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Agrément Certificate
03/4058
Product Sheet 3

WETHERBY EXTERNAL WALL INSULATION SYSTEMS

EPSICON 3 — MW EXTERNAL WALL INSULATION SYSTEM

This Agrément Certificate Product Sheet(1) relates to the Epsicon 3 — MW External Wall Insulation System, comprising mechanically fixed mineral wool (MW) insulation slabs, with supplementary adhesive, a glass fibre mesh-reinforced basecoat and dash render finish, for use without height restrictions on the outside of external walls in new or 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 (see section 7).

Behaviour in relation to fire — the system can have an A2-s1, d0 reaction to fire classification in accordance with BS EN 13501-1 : 2018 (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 durability can be extended to 60 years by using a different fixing methodology and by following an effective maintenance schedule as described in sections 12 and 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

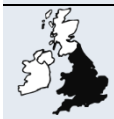
Date of Second issue: 26 February 2021

Originally certificated on 22 May 2015

Hardy Giesler
Chief Executive Officer

Regulations

In the opinion of the BBA, the Epsicon 3 — MW External Wall Insulation System, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements of the following Building Regulations (the 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 is unrestricted by 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 11.2 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 6.1 and 6.2 of this Certificate.
Regulation:	**7(1)**	**Materials and workmanship**
Comment:		The system is acceptable. See sections 13.1 and 13.2 and the *Installation* part of this Certificate.
Regulation:	**7(2)**	**Materials and workmanship**
Comment:		The system is unrestricted by this Regulation. See sections 8.1 to 8.4 of this Certificate.
Regulation:	**26**	**CO_2 emission rates for new buildings**
Regulation:	**26A**	**Fabric energy efficiency rates for new dwellings (applicable to England only)**
Regulation:	**26A**	**Primary energy consumption rates for new buildings (applicable to Wales only)**
Regulation:	**26B**	**Fabric performance values for new dwellings (applicable to Wales only)**
Comment:		The system can contribute to satisfying these Regulations. See sections 6.1 and 6.2 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 a construction satisfying this Regulation. See sections 12, 13.1 and 13.2 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 is unrestricted by 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 is unrestricted by this Standard, with reference to clause 2.7.1[(1)(2)]. 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 contribute to satisfying this Standard, with reference to clauses 3.15.1[(1)(2)], 3.15.4[(1)(2)] and 3.15.5[(1)(2)]. See sections 11.3 and 11.4 of this Certificate.
Standard:	6.1(b)	Carbon dioxide emissions
Standard:	6.2	Building insulation envelope
Comment:		The system can contribute to satisfying these Standards, with reference to clauses (or parts of) 6.1.1[(1)], 6.1.2[(1)(2)], 6.1.3[(1)(2)], 6.1.6[(1)], 6.1.10[(2)], 6.2.1[(1)(2)], 6.2.3[(1)], 6.2.4[(1)], 6.2.5[(1)(2)], 6.2.6[(2)], 6.2.7[(2)], 6.2.8[(1)], 6.2.9[(1)], 6.2.10[(1)], 6.2.11[(1)], 6.2.12[(1)] and 6.2.13[(2)]. See sections 6.1 and 6.2 of this Certificate.
Standard:	7.1(a)(b)	Statement of sustainability
Comment:		The system can contribute to satisfying the relevant requirements of Regulation 9, Standards 1 to 6, and therefore will contribute to a construction meeting the bronze level of sustainability as defined in this Standard. In addition, the system can contribute to a construction meeting a higher level of sustainability as defined in this Standard, with reference to clauses 7.1.4[(1)(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 6.1 of this Certificate.
Regulation:	**12**	**Building standards applicable to conversions**
Comments:		All comments given for this system under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to clause 0.12.1[(1)(2)] and Schedule 6[(1)(2)].

