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BBA APPROVAL INSPECTION TESTING CERTIFICATION
TECHNICAL APPROVALS FOR CONSTRUCTION

Agrément Certificate
14/5142
Product Sheet 2

HENKEL CERESIT CERETHERM EXTERNAL WALL INSULATION SYSTEMS

CERESIT CERETHERM CLASSIC MW EXTERNAL WALL INSULATION SYSTEM

This Agrément Certificate Product Sheet(1) relates to the Ceresit Ceretherm Classic MW External Wall Insulation System, comprising mineral wool fibre (MW) insulation slabs, mechanically-fixed with supplementary adhesive, with 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. The impact resistance is dependent on the finish chosen (see section 7).

Behaviour in relation to fire — the system has, depending on its configuration, an A2-s1,d0, B-s1,d0 or 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 (see section 13).

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: 23 February 2015

B C Chamberlain
Brian Chamberlain
Head of Approvals — Engineering

Claire
Claire Curtis-Thomas
Chief Executive

Certificate amended on 18 May 2018 to reflect changes in section 7.

Regulations

In the opinion of the BBA, Ceresit Ceretherm Classic MW External Wall Insulation System, 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)

Requirement:	**A1**	**Loading**
Comment:		The system can sustain and transmit wind loads to the substrate wall. See sections 7.1 to 7.12 of this Certificate.
Requirement:	**B4(1)**	**External fire spread**
Comment:		The system can satisfy this Requirement. See sections 8.1 to 8.4 of this Certificate.
Requirement:	**C2(b)**	**Resistance to moisture**
Comment:		The system provides a degree of protection against rain ingress. See section 10.1 of this Certificate.
Requirement:	**C2(c)**	**Resistance to moisture**
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.
Requirement:	**L1(a)(i)**	**Conservation of fuel and power**
Comment:		The system can contribute to satisfying this Requirement. See sections 6.2 and 6.3 of this Certificate.
Regulation:	**7**	**Materials and workmanship**
Comment:		The system is acceptable. See section 13.1 and the *Installation* part of this Certificate.
Regulation:	**26**	**CO_2 emission rate for new buildings**
Regulation:	**26A**	**Fabric energy efficiency rates for new dwellings (applicable to England only)**
Regulation:	**26A**	**Primary energy consumption rates for buildings (applicable to Wales only)**
Regulation:	**26B**	**Fabric performance values for new dwellings (applicable to Wales only)**
Comment:		The system can contribute to satisfying this Regulation. See sections 6.2 and 6.3 of this Certificate.

The Building (Scotland) Regulations 2004 (as amended)

Regulation:	**8(1)(2)**	**Durability, workmanship and fitness of materials**
Comment:		The system can contribute to the construction satisfying this Regulation. See sections 12 and 13.1 and the *Installation* part of this Certificate.
Regulation:	**9**	**Building standards applicable to construction**
Standard:	1.1	Structure
Comment:		The system can sustain and transmit wind loads to the substrate wall. See sections 7.1 to 7.12 of this Certificate.
Standard:	2.6	Spread to neighbouring buildings
Comment:		The system can satisfy this Standard, with reference to clauses 2.6.4[1][2], 2.6.5[1] and 2.6.6[2]. See sections 8.1 to 8.4 of this Certificate.
Standard:	2.7	Spread on external walls
Comment:		The system can satisfy this Standard, and is acceptable for use less than one metre from a boundary, with reference to clauses 2.7.1[1][2] and 2.7.2[1][2] and Annex 2A[1]. See sections 8.1 to 8.4 of this Certificate.
Standard:	3.10	Precipitation
Comment:		The system can contribute to a construction satisfying this Standard, with reference to clauses 3.10.1[1][2] and 3.10.2[1][2]. See section 10.1 of this Certificate.
Standard:	3.15	Condensation
Comment:		The system can satisfy the requirements of this Standard, with reference to clauses 3.15.1[1][2], 3.15.4[1][2] and 3.15.5[1][2]. 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 part of) 6.1.1[1][2], 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], 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:		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 these Standards, with reference to clauses 7.1.4[1][2] [Aspect 1[1][2] and 2[1]], 7.1.6[1][2] [Aspect 1[1][2] and 2[1]] and 7.1.7[1][2] [Aspect 1[1][2]]. See section 6.2 of this Certificate.
Regulation:	**12**	**Building standards applicable to conversions**
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[1][2] and Schedule 6[1][2].

(1) Technical Handbook (Domestic).
(2) Technical Handbook (Non-Domestic).

Regulation:	23	Fitness of materials and workmanship
Comment:		The system is acceptable. See section 13.1 and the *Installation* part of this Certificate.
Regulation:	28(b)	Resistance to moisture and weather
Comment:		Walls insulated with the system will satisfy this Regulation. See section10.1 of this Certificate.
Regulation:	29	Condensation
Comment:		Walls insulated with the system will satisfy this Regulation. See section 11.4 of this Certificate.
Regulation:	30	Stability
Comment:		The system can sustain and transmit wind loads to the substrate wall. See sections 7.1 to 7.12 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
Comment:		The system can contribute to satisfying this Regulation. See sections 6.2 and 6.3 of this Certificate.
Regulation:	40	Target carbon dioxide emission rate
Comment:		The systems can contribute to satisfying these Regulations. 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 Ceresit Ceretherm Classic MW External Wall Insulation System, 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 Ceresit Ceretherm Classic MW External Wall Insulation System comprises mineral wool insulation slabs, glass-fibre-mesh-reinforced basecoat, key coat and render finishes (see Figure 1). The insulation slabs are fixed to the external surface of the wall using mechanical fixings, and where necessary supplementary adhesive (ensuring a minimum of 40% coverage of adhesive is achieved after the slabs have been pressed against the wall). When all insulation slabs have been fixed to the wall, basecoat is applied to their surface to a uniform thickness, with the reinforcing mesh embedded immediately, and the surface smoothed with a trowel. A further layer of basecoat is used, in order to achieve the required overall thickness. When the basecoat is dry, primer is applied before the surface is ready for the application of the selected finishes.

1.2 The system is made up of the following components:

Adhesive

- Ceresit CT 180 — a cement-based powder requiring the addition of 0.19 to 0.21 litres of clean water per kg
- Ceresit CT 190 — adhesive and reinforcing mortar, a cement-based powder requiring the addition of 0.26 to 0.28 litres of clean water per kg.

Insulation

- MW Dual Density 036 — dual density mineral wool slabs, 1200 mm by 600 mm in thicknesses from 50 mm to 250 mm, with nominal densities of 160/100 kg·m^{-3} (outer/inner layer), a minimum compressive strength of 10 kPa and a tensile resistance perpendicular to the faces of 10 kPa. Slabs are manufactured to comply with BS EN 13162 : 2012.

Mechanical fixings

Mechanical fixings[1] — anchors with adequate length to suit the substrate and insulation thickness and selected from:

- Koelner KI-10N — polypropylene anchor sleeve with carbon steel or electro-galvanized with head-coated polyamide pins
- Koelner TFIX-8M — polypropylene anchor sleeve with electro-galvanized or glassfibre-reinforced polyamide pins
- Koelner TFIX-8S — polypropylene anchor sleeve with electro-galvanized or glassfibre-reinforced polyamide pins
- Koelner TFIX-8ST — polypropylene anchor sleeve with electro-galvanized or glassfibre-reinforced polyamide pins
- Klimas WKTHERMϕ8 — polyethylene anchor sleeve with carbon steel galvanised pin (polyamide-coated head)
- Klimas WKTHERMϕS8 — polyethylene anchor sleeve with carbon steel galvanised pin (polyamide-coated head)

- Klimas Eco-drive W — polyamide anchor sleeve with carbon steel pin (nylon-coated head)
- EJOT STR U 2G — polyethylene anchor sleeve with electro-galvanized or stainless steel pins
- EJOT H1 eco — polyethylene anchor sleeve with polyamide mounting plug and electro-galvanized steel pins

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

Basecoat

- Ceresit CT 190 — adhesive and reinforcing mortar, a cement-based powder requiring the addition of 0.26 to 0.28 litres of clean water per kg. Applied to a thickness of between 3 mm and 4 mm.

Reinforcement

- Ceresit CT 325 — depending on the supplier, either a 1.0 m or 1.1 m wide standard mesh (various grid sizes and mass per unit area) of multi-strength glassfibre with a polymer coating, and selected from:

Name	Mesh size	Mass per unit area
Vertex AKE 145 A/ R 117 A 101	3.5 mm by 4.5 mm	147 $g \cdot m^{-2}$
ST 2924-100/7 KM	3.9 mm by 4.0 mm	158 $g \cdot m^{-2}$
OMFA 117-S	4.5 mm by 3.0 mm	145 $g \cdot m^{-2}$
OMFA 122	3.5 mm by 3.5 mm	160 $g \cdot m^{-2}$
SSA-5433 SM	4.0 mm by 4.0 mm	165 $g \cdot m^{-2}$
SKLOTEX A2-101 (145)	5.0 mm by 5.0 mm	145 $g \cdot m^{-2}$

Primer

- Ceresit CT 15 — ready-to-use primer, to be used with silicate finishing coats
- Ceresit CT 16 — ready-to-use primer, to be used with mineral, acrylic, silicone and silicate-silicone finishing coats.

Finishing coats

Mineral finishing coats:

- Ceresit CT 35 — cement-based powder, requiring the addition of 0.2 litres to 0.22 litres of water per kg. Available in 2.5 mm and 3.5 mm particle sizes, with the applied thickness being regulated by particle size
- Ceresit CT 136 — polymer-modified cement-based dash receiver requiring the addition of 0.21 litres to 0.23 litres of water per kg. Applied to a thickness of 6 mm to 8 mm and used with a spar dash finish
- Ceresit CT 137 — cement-based powder, requiring the addition of 0.22 litres to 0.23 litres of water per kg for maximum particle sizes of 1.5 mm, and 0.17 litres to 0.19 litres of water per kg for maximum particle size of 2.5 mm. The applied thickness is regulated by particle size
- Ceresit CT 720 — cement-based powder, requiring the addition of 0.21 litres of water per kg. Available in maximum particle size 1 mm, with the applied thickness being regulated by this size.

