## 16 Procedure

### General

16.1 Installation of the system must be carried out in accordance with the Certificate holder's current installation instructions.

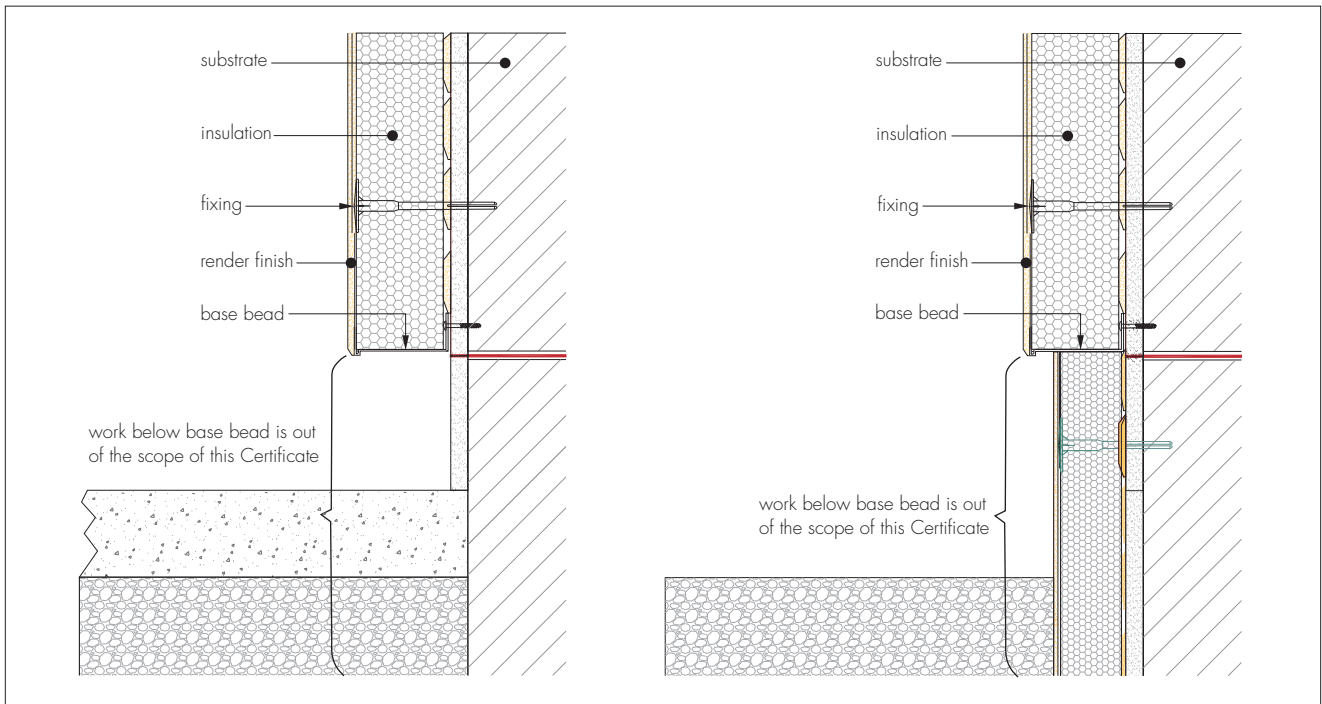
16.2 Weather conditions should be monitored to ensure correct application and curing conditions. Application of coating materials must not be carried out at temperatures below 5°C or above 30°C, nor if exposure to frost is likely, and the coating must be protected from rapid drying. Installation should not take place during rainfall or if rain is anticipated. In addition, cementitious based renders must not be applied if the temperature will fall below 0°C within 48 hours of completion.

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

### Positioning and securing insulation boards

16.4 The base profile is secured to the external wall above the dpc using the approved profile fixings at approximately 300 mm centres (see Figure 3). Base rail connectors are inserted at all rail joints. Extension profiles are fixed to the front lip of the base rail or stop end channel where appropriate.