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

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

Regulation:	**23**	**Fitness of materials and workmanship**
Comment:		The system is acceptable. See sections 13.1 and 13.2 and the *Installation* part of this Certificate.
Regulation:	**28(b)**	**Resistance to moisture and weather**
Comment:		The system provides a degree of protection against rain ingress. See section 10.1 of this Certificate.
Regulation:	**29**	**Condensation**
Comment:		The system can contribute to minimising the risk of interstitial condensation. 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 is unrestricted by 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 can contribute to satisfying these Regulations. See sections 6.1 and 6.2 of this Certificate.

Construction (Design and Management) Regulations 2015
Construction (Design and Management) Regulations (Northern Ireland) 2016

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

See sections: 3 *Delivery and site handling* (3.2) and 12 *Maintenance and repair* of this Certificate.

Additional Information

NHBC Standards 2021

In the opinion of the BBA, the Epsicon 3 — MW External Wall Insulation System, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements in relation to *NHBC Standards 2021*, Part 6 *Superstructure (excluding roof)*, Chapter 6.9 *Curtain walling and cladding*.

Technical Specification

1 Description

1.1 The Epsicon 3 — MW External Wall Insulation System consists of mineral wool (MW) insulation slabs which are mechanically fixed to the substrate wall, with supplementary adhesive (ensuring a minimum of 40% coverage), a reinforcing glass fibre mesh embedded in the basecoat and dash render finish (see Figure 1).

1.2 The system can be designed to achieve either a 30- or 60-year durability. Mechanical fixings are applied through the insulation slabs for a 30-year system or through the reinforcing mesh and insulation slabs for a 60-year system.

Table 1 Epsicon 3 — MW External Wall Insulation System components

Supplementary adhesive	Wetherby Bedding Adhesive
Insulation	Mineral wool dual density (MWDD 036)
Basecoat	Lightweight basecoat render
Reinforcement	Reinforcing mesh
Finish	Lightweight dash receiver + dry dash aggregates
Mechanical fixings	Various

30-year durability – through the slabs

1.3 The system is mechanically fixed, with supplementary adhesive (a minimum of 40% coverage of adhesive), through the insulation slabs into the external wall of the building structure. The basecoat is applied to the insulation slabs and over the installed fixings, with the reinforcing mesh placed and embedded into the wet basecoat. When the basecoat has dried, the finish is applied (see Figure 1).

60-year durability – through the basecoat/reinforcing mesh

1.4 For a 60-year durability, the system is mechanically fixed, with supplementary adhesive (a minimum of 40% coverage of adhesive), through the basecoat/reinforcing mesh – additionally, one fixing is applied initially, directly through the slab. The rest of the fixings are applied while the basecoat (with reinforcing mesh) is still wet, with mesh patches applied over the fixing heads, or a second layer of mesh is applied. A second layer of basecoat is applied and, when dry, the finish is applied (see Figure 1).

1.5 Additionally, for the 60-year durability system, further requirements (for instance, see section 4.14) must be satisfied.

1.6 The system comprises the following components:

Adhesive (supplementary)

- Wetherby Bedding Adhesive — polymer-modified cementitious basecoat, comprising limestone sand, cement and additives. Supplied as a grey powder, requiring the addition of 5 to 6 litres of clean water per 25 kg bag, applied to a thickness of 4 to 6 mm at a coverage of 7.2 to 10.8 kg·m^{-2}.

Insulation(1)

- Mineral wool dual density (MWDD 036) slabs — 1200 by 600 mm and in a range of thicknesses from 80(2) 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. The slabs are manufactured to comply with BS EN 13162 : 2012.

(1) For declared thermal conductivity values (λ_D), see section 6.1 of this Certificate
(2) Thicknesses of less than 80 mm are also available and are for use on reveals.