Acrylic finishing coats:

- Ceresit CT 60 — ready-to-use paste, grained structure with maximum particle size of 1 mm, 1.5 mm, 2 mm or 2.5 mm. The applied thickness is regulated by particle size
- Ceresit CT 79 — ready-to-use elastometric plaster, stone texture with particle size of 1.5 mm, with the applied thickness regulated by particle size
- Ceresit CT 77 — ready-to-use plaster with particle size between 0.8 mm to 2.0 mm, with the applied thickness regulated by particle size
- Ceresit CT 177 — ready-to-use mosaic structure plaster with particle size between 1 mm to 1.6 mm, with the applied thickness regulated by particle size.

Silicate finishing coats:

- Ceresit CT 72 — ready-to-use paste, grained structure with maximum particle size of 1 mm, 1.5 mm, 2 mm or 2.5 mm, with the applied thickness regulated by particle size
- Ceresit CT 73 — ready-to-use paste, ribbed structure with maximum particle size of 2 mm or 3 mm, with the applied thickness regulated by particle size

Silicone finishing coats:

- Ceresit CT 74 — ready-to-use paste, grained structure with maximum particle size of 1 mm, 1.5 mm, 2 mm or 2.5 mm, with the applied thickness regulated by particle size
- Ceresit CT 75 — ready-to-use paste, ribbed structure with maximum particle size of 2 mm or 3 mm, with the applied thickness regulated by particle size.

Silicate-silicone finishing coats:

- Ceresit CT 174 — ready-to-use paste, grained structure with maximum particle size of 1.5 mm or 2 mm, with the applied thickness regulated by particle size
- Ceresit CT 175 — ready-to-use paste, ribbed structure with maximum particle size of 2 mm, with the applied thickness regulated by particle size.

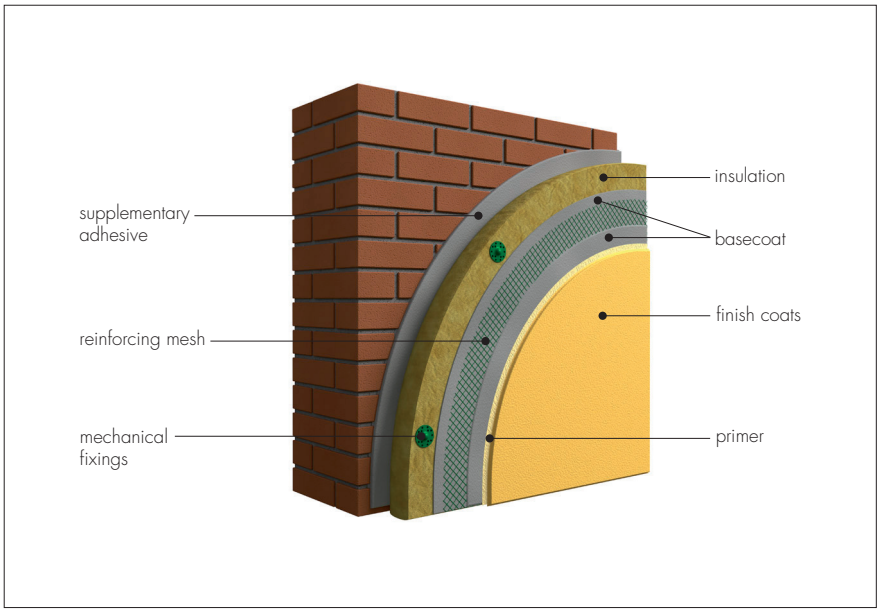
Decorative coats

- Spar dash aggregate — available in range of sizes and colours
- Ceresit CT 48 — ready-to-use silicone coating (optional), which can be used with all mineral, acrylic, silicate, silicone and silicate-silicone based finishing coats. Available in various colours within the Ceresit Colours of Nature product range
- Ceresit CT 49 — ready-to-use nano-silicone coating (optional), which can be used with all mineral, acrylic, silicate, silicone and silicate-silicone based finishing coats. Available in various colours within the Ceresit Colours of Nature product range
- Ceresit CT 54 — ready-to-use silicate coating (optional), which can be used with all mineral, silicate, and silicate-silicone based finishing coats. Available in various colours within the Ceresit Colours of Nature product range
- Ceresit CT 721 — ready-to-use 'wood' colour-impregnate (optional), which can be used with all mineral, acrylic and silicone based finishing coats. Available in various colours within the Ceresit Visage product range.

1.3 Ancillary materials also used with the system but outside the scope of this Certificate:

- Range of aluminium, PVC-U or stainless steel profiles, comprising:
  - base profile
  - edge profile
  - corner profile with optional PVC-U nosing
  - render stop profile
  - movement joint
  - expansion joint
- profile connectors and fixings
- fungicidal wash
- sealants — silicone in accordance with BS EN ISO 11600 : 2003
- expansion foam — fire-rated polyurethane foam used for filling gaps between insulation slabs.

Figure 1 Ceresit Ceretherm Classic MW External Wall Insulation



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 Henkel Polska Spolka z.o.o. has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 by PCA (Certificate 335/A/2007 AQAP 2110 : 2006).

3 Delivery and site handling

3.1 The insulation slabs are delivered in sealed packs, with the product identification and manufacturer's batch numbers.

3.2 The other components are delivered in the quantities and packaging listed in Table 1. Each package carries the product identification and manufacturer's batch number.

Table 1 Component supply details

Components	Quantity and package
Ceresit CT 180 adhesive	25 kg bag
Ceresit CT 190 adhesive	25 kg bag
Mineral Wool DD insulation boards	Wrapped in polythene
Mechanical fixings	Boxed by manufacturer
Ceresit CT 190 basecoat	25 kg bag
Ceresit CT 325 reinforcement mesh	Roll, 1.0 m or 1.1 m wide by 50 m length
Ceresit CT 15 primer	10 litre plastic bucket
Ceresit CT 16 primer	5 and 10 litre plastic bucket
Ceresit CT 35 finishing coat (mineral)	25 kg bag
Ceresit CT 136 dash receiver (mineral)	25 kg bag
Ceresit CT 137 finishing coat (mineral)	25 kg bag
Ceresit CT 720 finishing coat (mineral)	25 kg bag
Ceresit CT 60 finishing coat (acrylic)	25 kg plastic container
Ceresit CT 79 finishing coat (acrylic)	25 kg plastic container
Ceresit CT 77 finishing coat (acrylic)	25 kg plastic container
Ceresit CT 177 finishing coat (acrylic)	25 kg plastic container
Ceresit CT 72 finishing coat (silicate)	25 kg plastic container
Ceresit CT 73 finishing coat (silicate)	25 kg plastic container
Ceresit CT 74 finishing coat (silicone)	25 kg plastic container
Ceresit CT 75 finishing coat (silicone)	25 kg plastic container
Ceresit CT 174 finishing coat (silicate-silicone)	25 kg plastic container
Ceresit CT 175 finishing coat (silicate-silicone)	25 kg plastic container
Ceresit CT 48 decorative coats (silicone paint)	3.5 & 15 litre plastic container
Ceresit CT 49 decorative coats (nano-silicone paint)	15 litre plastic container
Ceresit CT 54 decorative coats (silicate paint)	3.5 & 15 litre plastic container
Ceresit CT 721 decorative coats (paint)	4 litre plastic container
Spar dash aggregate	25 kg bag

3.3 The slabs 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 to avoid damage.

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

3.5 The powder and paste components must be stored in a safe area, in dry conditions, off the ground and protected from excessive heat, moisture and frost. Contaminated materials should be discarded.

3.6 The primers 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 Ceresit Ceretherm Classic MW External Wall Insulation System.

Design Considerations

4 General

4.1 The Ceresit Ceretherm Classic MW External Wall Insulation System, when installed in accordance with this Certificate, is satisfactory for use in reducing the thermal transmittance (U value) of external masonry or concrete 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 treatment with the system (eg the insulation must be protected by an overhang, and window sills should be designed and installed so as to direct water away from the building).

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

4.3 The system is for application to the outside of external walls of masonry, normal weight concrete, lightweight concrete, autoclaved concrete and no-fines concrete construction, on new or existing domestic and non-domestic

buildings (with or without existing render). Prior to the installation of the system, 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 EN 1992-1-1 : 2004 and its UK National Annex
- BS EN 1996-1-1 : 2005 and its UK National Annex
- BS EN 1996-2 : 2006 and its UK National Annex
- BS 8000-2.2 : 1990
- BS 8000-0 : 2014
- BS 8000-3 : 2001.

4.5 New walls not subject to regulatory requirements should also be built in accordance with the Standards identified in section 4.4 of this Certificate.

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

4.7 The system will improve the weather resistance of a wall and provide a decorative finish. However, for existing buildings, 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.

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

4.9 The fixing of sanitary pipework, plumbing, rainwater goods, satellite dishes, clothes lines, hanging baskets and similar items to the system is outside the scope of this Certificate. See section 4.10 of this Certificate.

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

4.11 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.

4.12 It is essential that this 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 14).

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/).

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 declared thermal conductivity value (λ_D) 0.036 $W \cdot m^{-1} \cdot K^{-1}$.

6.2 The U value of a completed wall will depend on the selected insulation thickness, the type and number of fixings, and 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 2 of this Certificate.