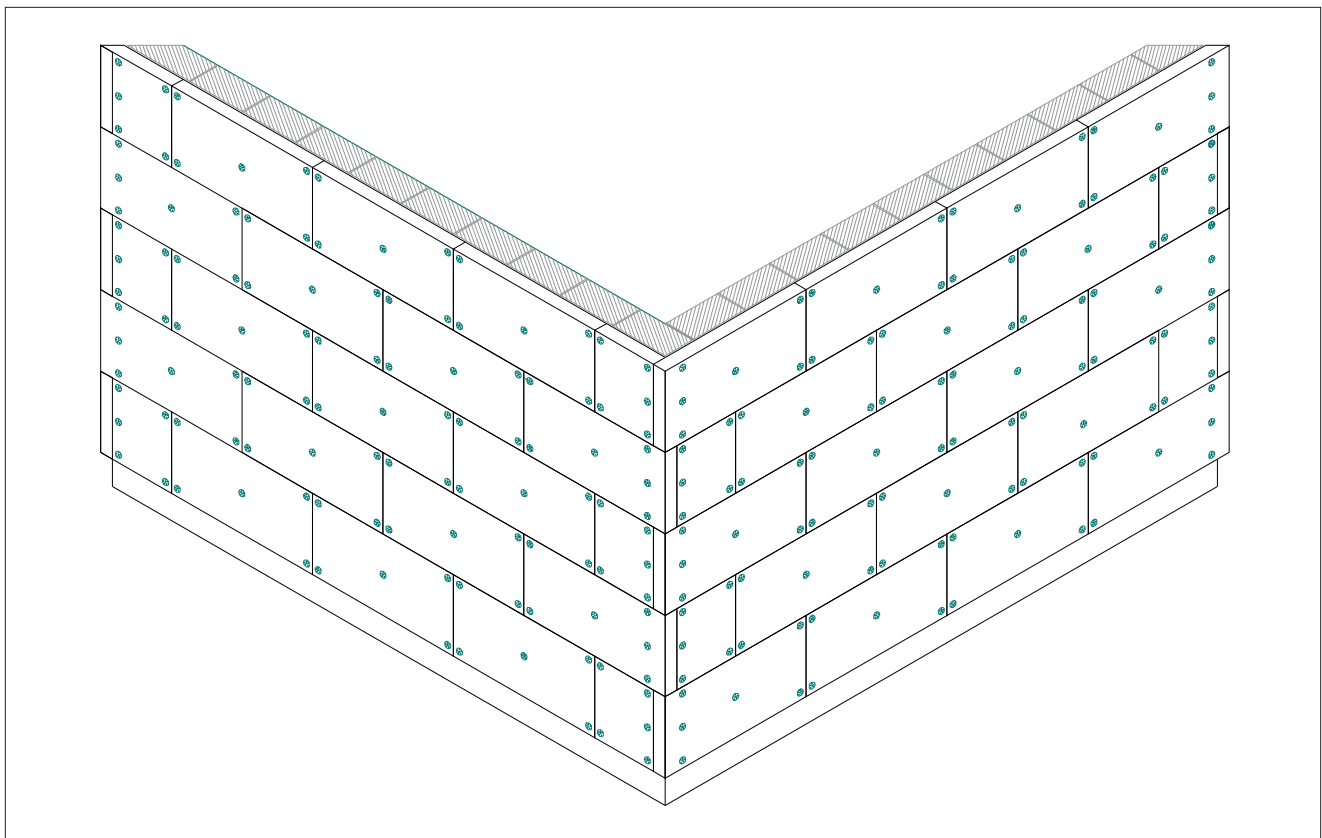
Figure 3 Typical Section of base profile



16.5 Where supplementary adhesive is used, the adhesive is prepared by mixing approximately four parts of Styrofix to one part water by weight, mixing with a slow speed mixer for three to five minutes until homogeneous. The adhesive is applied in a continuous line around the perimeter of the board with six additional dabs of adhesive distributed uniformly over the remaining surface — at least 40% of the board should be covered. Alternatively, the adhesive can be applied over the entire face of the insulation board using a notched trowel.