Mechanical fixings

- mechanical fixings(1)(2) — fixing anchors with various length to suit the substrate and the insulation thickness, approved and supplied by the Certificate holder, and selected from:

  — Ejotherm NT U — polyethylene (HDPE) anchor sleeve with stainless steel or galvanized steel pin
  — Ejotherm STR U — HDPE anchor sleeve and polystyrene anchor cap with galvanized steel centre pin
  — Fischer Termoz 8U — polyamide with stainless steel or electro-galvanized steel pin
  — Fischer Termoz 8UZ — polypropylene sleeve with polymide GF screw
  — Fischer Termoz 8N — polyamide with steel, stainless steel or electro-galvanized steel pin
  — Fischer Termoz CN8 — polyethylene with polyamide or electro-galvanized steel pin
  — Koelner TFIX-8S — polypropylene sleeve with electro-galvanized-steel pin
  — Koelner TFIX-8ST — polypropylene sleeve with steel, electro-galvanized-steel screw and polyamide GF expansion screw head
  — Koelner TFIX-8M — polypropylene sleeve with electro-galvanized-steel pin
  — Bravoll PTH-KZ 60/8 — polypropylene anchor sleeve with stainless steel or electro-galvanized pin
  — Bravoll PTH-KZL 60/8 — copolymer polypropylene with electro-galvanized pin
  — Bravoll PTH-S — copolymer polypropylene with electro-galvanized screw
  — Spit ISO 10(3) — polypropylene plastic expansion sleeve with a polypropylene or polyamide 6 plastic pin.

  (1) Other fixings may be used provided they can be demonstrated to have equal or higher pull-out, plate diameter and plate stiffness characteristics
  (2) Polyethylene, HDPE or polyamide ribbed or anchor sleeve with a stainless pin is required to achieve a 60 years' durability performance
  (3) Fixings can only be specified for 30-year durability applications.

Basecoat

- Lightweight basecoat render — a polymer-modified cementitious powder, comprising limestone sand, cement and additives. Supplied as a powder requiring 5 to 6 litres of clean water per 25 kg bag, applied to a thickness of 4 to 6 mm with a coverage of 7.2 to 10.8 kg.m^{-2}.

Reinforcement

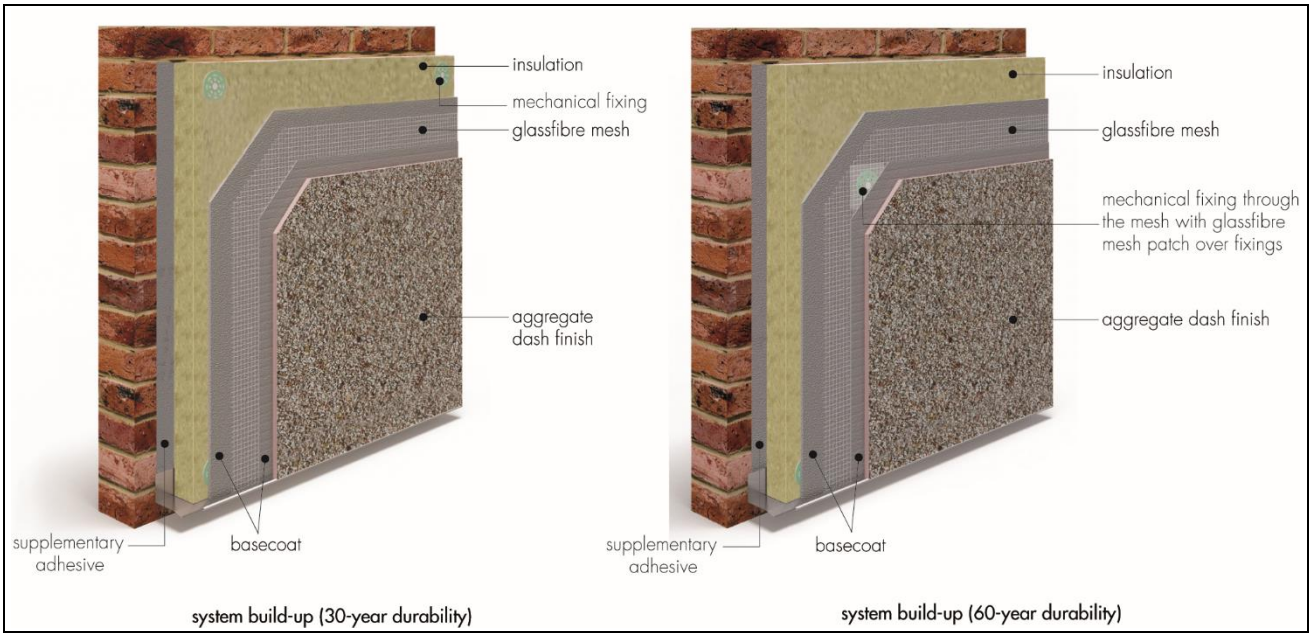
- 50 by 1 m rolls, with a 3.5 by 3.5 mm grid size, organic content of 20%, PCS value of 8.17 MJ·kg^{-1} and nominal weight of 160 g·m^{-2}.