Table 2 Insulation thickness required to achieve design U values[1][2][3]

U value[4] ($W \cdot m^{-2} \cdot K^{-1}$)	Insulation thickness[3] (mm)	
	215 mm brickwork $\lambda = 0.56\ W \cdot m^{-1} \cdot K^{-1}$	200 mm dense blockwork $\lambda = 1.75\ W \cdot m^{-1} \cdot K^{-1}$
0.18	210	220
0.19	200	210
0.25	140	150
0.26	140	140
0.28	120	130
0.30	110	120
0.35	90	100

(1) Wall construction inclusive of 13 mm plaster ($\lambda = 0.57\ W \cdot m^{-1} \cdot K^{-1}$), brickwork (protected) with 17.1% mortar or dense blockwork with 6.7% mortar ($\lambda = 0.88\ W \cdot m^{-1} \cdot K^{-1}$). Declared thermal conductivity of insulation (λ_D) is as shown in section 6.1. A 5 mm thick layer of adhesive with $\lambda = 1.0\ W \cdot m^{-1} \cdot K^{-1}$ covering 40% of the insulation surface, together with an external render thickness of 3.8 mm with $\lambda = 1.0\ W \cdot m^{-1} \cdot K^{-1}$ is also included.

(2) Calculations based on a system that included 7 galvanized steel fixings per m^2, with a point thermal transmittance (χ_p) of 0.004 $W \cdot K^{-1}$ per steel pin. Use of other types of fixings should be calculated in accordance with BS EN ISO 6946 : 2007.

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

(4) When applying the maximum available insulation thickness, these walls can achieve U values of 0.16 $W \cdot m^{-2} \cdot K^{-1}$.

6.3 The system can maintain, or contribute to maintaining, continuity of thermal insulation at junctions between walls and other elements. Details shown in section 16 will allow use of the default ψ-values (Psi) for Accredited Construction Details in Emission Rate calculations to SAP 2009 or the Simplified Building Energy Model (SBEM). Detailed guidance can be found in the documents supporting the national Building Regulations.

7 Strength and stability

General

7.1 The Certificate holder is ultimately responsible for the design of the system and it is the responsibility of the company installing the system to accurately follow the installation instructions (see also section 5 of this Certificate). The Certificate holder must also verify that a suitably experienced and qualified individual (with adequate professional indemnity) establishes that:

- the wind loads on the different zones of the building's elevation for the specific geographical location have been calculated correctly (see section 7.3)
- the system can adequately resist and safely transfer the calculated loads, accounting for all possible failure modes, to the substrate wall and supporting structure (see sections 7.3 to 7.6).

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

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

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

7.5 Positive wind load is transferred to the substrate wall directly via compression through the render and insulation system.

7.6 Negative wind load is transferred to the substrate wall via[1][2]:

- the bond between the insulation and render system (see section 7.7)
- the pull-out resistance of the fixing from the substrate wall (see section 7.8)
- the pull-through resistance of the fixing (see section 7.9).

(1) For mechanically fixed systems with supplementary adhesive, the contribution of the adhesive is not considered when calculating resistance to wind load.

(2) Further guidance is available from BBA Guidance Note 1, available on the BBA website (www.bbacerts.co.uk).

7.7 The characteristic bond resistance between the insulation and render interface derived from test results was 10 $kN \cdot m^{-2}$. The design resistance of the bond between the insulation and render (N_{RD1}) should be taken as the characteristic bond resistance divided by a partial factor of 9.

7.8 Typical characteristic pull-out resistances for the fixings taken from the corresponding European Technical Assessment (ETA) are given in Table 3; the values are dependent on the fixing type and must be selected to suit the specific loads and substrate concerned. In situations where suitable data does not exist[1], the characteristic pull-out resistance must be established from site-specific pull-out tests conducted on the substrate of the building to ascertain the minimum resistance to pull-out failure of the fixings, and determined in accordance with the guidance given in EOTA TR051 (minimum test characteristic value = 0.6 x mean of 5 lowest test results). To obtain the design pull-out resistance of the fixings (N_{RD2}), this characteristic pull-out resistance should then be divided by the partial factor given in Table 4.

(1) To qualify as suitable data, the age and condition of the substrate must be equivalent to that used to establish the values in the ETA.

Table 3 Fixings — typical characteristic pull-out strengths

Fixing type[1]	ETA number	Substrate	Drill diameter (mm)	Effective anchorage depth (mm)	Characteristic pull-out resistance (kN)[2]	Partial safety factor
Koelner KI-10N	07/0221	Clay brickwork	10	60	0.75	2
Koelner TFIX-8M	07/0336	Concrete (C12/15) Clay brickwork	8	25	1.2	2
Koelner TFIX-8S	11/0144	Concrete (C12/15) Clay brickwork	8	25(3) or 65[3]	1.2	2
Koelner TFIX-8ST	11/0144	Concrete (C12/15) Clay brickwork	8	25[3] or 65[3]	1.2	2
Klimas Wkret-Met	11/0232	Concrete (C12/15) Clay brickwork	8	≥ 25	1.2 1.5	2
WKTHERMϕ8	13/0724	Concrete (C12/15) Clay brickwork	8	25[3] or 65[3]	1.2 1.5	2
Klimas Wkret-Met	13/0107	Concrete (C12/15) Clay brickwork	8	35[3] or 55[3]	1.2 1.5	2
WKTHERMϕS8	04/0023	Concrete (C12/15) Clay brickwork	8	25[3] or 65[3]	1.5	2
Klimas Wkret-Met	11/0192	Concrete (C12/15) Clay brickwork	8	25	0.9	2

(1) The minimum values for plate stiffness of fixings is 0.5 kN·mm-2 and the load resistance is 1.23 kN.
(2) Values are determined in accordance with EAD 330196-00-0604 : 2016 and are dependent on the substrate. The Use Categories are defined in the corresponding ETA.
(3) Dependent on use categories A, B, C, D or E as defined in ETAG 014. Lower figure applies to categories A, B, C and D.

7.9 The characteristic pull-through resistance of the fixings was determined from tests using a 60 mm diameter fixing plate and minimum insulation thickness of 80 mm. The design resistance per fixing (N_{RD3}) is obtained by applying an appropriate partial factor as shown in Table 4.

Table 4 Design pull-through resistances

Factor (unit)[1]	Mineral wool Insulation 1200 mm x 600 mm	
	Pull through data	
Tensile resistance of the insulation (kPa)	≥ 10	
Fixing type[1]	Koelner KI-10N fixings	
Fixing plate diameter (mm)	≥ 60	
Insulation thickness (mm)	≥ 80	
Characteristic pull through resistance[2] per fixing kN	At panel	0.243
Partial factor[3]	2.5	
Design pull through resistance per fixing (N_{RD3}) kN	At panel	0.097
Design pull through resistance per slab kN (based on the minimum number of fixings)[4]	0.485	
Design pull through resistance per slab kN (based on maximum number of fixings)[5]	0.873	

(1) See Table 3 for typical characteristic pull-out resistance of the fixings.
(2) Characteristic pull-through resistance of insulation over the head of the fixing, in accordance with BS EN 1990 : 2002, Annex D7.2 and its UK National Annex.
(3) The partial factor is based on the assumption that all insulation slabs are quality controlled and tested to establish tensile strength perpendicular to the face of the slab.
(4) The minimum design pull through resistance per slab is based on a minimum of 5 fixings per slab (1200 mm x 600 mm), which equates to approximately 7 fixings per m^2. The design resistance for the minimum number of fixings is based on the fixing pattern provided in Figure 4 of this Certificate and minimum insulation thickness specified in Table 5. The fixing pattern and interaction of the fixings should be considered when calculating the design resistance per slab.
(5) The maximum design pull through resistance per slab is based on a maximum of 9 fixings per slab (1200 mm x 600 mm), which equates to approximately 13 fixings per m^2. The design resistance for the maximum number of fixings is only applicable to the minimum insulation thickness tested and as specified in Table 4. The fixing pattern, insulation thickness and interaction of the fixings should be considered when calculating the design resistance per slab.

7.10 The number and spacing of the fixings should be determined by the Certificate holder. The number of fixings must not be less than the minimum specified for the system and the fixings should be symmetrically positioned and evenly distributed about the centre of the board both vertically and horizontally, except at openings and building corners.

7.11 The data obtained from sections 7.7, 7.8 and 7.9 must be assessed against the design wind load and the following expression must be satisfied:

For safe design:

$Rd \geq W_e$

$Rd_{b.ins/rend} = Ar * NRD1$

$Rd_{pull\text{-}out} = n * NRD2$

$Rd_{pull\text{-}through} = (N_{RD3panel} * n_{panel}) + (NR_{D3joint} * n_{joint})/A_{board}$

Where:

R_d	is the design ultimate resistance ($kN \cdot m^{-2}$) taken as the minimum of $Rd_{b.ins/rend}$, $Rd_{pull\text{-}out}$ and $Rd_{pull\text{-}through}$
W_e	is the applied ultimate wind load ($kN \cdot m^{-2}$)
$Rd_{b.ins/rend}$	is the design bond resistance between the insulation and render ($kN \cdot m^{-2}$)
$Rd_{pull\text{-}out}$	is the design pull-out resistance of the insulation fixings per metre square ($kN \cdot m^{-2}$)
$Rd_{pull\text{-}through}$	is the design pull-through resistance of the insulation fixings per metre square ($kN \cdot m^{-2}$)
A_r	is the reinforced basecoat bond area (based on % area covered)
N_{RD1}	is the design adhesive bond resistance between the insulation and render, based on test ($kN \cdot m^{-2}$)
n	is the number of anchor fixings per m^2
N_{RD2}	is the design pull-out resistance per fixing based on test (kN)
$N_{RD3panel}$	is the design pull-through resistance per anchor not placed at the panel joint, based on test (kN)
$N_{RD3joint}$	is the design pull-through resistance per anchor placed at the panel joint, based on test (kN)
n_{panel}	is the number of internal anchors in a panel
nj_{oint}	is the number of joint anchors in a panel
A_{board}	is the area of the board (m^2)

7.12 The insulation system is mechanically fixed to the substrate wall with a minimum of 5 fixings per slab or approximately 7 fixings per square metre, as per the fixing patterns shown in Figure 4, and in conjunction with a minimum 40% coverage of supplementary adhesive (see section 16 of this Certificate). Additional fixings may be required, depending on the results of the calculations detailed above for the specific site.