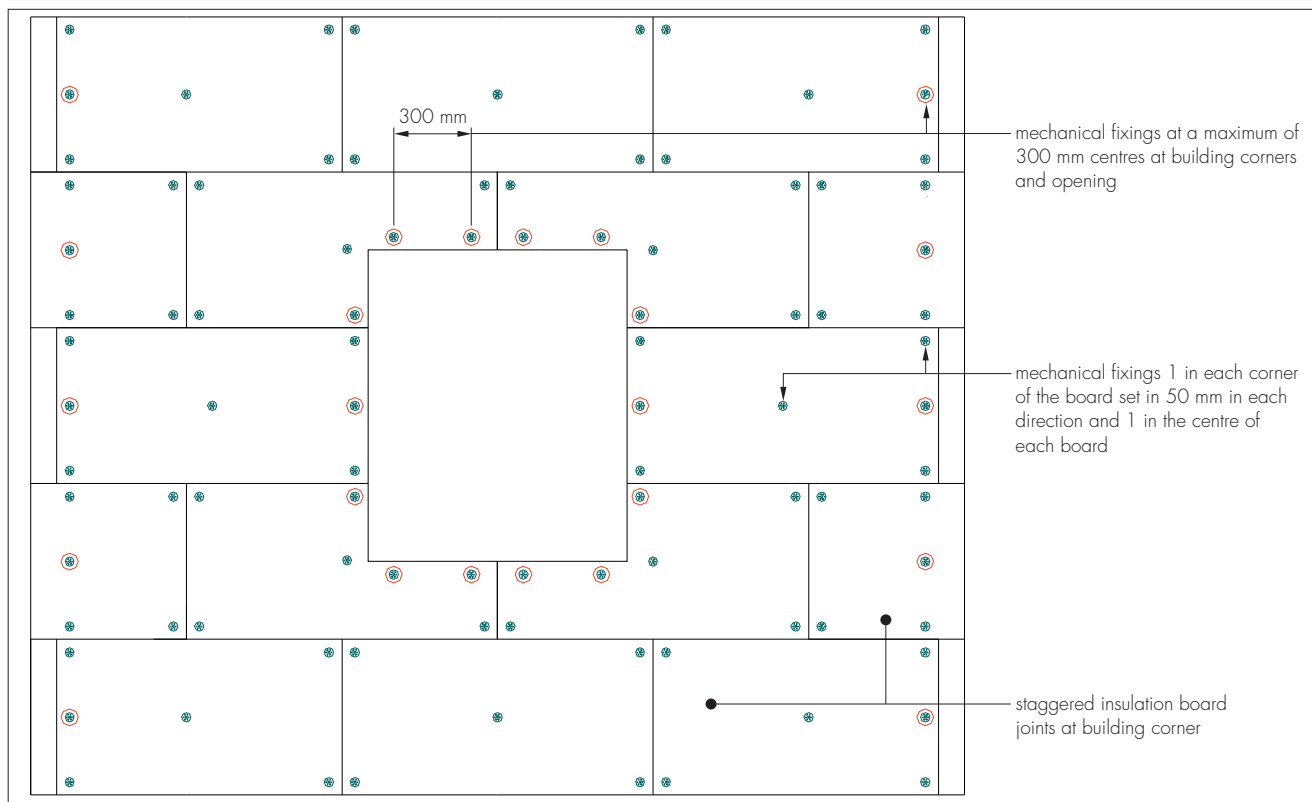
16.6 The boards must be pressed firmly against the wall and butted tightly together with the vertical joints staggered by at least 200 mm (see Figure 4). Joints between boards greater than 2 mm should be filled with slivers of insulation board. Gaps greater than 10 mm should be closed by repositioning or, where appropriate, by cutting boards to fit. Any gaps, high spots or irregularities are removed by lightly planing with a rasp over the whole surface. Alignment should be checked as work proceeds.

Figure 4 Typical arrangement of insulation boards



16.7 The first run of insulation boards is positioned on the base profile. Holes are drilled into the substrate to the required depth through the insulation at the corners of each board and at positions which allow a minimum of eight fixings per square metre at edge zones and at positions which will allow a minimum of five fixings per insulation board (eight fixings per square metre) in the main area of the wall (see Figure 5). 