Dash aggregate finish

- Lightweight dash receiver — a cementitious ready-mixed render supplied as a powder to which clean water is added and comprising limestone sand, cement, hydrated lime, lightweight aggregates, polypropylene fibres and polymers. Applied to a thickness of 6 to 10 mm with a coverage of 9 to 15 kg.m^{-2}

- Dry dash — aggregates up to 8 mm and available in a range of colours.

Figure 1 Epsicon 3 — MW External Wall Insulation System



1.7 Ancillary materials used with the system are:

- A range of aluminium, PVC-U or stainless-steel profiles(1) comprising:

  - base profile
  - edge profile
  - corner profile with optional PVC-U nosing
  - render stop profile.

1.8 Ancillary materials also used with the system, but which are outside the scope of this Certificate, are:

  - profile connectors and fixings
  - silicone-based joint sealant
  - algae and fungal wash
  - PU foam filler
  - sealing tape.

(1) For 60-year durability systems, these profiles must be made of stainless steel (see section 13.2).

2 Manufacture

2.1 Components are either 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 Wetherby Building Systems Limited has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2015, BS EN ISO 14001 : 2015, and BS EN ISO 45001 : 2018 by Alcumus ISOQAR (Certificates 16512-QMS-001, 16512-EMS-001 and 16512-OHS-001 respectively).

3 Delivery and site handling

3.1 The insulation is delivered to site shrink-wrapped in polythene packs bearing the manufacturer's and product identification marks and batch numbers.

3.2 Components are delivered to site in the quantities and packages listed in Table 2. Each package carries the manufacturer's and product identification marks and batch number. The basecoat and render also include the BBA logo, incorporating the number of this Certificate.

Table 2 Component supply details

Component	Quantity and packaging
Insulation slabs	Polythene shrink-wrapped sealed packs
Wetherby Bedding adhesive	25 kg bags
Lightweight basecoat render	25 kg bags
Reinforcing mesh	50 by 1 m rolls
Lightweight dash receiver	25 kg bags
Dry dash aggregate	25 kg bags
Mechanical fixings	boxed by the manufacturer

3.3 The insulation slabs should be stored on a firm, clean, level base, off the ground and must be protected from prolonged exposure to sunlight either by storing opened packs under cover in dry conditions or re-covering with opaque polythene sheeting.

3.4 Care must be taken when handling the insulation slabs to avoid both damage and contact with solvents or bitumen products. Slabs that become damaged, soiled or wet should be discarded.

3.5 The basecoat and dash receiver must be stored in dry conditions, off the ground, and protected from frost at all times. Bags of unopened render will have a shelf-life of 12 months when stored correctly. Damaged, wet or contaminated products must not be used and should be discarded.

3.6 The 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 Epsicon 3 — MW External Wall Insulation System.

Design Considerations

4 General

4.1 The Epsicon 3 — MW External Wall Insulation System, when installed in accordance with this Certificate, is satisfactory for use in reducing the thermal transmittance (U value) of the walls in new and existing buildings. It is essential that 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 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) without height restriction. 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 8000-0 : 2014
- BS 8000-2.2 : 1990
- 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).

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.

4.13 The system can be adapted to achieve an extended service life of 60 years instead of the standard 30.

4.14 For a 60-year durability system, the mechanical fixings must be applied through the reinforcing mesh. Additionally, the following components must be constructed from stainless steel grade 1.4301 or 1.4401 to BS EN 10088-2 : 2014.