Impact resistance

7.13 Hard body impact tests were carried out in accordance with ETAG 004 : 2013. The system is suitable for use in the Categories up to and including those specified in Table 5 of this Certificate.

Table 5 System impact resistance

Rendering system: Ceresit CT 190 basecoat, + finishing coats + decorative coat indicated below:	Category[1]
	Single-layer mesh
Ceresit CT 77 Ceresit CT 79 Ceresit CT 177	Category I
Ceresit CT 60, Ceresit CT 72, Ceresit CT 74 Ceresit CT 73, Ceresit CT 75, Ceresit CT 175 Ceresit CT 174	Category II
Ceresit CT 35 Ceresit CT 60, Ceresit CT 72, Ceresit CT 74 Ceresit CT 137 Ceresit CT 720 (with Ceresit CT 721)	Category III

(1) The 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.
- Category III — a zone not likely to be damaged by normal impacts caused by people or by thrown or kicked objects.

8 Behaviour in relation to fire

8.1 The reaction to fire classification for the system is as indicated in Table 6, in accordance with BS EN 13501-1 : 2007.

Table 6 System fire classifications

System configuration:	Classification
Adhesive: Ceresit CT 180 or CT 190 Insulation: Mineral wool slabs Basecoat: Ceresit CT 190 Primer: CT 15 (for CT 72 and CT 73), CT 16 (for CT 35, CT 136 and CT 137) Finishing coats: CT 35, CT 136, CT 137, CT 72, CT 73 Decorative coats: CT 48, CT 49, CT 54	A2-s1,d0
Adhesive: Ceresit CT 180 or CT 190 Insulation: Mineral wool slabs Basecoat: Ceresit CT 190 Primer: CT 16 Finishing coats: CT 74, CT 174, CT 60, CT 79, CT 720 Decorative coats: CT 48, CT 49, CT 54, CT 721	B-s1,d0
Adhesive: Ceresit CT 180 or CT 190 Insulation: Mineral wool slabs Basecoat: Ceresit CT 190 Primer: CT 16 Finishing coats: CT 75, CT 175, CT 77, CT 177 Decorative coats: CT 48, CT 49, CT 54, CT 721	B-s2,d0

8.2 The mineral wool insulation material in isolation is classified as non-combustible.

8.3 The fire classification applies to the full range of thicknesses covered by this Certificate (see section 1.2).

Systems with a A2-s1,d0 fire classification

8.4 The system is considered suitable for use on or at any distance from the boundary without height restriction.

Systems with an B-s1,d0 and B-s2,d0 fire classification

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

8.6 The system is considered to be used in buildings without any height restrictions.

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

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

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

8.10 For application to second storey walls and above, it is recommended that the designer considers at least one stainless steel fixing per square metre, as advised in BRE Report BR 135 : 2013.

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[1][2]

(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 water 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 is no sign 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 water ingress.

10.3 The 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 top 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 and windows, 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 $W \cdot m^{-2} \cdot K^{-1}$ 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 $W \cdot m^{-2} \cdot K^{-1}$ at any point. Guidance may be obtained from BS 5250 : 2011, section 4 and Annex G, 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 water vapour resistance (μ) factor (for the insulation slab) and equivalent air layer thickness (s_d) (for the render systems) is shown in Table 7.

Table 7 Water vapour resistance factor and equivalent air layer thickness

	Thickness (mm)	μ	s_d (m)
Mineral wool insulation (MW Dual Density 036)	50 to 250	1	—
Rendering system(1) : Ceresit CT 190 basecoat(2) plus, as appropriate, primer + finish coat (specific particle size) + decorative coat, as indicated below:			
Ceresit CT 35 (particle size 3.5 mm)	6.5 to 7.5	—	0.10
Ceresit CT 136 (excluding spar dash)	9 to 12	—	0.23
Ceresit CT 137 (particle size 2.5 mm)	5.5 to 6.5	—	0.10
Ceresit CT 60 (particle size 2.5 mm)	5.5 to 6.5	—	0.25
Ceresit CT 77 (particle size 1.4 mm to 2.0 mm)	4.9 to 5.5	—	0.29
Ceresit CT 79 (particle size 1.5 mm)	4.5 to 5.5	—	0.48
Ceresit CT 177 (particle size 1.0 mm to 1.6 mm)	4.0 to 5.6	—	0.33
Ceresit CT 720 (particle size 1.0 mm) + Ceresit CT 721	4.0 to 5.6	—	0.33
Ceresit CT 72 (particle size 2.5 mm)	5.5 to 6.5	—	0.13
Ceresit CT 73 (particle size 2.0 mm)	5.0 to 6.0	—	0.12
Ceresit CT 74 (particle size 2.5 mm)	5.5 to 6.5	—	0.20
Ceresit CT 74 (particle size 2.5 mm) + Ceresit CT 42	5.5 to 6.5	—	0.32
Ceresit CT 75 (particle size 2.0 mm)	5.0 to 6.0	—	0.21
Ceresit CT 174 (particle size 2.5 mm) + Ceresit CT 44	5.5 to 6.5	—	0.36
Ceresit CT 174 (particle size 2.5 mm) + Ceresit CT 48	5.5 to 6.5	—	0.21
Ceresit CT 175 (particle size 2.0 mm)	5.0 to 6.0	—	0.16
Rendering system(3) : Ceresit CT 190 basecoat(2) plus decorative coat(4), as indicated below:			
Ceresit CT 48 (silicone paint)	3.0 to 4.0	—	0.09
Ceresit CT 54 (silicate paint)	3.0 to 4.0	—	0.08

(1) Comprising basecoat, reinforcing mesh, key coat and finish coat – minimum overall thickness 3.8 mm (which is based on using Ceresit CT 77 with particle size of 0.8 mm), and maximum overall thickness 12 mm (which is based on using Ceresit CT 136 with maximum thickness of 8 mm).

(2) Applied to a thickness of between 3.0 mm to 4.0 mm.

(3) Comprising basecoat and decorative coat (silicone and silicate paints).

(4) Results based on 2 coats of decorative paint finish, with a nominal thickness of 80 to 120 microns.

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

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 the need for any necessary repairs to the building structure before application of the system. A specification is prepared for each elevation of the building indicating:

- the position of beads
- detailing around windows, doors and at eaves
- damp-proof course (dpc) level
- exact position of expansion joints, if required
- areas where flexible sealants must be used
- any alterations to external plumbing.

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 tool spanning the storey height. Any excessive irregularities, ie greater than 20 mm, must be made good prior to installation, to ensure that the insulation slabs 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
- 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 25°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 72 hours of completion.

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

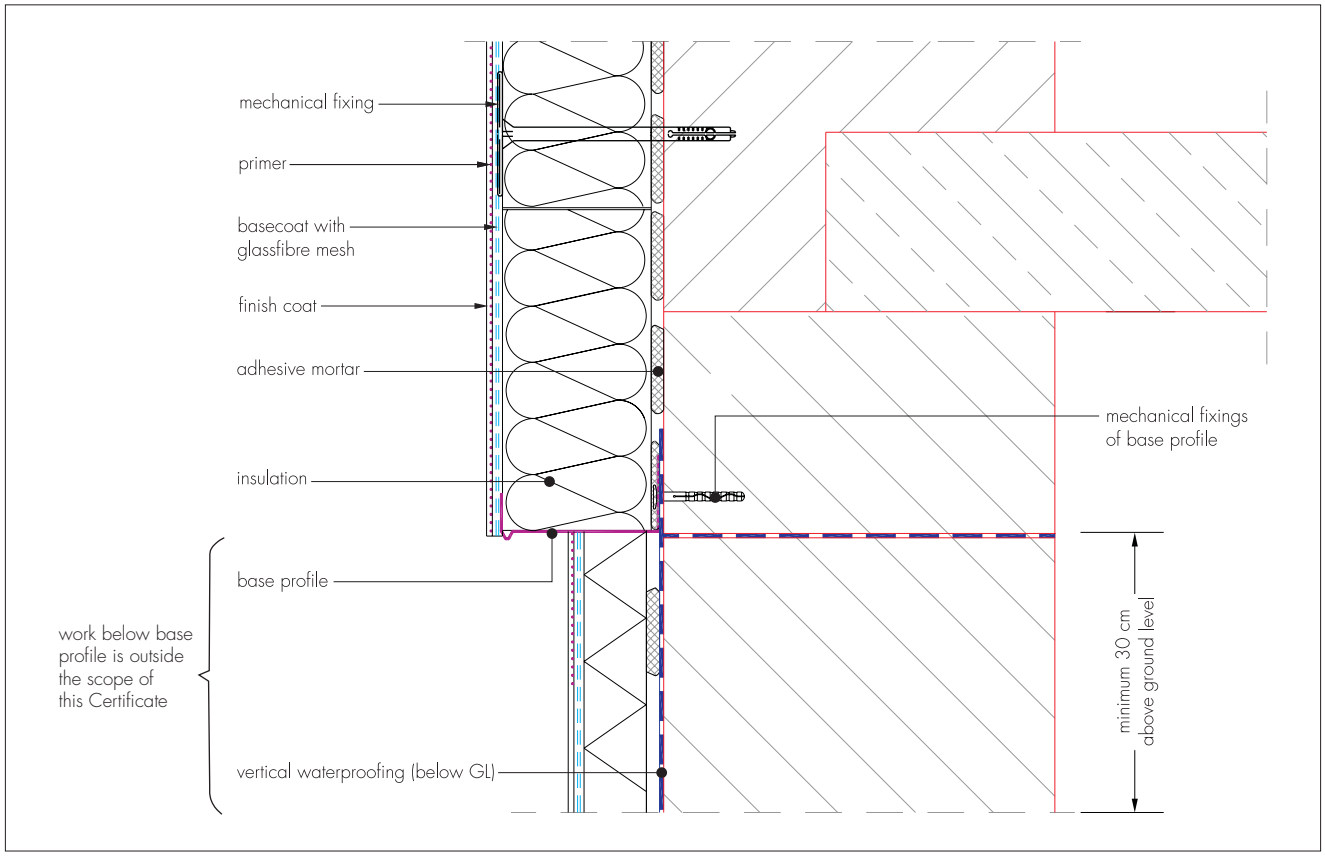
16.4 The primers should always be used, and diluted as necessary (see section 1.2).