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 the vertical board joints are staggered and overlapped at the building corners and the board joints do not occur within 200 mm of the corners of openings.

Figure 5 Insulation slab fixing pattern



16.8 To fit around details such as doors and windows, the 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 system.

16.9 Installation continues until the whole wall is completely covered including, where appropriate, the building soffits and eaves.

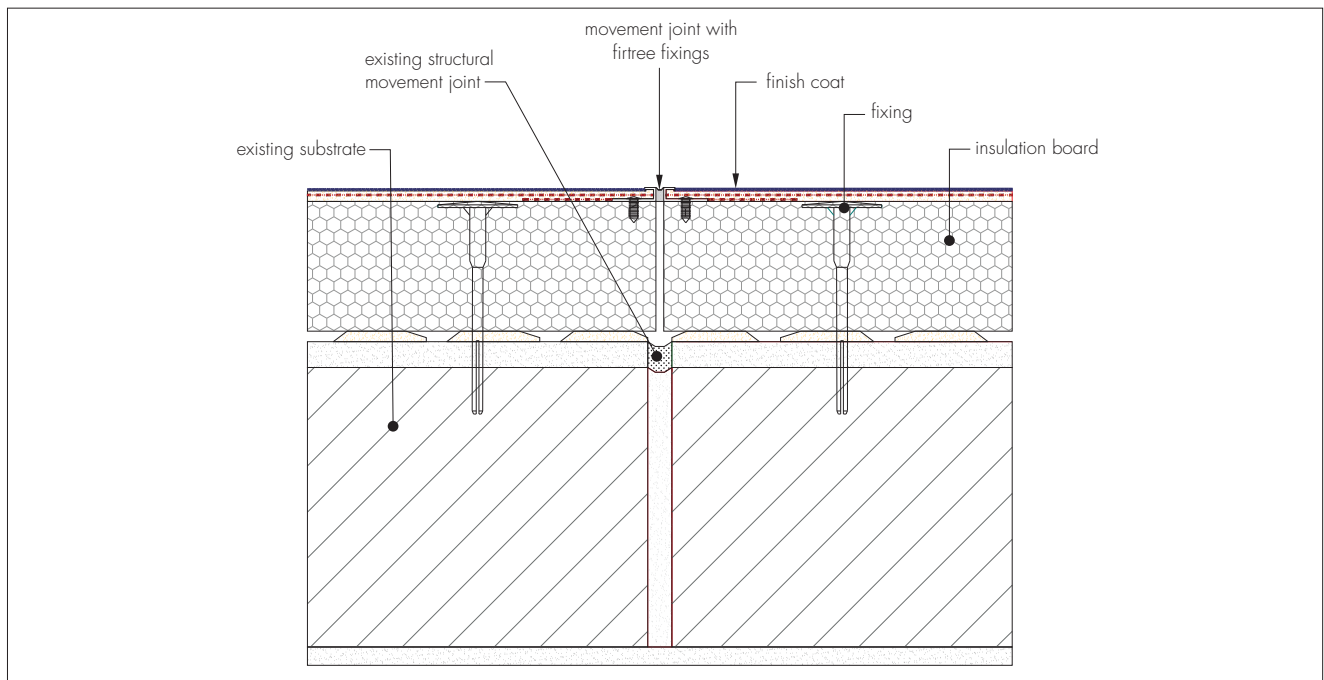
16.10 After the render coat is applied, the relevant seals are positioned and installed at all openings (eg windows and doors), overhanging eaves, gas and electric meter boxes, wall vents or where the render abuts any other building material or surface. This helps to reduce the risk of water ingress into the structure.