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

Positioning and securing insulation slabs

16.6 The base profile is secured to the external wall above the dpc using the approved profile fixings at approximately 300 mm centres (see Figure 2). 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.

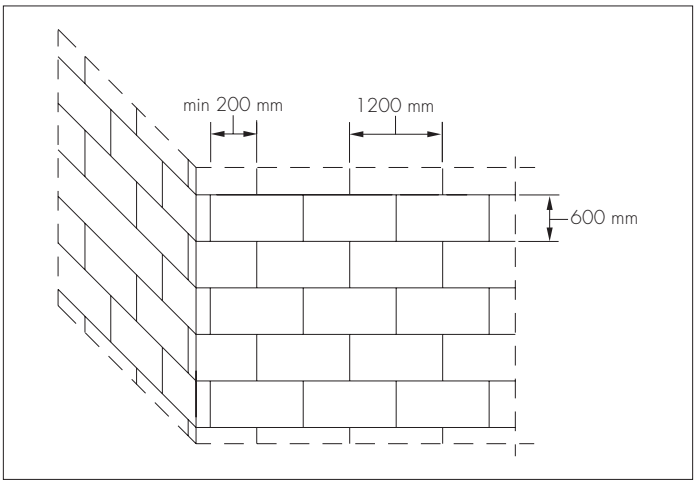
Figure 2 Typical section of base profile



16.7 The adhesive is prepared with the required amount of water (see section 1.2), and mixed with a paddle mixer until the desired consistency is achieved. After allowing the adhesive to rest for 2 minutes, it is stirred again. The adhesive is applied in a continuous line around the perimeter of the slab with three additional dabs of adhesive distributed uniformly over the remaining surface — allowing enough adhesive to achieve at least 40% coverage after the slabs have been pressed against the wall.

16.8 The slabs must be pressed firmly against the wall and butted tightly together with the vertical joints staggered by at least 200 mm (see Figure 3). Joints between slabs should be maintained in straight line and surfaces levelled. Gaps greater than 10 mm should be closed by repositioning or, where appropriate, by cutting slabs to fit. Alignment should be checked as work proceeds.

Figure 3 Typical arrangement of insulation slabs



16.9 After the first run of insulation slabs are positioned on the base profile, holes are drilled into the substrate to the required depth through the insulation equidistant at the corners of each slab and one in the middle of the slab, which would result to seven fixings per square metre in the main area of the wall (see Figure 4). If required, extra fixings can be applied at the edge zones to satisfy the wind load conditions. Around openings, additional fixings should be used at approximately 300 mm centres (see figure 5). The mechanical fixings are inserted and tapped or screwed firmly into place, securing the insulation to the substrate. Subsequent rows of slabs are positioned so that the vertical slab joints are staggered and overlapped at the building corners and so that the slab joints do not occur within 200 mm of the corners of openings.

Figure 4 Insulation slab fixing pattern

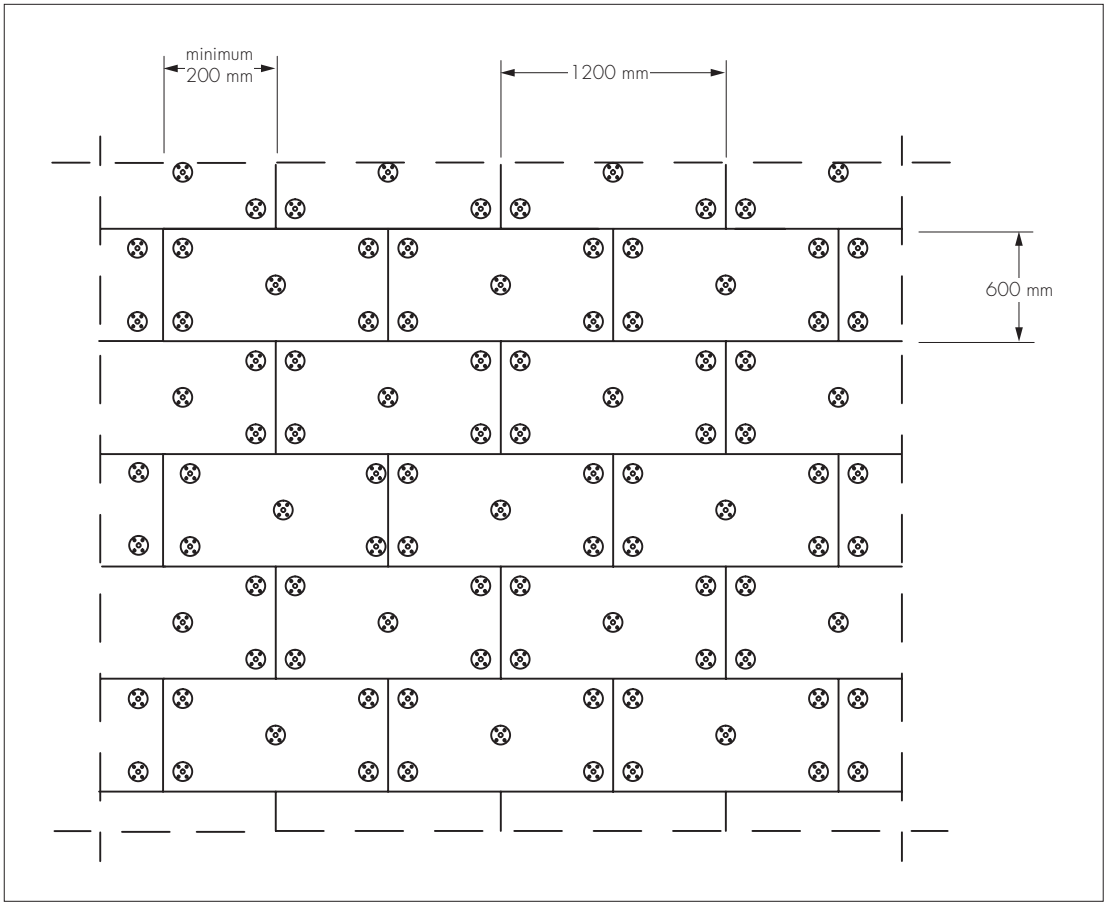
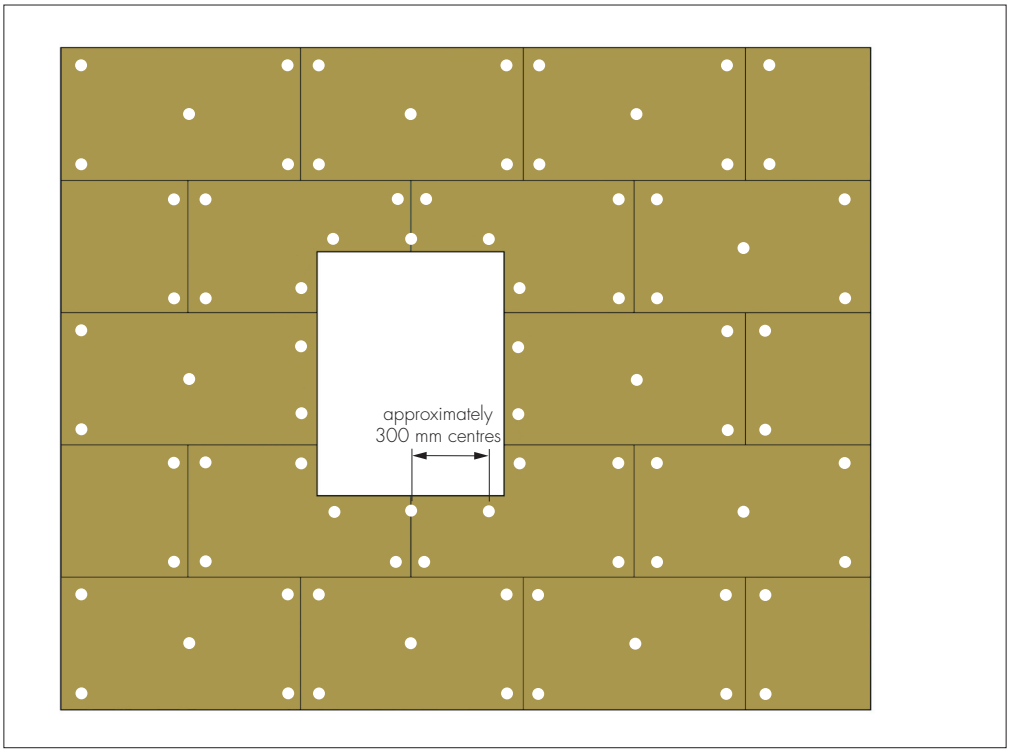


Figure 5 Window fixing detail



16.10 Any high spots or irregularities should be levelled by pressing the slabs into place until a flat surface is achieved, which is essential in order to aid the application of an even thickness of basecoat. After sufficient stabilisation of the installed insulation (normally 48 hours), during which time the insulation should be protected from exposure to extreme weather conditions to prevent degradation, the insulated wall is ready for the application of the basecoat.

16.11 To fit around details such as doors and windows, insulation slabs 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.

16.12 Window and door reveals should be insulated to minimise the effects of cold bridging. Where clearance is limited, strips of approved insulation should be installed to suit available margins and details. Installation continues until the whole wall is completely covered including, where appropriate, the building soffits and eaves.

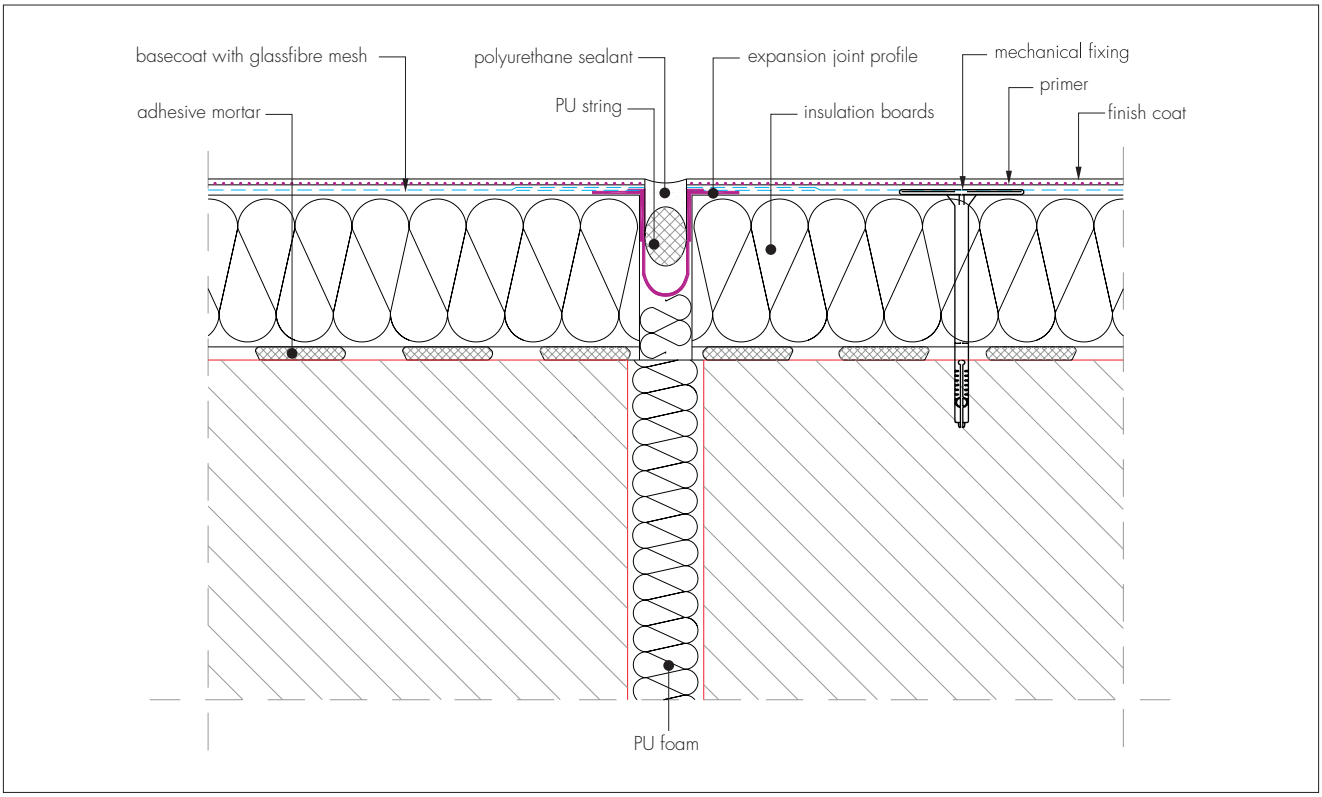
16.13 Prior to the application of the render system, the relevant seals are positioned and installed at all openings (or a bead of joint sealant is gun-applied at window and door frames), overhanging eaves, gas and electric meter boxes, and wall vents, or where the render abuts any other building material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

16.14 All corners are fixed with mesh angles installed with adhesive mortar. Where appropriate, the PVC angle with drip mesh is installed, to allow the rainwater to drain away.

Movement joints

16.15 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



Application of basecoat and reinforcement mesh

16.16 The basecoat is prepared with the required amount of water (see section 1.2), and mixed with a paddle mixer until the desired consistency is achieved. After allowing the basecoat to rest for 2 minutes, it is stirred again before it is ready. It is applied over the insulation slabs using a stainless steel trowel at approximately two thirds of the final basecoat thickness.

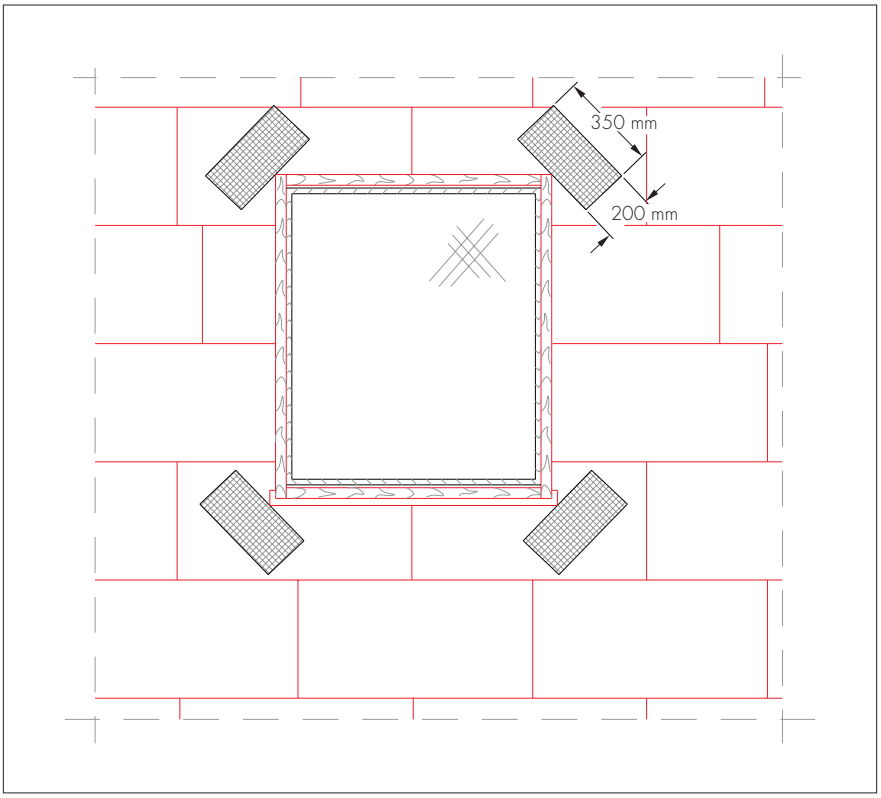
16.17 A layer of alkali-resisting glassfibre reinforcement mesh is immediately embedded (with its concave surface facing the wall). The mesh should be pressed into the basecoat using a float, taking care to avoid direct contact with the insulation.The remaining one third of thickness of basecoat is then applied, ensuring the mesh is completely covered and the minimum basecoat thickness achieved.

16.18 The mesh should be free of wrinkles and fully embedded in the basecoat (for areas requiring extra resistance to impact, two mesh layers should be used).

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

16.20 Additional pieces of reinforcing mesh (approximately 200 mm by 350 mm strips) are applied diagonally at a 45° angle to the corners of openings (prior to the application of the basecoat or, if applying a double layer of base coat, prior to the application of the second coat) to provide the necessary reinforcement in the corners of window/ door openings in accordance with the Certificate holder's instructions (see Figure 7).

Figure 7 Additional reinforcement of openings



16.21 The reinforced basecoat is left to dry for at least 2 days before applying a second coat, where required. The overall thickness of the reinforced basecoat must be greater than 3 mm. The drying time will depend upon the conditions, but an additional 24 hours should elapse before the application of the primer.

Primer

16.22 The primer is roller-applied and left to dry for a minimum of 12 hours before the application of the finish coat, first making sure the surface is free from any irregularities (trowel-marks, exposed mesh, etc) and is in accordance with the Certificate holder's instructions.

Finish coat

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

16.24 The finish coat is applied directly over the primer to an approximate render thickness of between 0.8 mm and 3.5 mm (see section 1.2), using a stainless steel trowel and finished with a plastic trowel to create a textured finish. The drying time is dependent on conditions, but will typically be 24 hours, in accordance with the Certificate holder's instructions.

16.25 Continuous surfaces should be completed without a break to minimise colour shade variations and to avoid dry line jointing. If breaks cannot be avoided, they should be made where services or architectural features (such as reveals or lines of doors and windows) help mask cold joints. Where long, uninterrupted runs are planned, containers of the finishing coat should be checked for batch numbers. Bags with different batch numbers should be checked for colour consistency.

16.26 It is imperative that weather conditions are suitable for the application and curing of the finishing coats. In wet weather, the finished walls should be protected to prevent wash-off. It is also advisable that protective covers remain in place until required.