16.11 Corner beads are fixed to all building corners and to door and window heads and jambs using the basecoat renders (see Figure 10).

### Movement joints

16.12 Generally, movement joints are not required in the system but, if an expansion joint is already incorporated in the substrate, a movement joint must be provided in the insulation system (see Figure 6).

Figure 6 Vertical movement joint



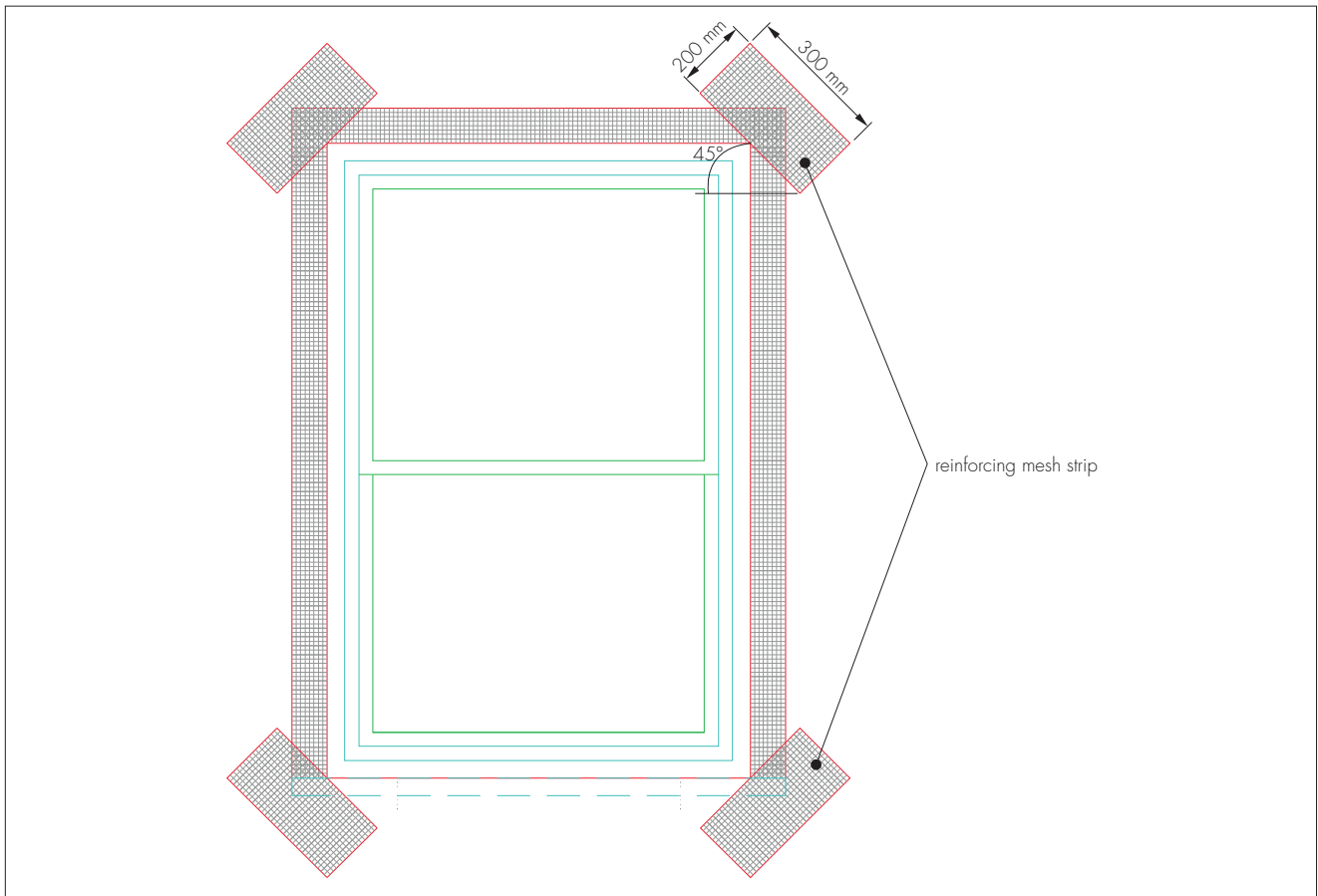
### Reinforcing

16.13 The basecoat is applied to the surface of the rasped insulation board, to a uniform thickness (4 mm to 6 mm thickness). The reinforcing mesh is immediately embedded into the base coat by trowelling from the centre to the edge, with 100 mm overlaps at joints.

16.14 The remaining one third of thickness of basecoat is then applied as required to ensure the mesh is completely covered and the required minimum thickness of 6 mm to 8 mm basecoat is achieved. The surface is smoothed with a trowel, working from the centre toward the edges, until the bare mesh is fully covered and not visible.

16.15 Overlapping at all mesh joints should not be less than 100 mm.

16.16 Additional pieces of reinforcing mesh (200 mm by 300 mm) should be used diagonally at the corners of openings as shown in Figure 7.



16.17 The mesh should be free of wrinkles and fully embedded in the basecoat.

16.18 Once the basecoat is set, a second light coat of the basecoat mixture is trowelled over the first, to fully cover the reinforcing mesh. The reinforcing mesh is also wrapped around the wall corners over the corner mesh or corner bead, and fixed in position by coating the faces and edges with the adhesive/basecoat.

#### Primer

16.19 The primer coat is roller-applied when the basecoat has dried (a minimum of 24 hours), first making sure it is free from any irregularities (trowel-marks, exposed mesh, etc).

#### Finishing

16.20 Finishes are applied directly over the primed basecoat to an approximate render thickness of between 1.0 mm and 3.0 mm.

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

Table 8 Thickness of render finishes

Finish coat	Thickness range (mm)
Terracoat Excel Terracoat Sil Excel	1.5 to 2.5
Terracoat Granule Terracoat Sil Granule Terralite Terol Granule Terol Decor	2 to 3

16.22 Continuous surfaces should be completed without a break.

16.23 At the tops of walls, the system should be protected by an adequate overhang (see Figure 8) or by an adequately sealed purpose-made flashing. Care should be taken in the detailing of the system around openings and projections (see Figures 9, 10 and 11).