16.27 At the top 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, 11 and 12).

Figure 8 Roof eaves details

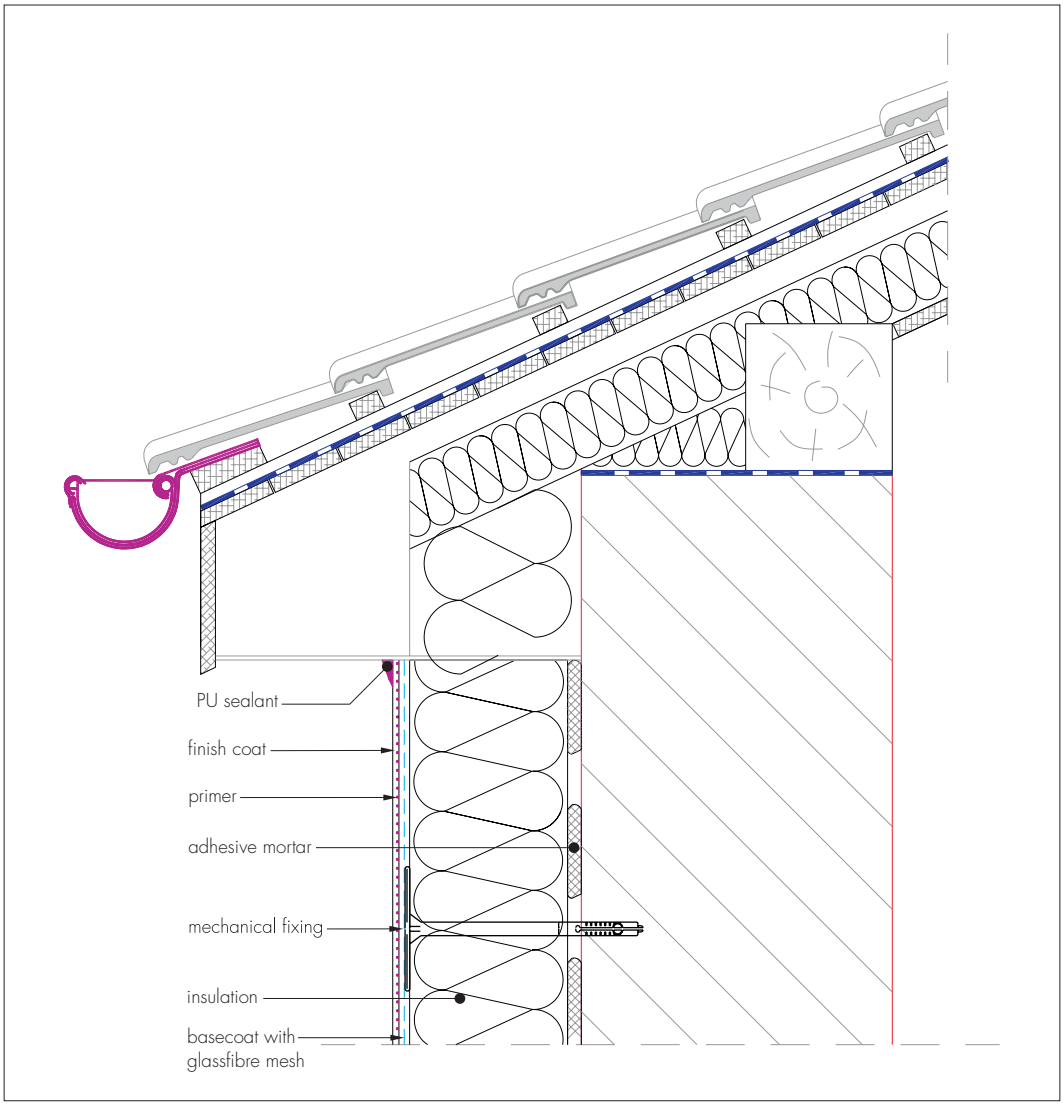


Figure 9 Building corner details

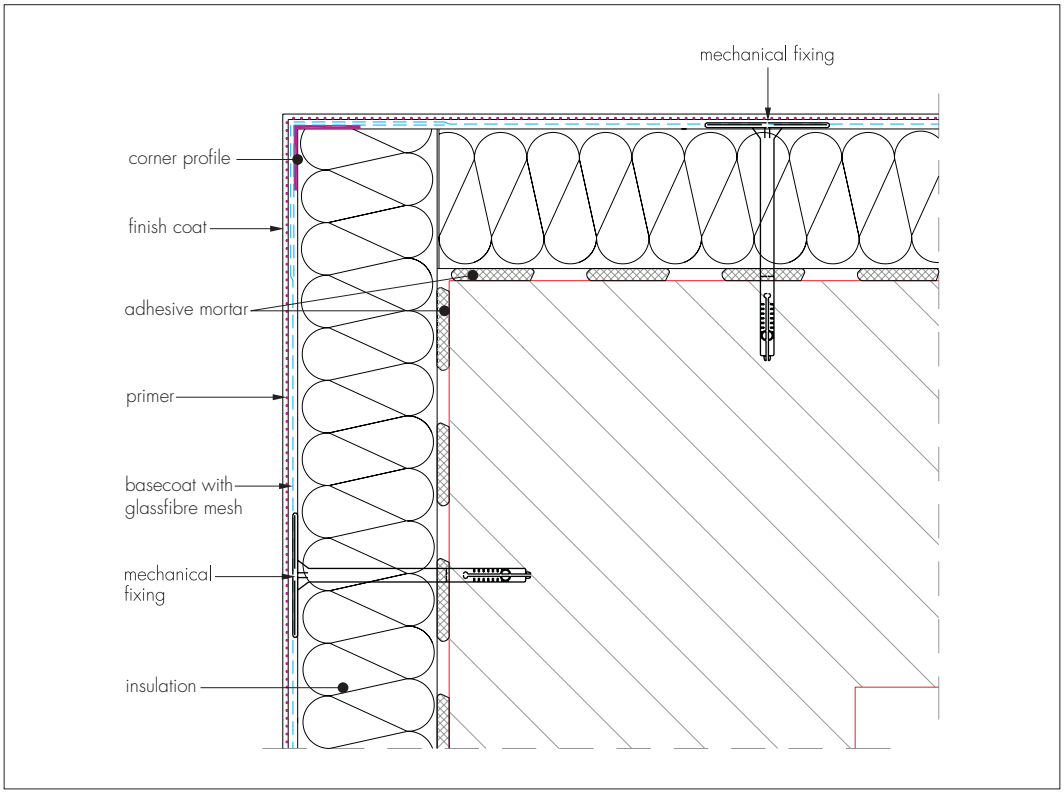


Figure 10 Insulated window reveal detail

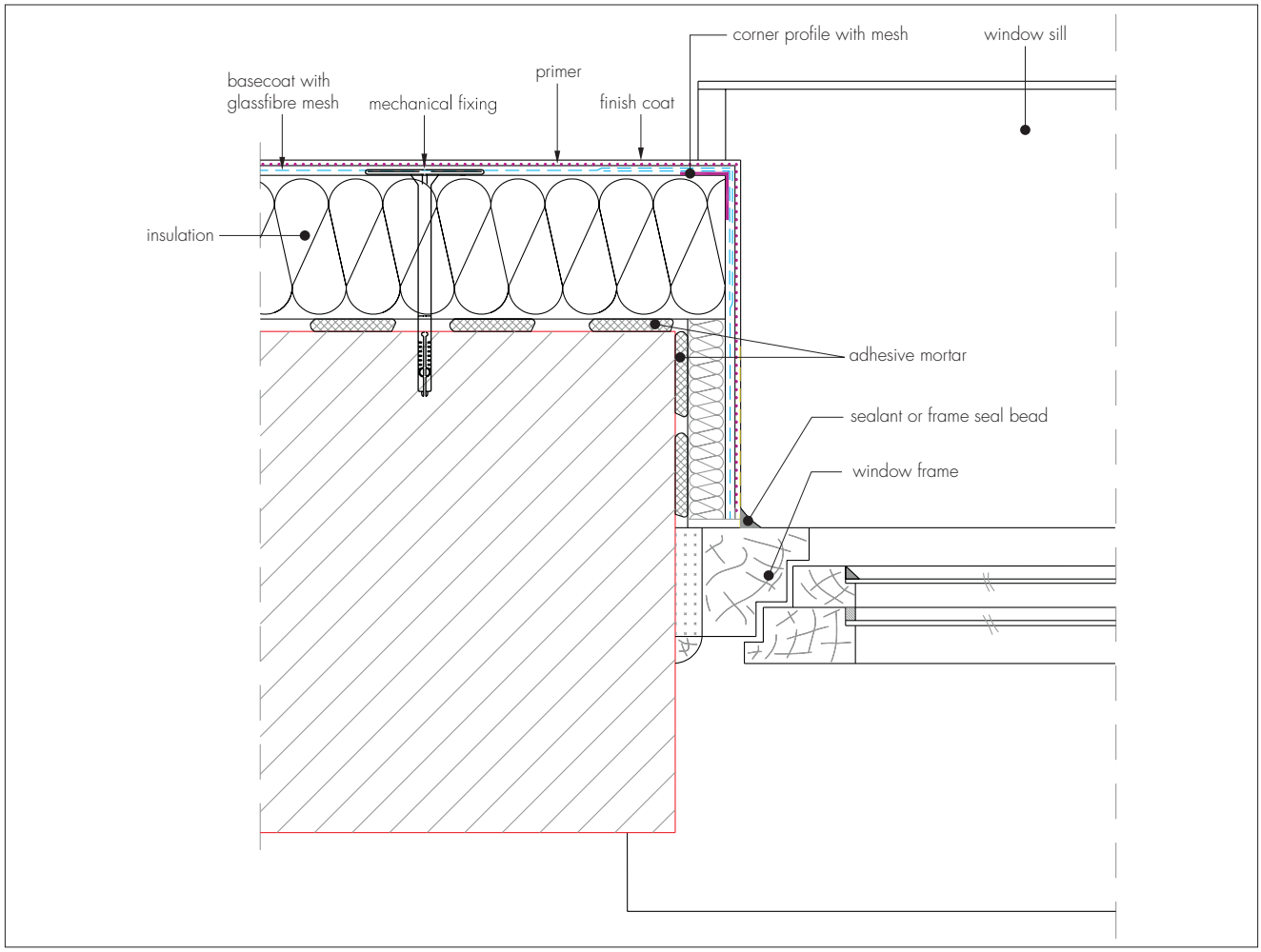


Figure 11 Insulated window head details

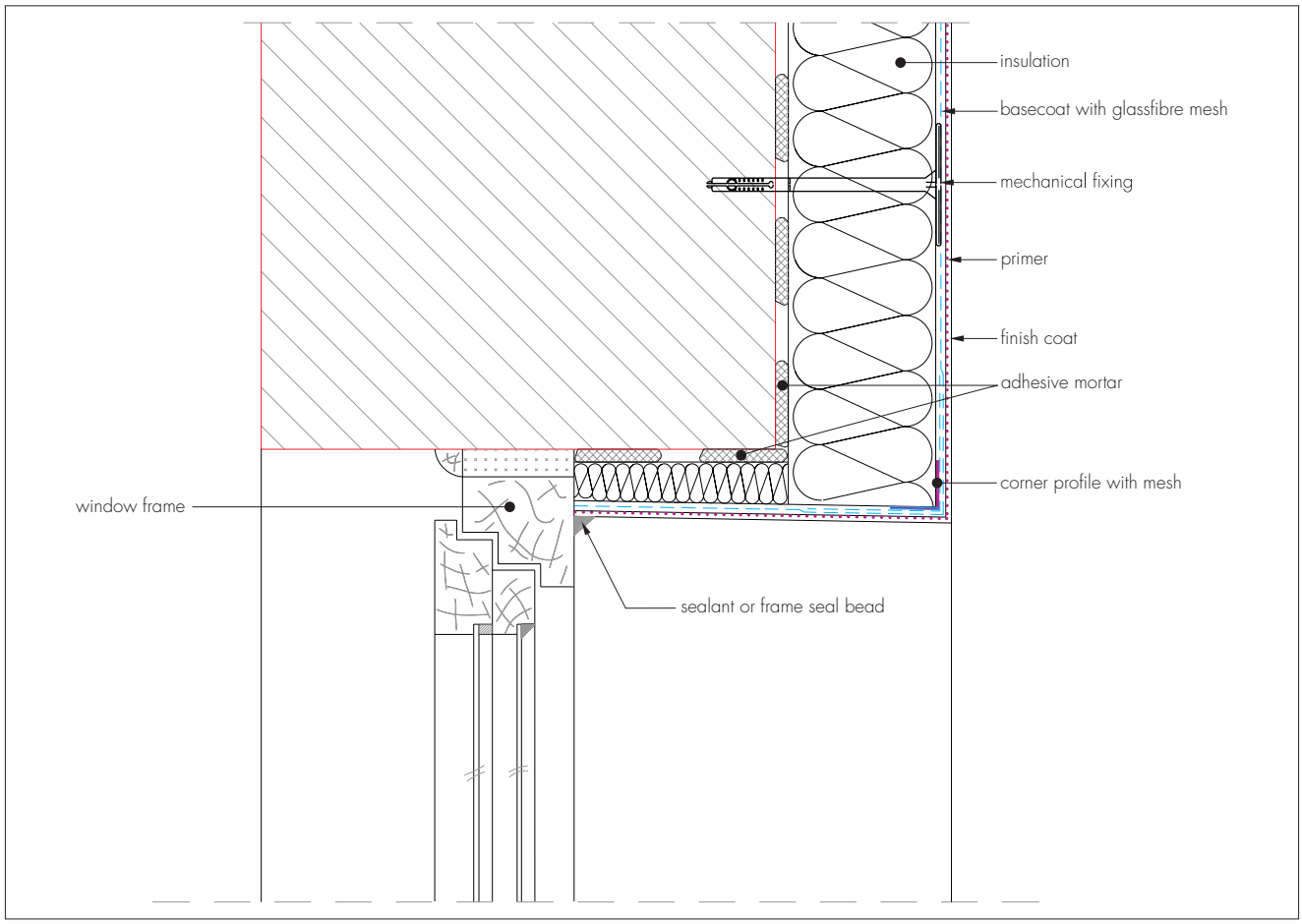
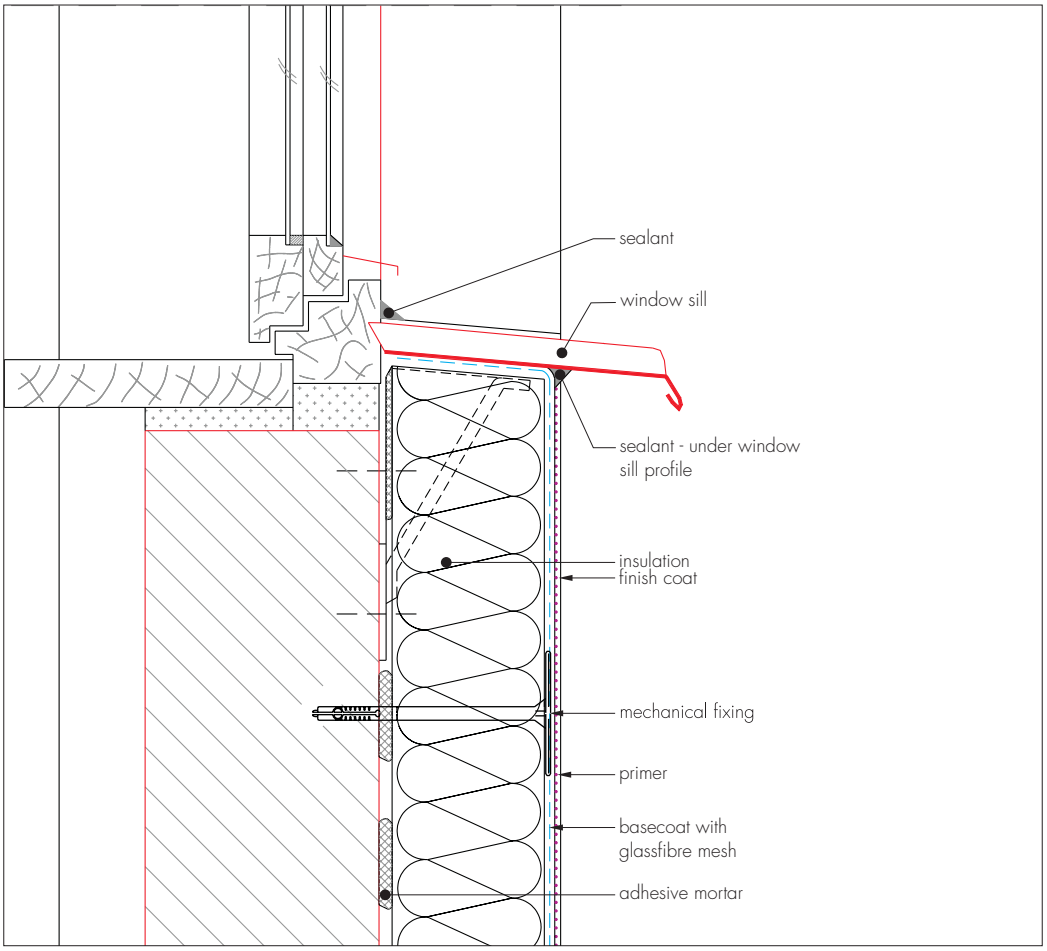


Figure 12 Window sill details



16.28 On completion of the installation, external fittings, eg rainwater goods, are securely fixed to timber grounds or extended fixings that have been built into the system during installation.

Technical Investigations

17 Investigations

17.1 The system was examined to determine:

- fire performance
- bond strength
- hygrothermal performance and resistance to freeze thaw
- resistance to hard body impact
- water vapour permeability
- pull through of fixing over insulation
- durability
- adequacy of fixing system
- the risk of interstitial condensation
- thermal conductivity.

17.2 The practicability of installation and the effectiveness of detailing techniques were examined.

17.3 The manufacturing process was evaluated, including the methods adopted for quality control, and details were obtained of the quality and composition of materials used.

Bibliography

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

BRE Report BR 262 : 2002 *Thermal insulation : avoiding risk*

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

BS 5250 : 2011 *Code of practice for control of condensation in buildings*

BS 8000-0 : 2014 *Workmanship on construction sites — Introduction and general principles*
BS 8000-2.2 : 1990 *Workmanship on building sites — Code of practice for concrete work — Sitework with in situ and precast concrete*
BS 8000-3 : 2001 *Workmanship on building sites — Code of practice for masonry*

BS EN 1990 : 2002 *Eurocode — Basis of structural design*
NA to BS EN 1990 : 2002 *UK National Annex to Eurocode — Basis of structural design*

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

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

BS EN 1996-1-1 : 2005 *Eurocode 6 — Design of masonry structures — General rules for reinforced and unreinforced masonry structures*
NA to BS EN 1996-1-1 : 2005 *UK National Annex to Eurocode 6 — Design of masonry structures — General rules for reinforced and unreinforced masonry structures*
BS EN 1996-2 : 2006 *Eurocode 6 — Design of masonry structures — Design considerations, selection of materials and execution of masonry*
NA to BS EN 1996-2 : 2006 *UK National Annex to Eurocode 6 — Design of masonry structures — Design considerations, selection of materials and execution of masonry*

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

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 11600 : 2003 *Building construction — Jointing products — Classification and requirements for sealants*

EOTA TR051 : 2016 *Recommendations for job-site tests of plastic anchors and screws*

ETAG 004 : 2013 *Guideline for European Technical Approval of Plastic Anchors for fixing of External Thermal* 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*

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- 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
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- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
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