Figure 8 Roof eaves detail

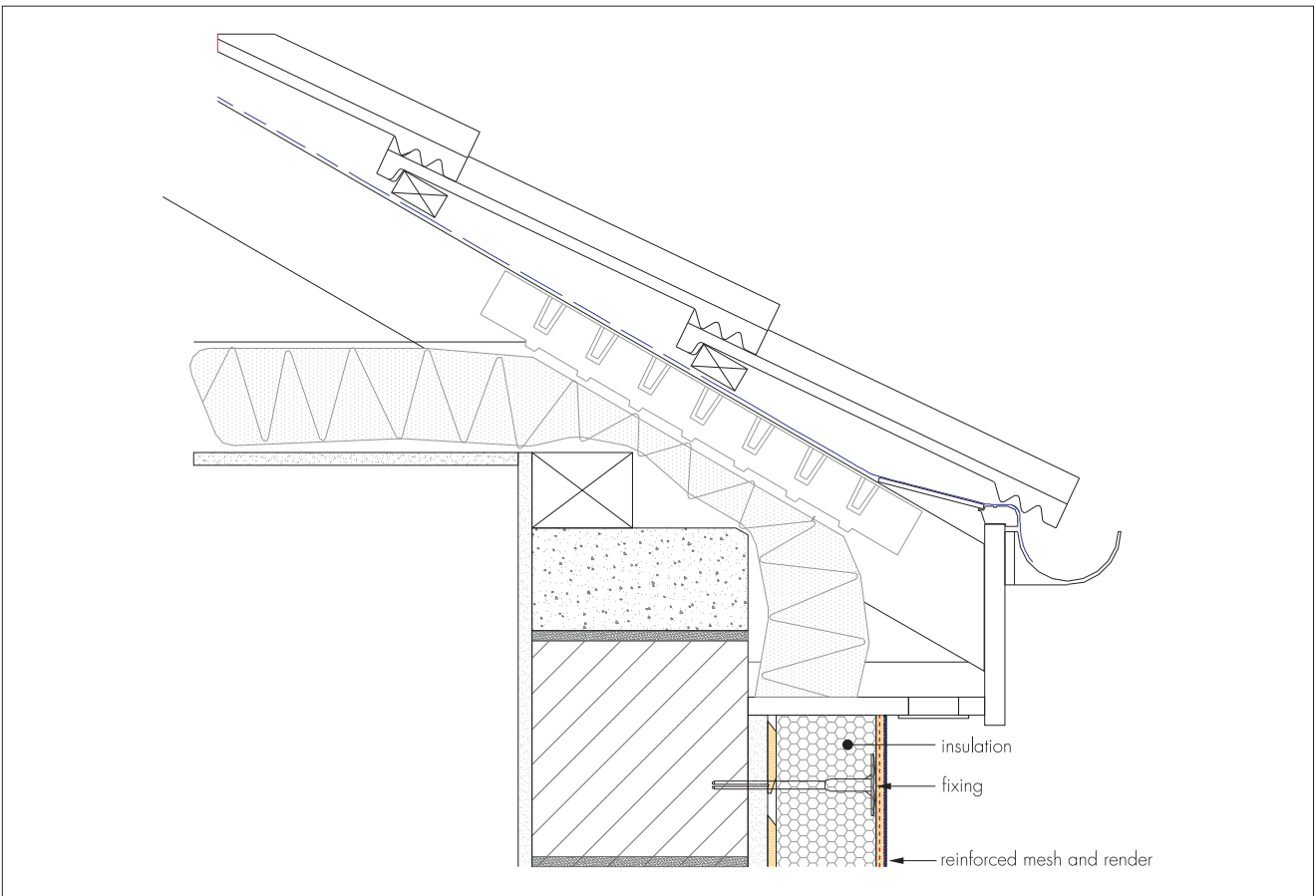


Figure 9 Insulated window detail

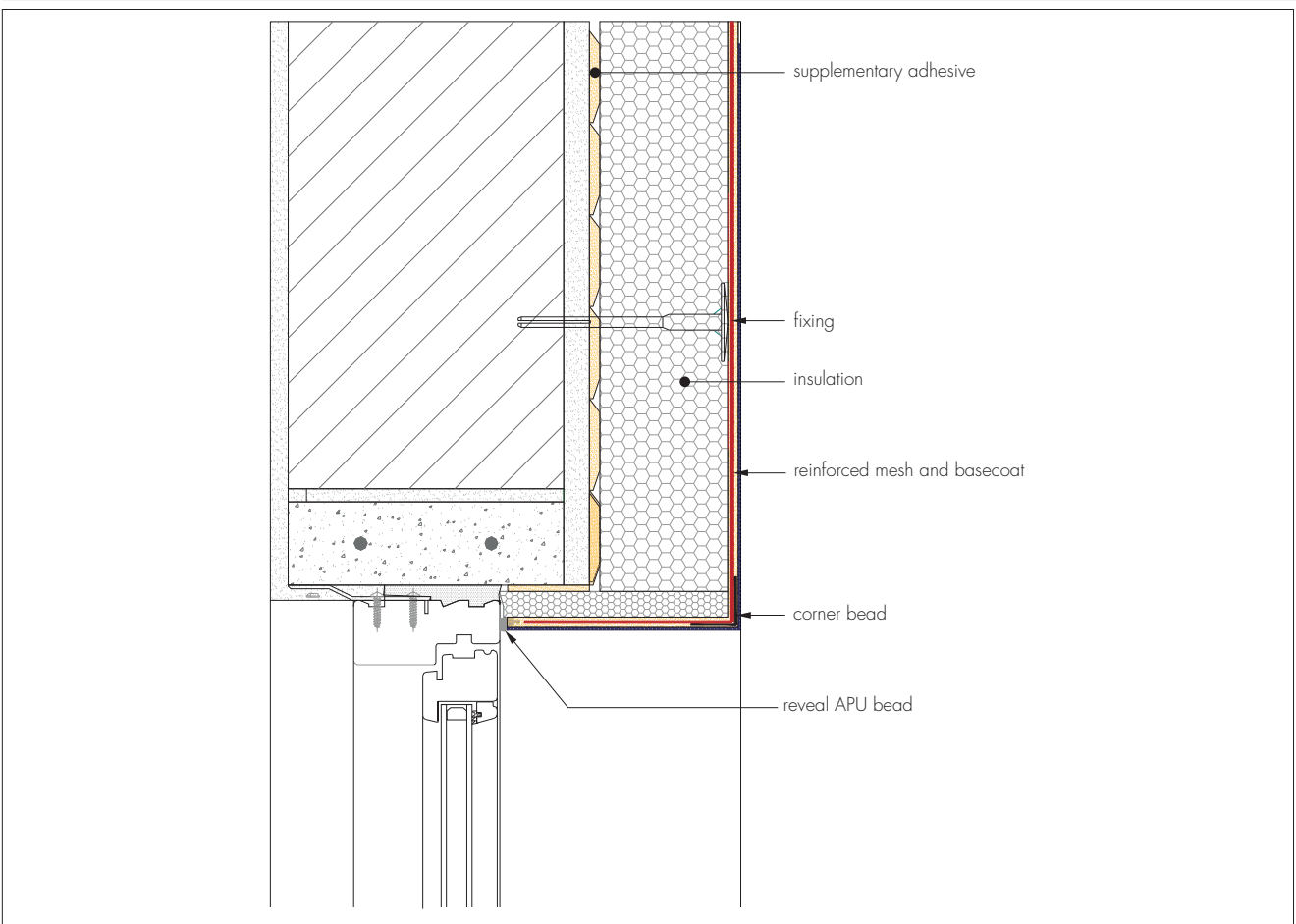


Figure 10 External corner detail

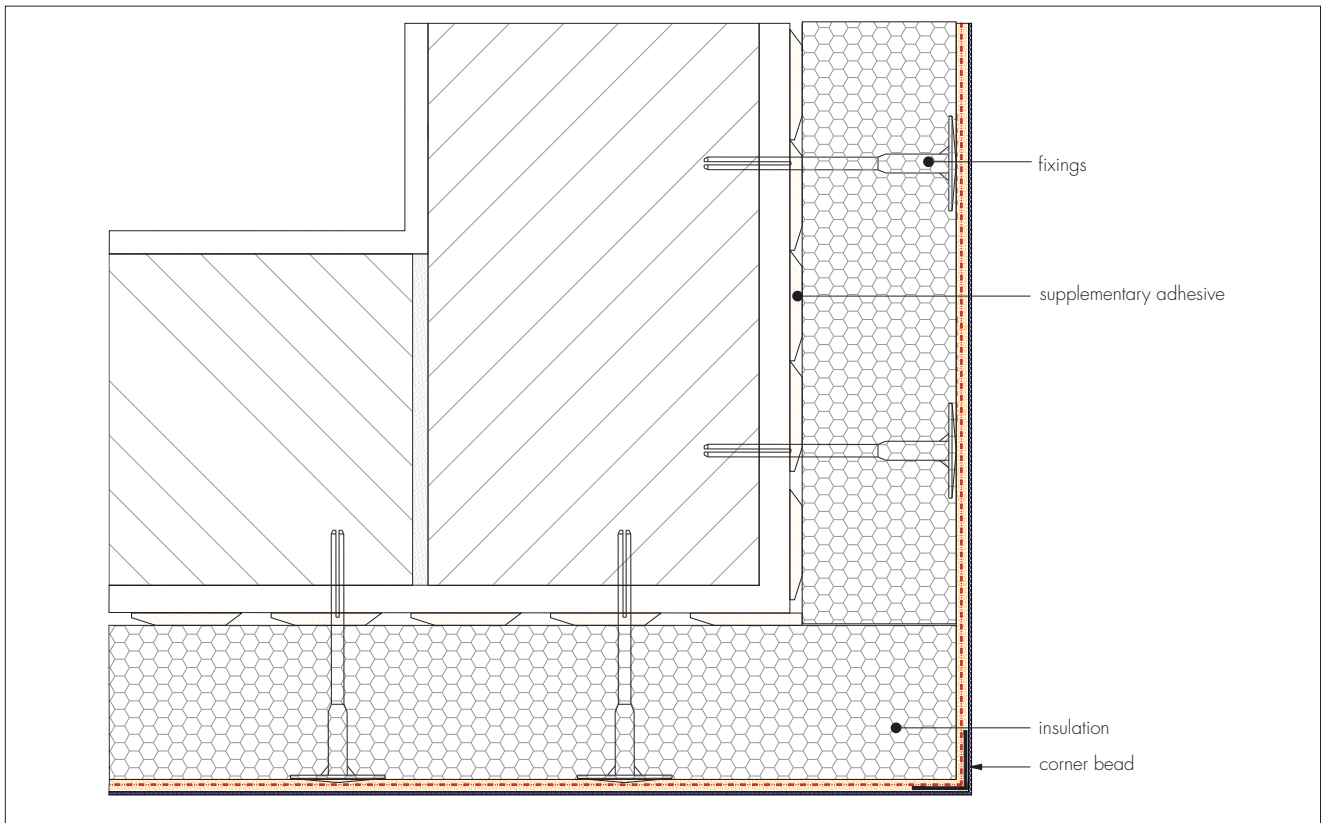
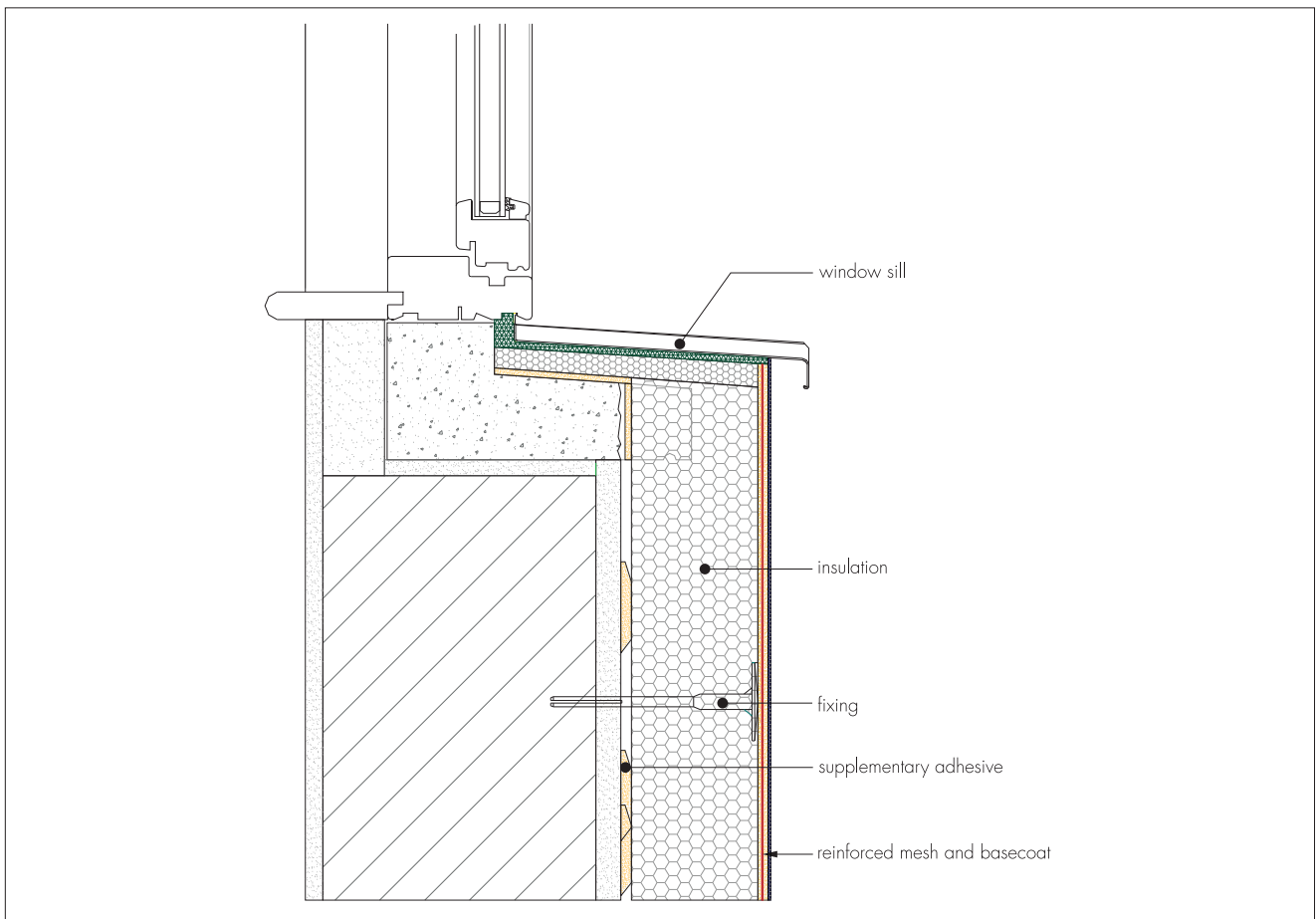


Figure 11 Window sill detail



16.24 On completion of the installation, external fittings, are refixed to the substrate.

## 17 Investigations

17.1 Tests were carried out on the system 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 performance
- bond strength
- hygrothermal performance
- resistance to frost
- resistance to impact
- water vapour permeability.

17.2 An examination was made of data relating to:

- reaction to fire tests to BS EN 13823 : 2010 and BS EN ISO 11925-2 : 2010
- Euroclassification in accordance with BS EN 13501-1 : 2007
- adequacy of fixing system
- the risk of interstitial condensation.

## Bibliography

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

BS EN 13501-1 : 2007 *Fire classification of construction products and building elements — Classification using test data from reaction to fire tests*

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 10456 : 2007 *Building materials and product — Hygrothermal properties — Tabulated design values and procedures for determining declared and design thermal values*

ETAG 004 : 2013 *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*

BRE Report 135 (BR 135 : 2013) *Fire performance of external thermal insulation for walls of multistorey buildings*

BRE Report 262 (BR 262 : 2002) *Thermal insulation: avoiding risks*

BRE Report 443 (BR 443 : 2006) *Conventions for U-value calculations*

## 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.