- base profile and render stop end including the fixings. In addition, any other profile component which would remain exposed after the application of the finish coat
- corner profile (if exposed after application of the system)
- pin or screw for mechanical fixings.

5 Practicability of installation

The system must only be installed by specialised contractors who have successfully undergone training and registration by the Certificate holder (see section 15 of this Certificate).

Note: The BBA operates a UKAS-accredited Approved Installer Scheme for external wall insulation (non-mandatory); details of approved installer companies are included on the BBA 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 : 2017 and BRE Report BR 443 : 2006 using the declared thermal conductivity (λ_D) of 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, the insulation value of the substrate masonry and its internal finish. Calculated U values for sample constructions in accordance with the national Building Regulations are given in Tables 3 and 4, and are based on the thermal conductivity given in section 6.1 of this Certificate.

Table 3 Insulation thickness required to achieve U values[(1)(2)(3)(4)] using galvanized steel fixings (30-year durability)

U value[(4)] ($W \cdot m^{-2} \cdot K^{-1}$)	215 mm dense 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	190	200
0.19	180	190
0.25	130	140
0.26	130	140
0.28	120	120
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 (λ_D) of insulation is as shown in section 6.1. An adhesive layer, 5 mm thick with $\lambda = 0.43\ W \cdot m^{-1} \cdot K^{-1}$ covering 40% of the area is also included, together with an external render thickness of 5 mm with $\lambda = 1\ W \cdot m^{-1} \cdot K^{-1}$.
(2) Calculations based on a system that included 7 fixings per square metre (with galvanized steel pin) with a point thermal transmittance (χ_p) of 0.004 $W \cdot K^{-1}$ per pin. Use of other types of fixings should be calculated in accordance with BS EN ISO 6946 : 2017.
(3) Based upon incremental insulation thickness of 10 mm.
(4) When applying the maximum available insulation thickness, these walls can achieve U values from 0.14 $W \cdot m^{-2} \cdot K^{-1}$.

Table 4 Insulation thickness required to achieve U values[(1)(2)(3)(4)] — using stainless steel fixings (60-year durability)

U value[(4)] ($W \cdot m^{-2} \cdot K^{-1}$)	215 mm dense 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 (λ_D) of insulation is as shown in section 6.1. An adhesive layer, 5 mm thick with $\lambda = 0.43\ W \cdot m^{-1} \cdot K^{-1}$ covering 40% of the area is also included, together with an external render thickness of 5 mm with $\lambda = 1\ W \cdot m^{-1} \cdot K^{-1}$.
(2) Calculations based on a system that included 7 fixings per square metre (with stainless steel pin) with a point thermal transmittance (χ_p) of 0.002 $W \cdot K^{-1}$ per pin. Use of other types of fixings should be calculated in accordance with BS EN ISO 6946 : 2017.
(3) Based upon incremental insulation thickness of 10 mm.
(4) When applying the maximum available insulation thickness, these walls can achieve U values from 0.14 $W \cdot m^{-2} \cdot K^{-1}$.

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

7 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 5; 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 5.

(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 5 Fixings — typical characteristic pull-out strengths

Fixing type[(1)]	ETA Number	Substrate	Drill diameter (mm)	Effective anchorage depth (mm)	Characteristic pull-out strength[(2)] (kN)	Partial factor
Ejotherm NT U	05/0009	Concrete (C12/15) Solid clay bricks	8	25	1.2 1.5	2
Ejotherm STR U	04/0023	Concrete (C12/15) Solid clay bricks	8	25	1.2 1.5	2
Fischer Termoz 8U	02/0019	Concrete (C12/15) Solid clay bricks	8	70	1.5	2
Fischer Termoz 8UZ	02/0019	Concrete (C12/15) Solid clay bricks	8	35	1.2 1.5	2
Fischer Termoz 8N	03/0019	Concrete (C16/20) Solid clay bricks	8	50	1.5 1.2	2
Fischer Termoz CN8	09/0394	Concrete (C12/15) Solid clay bricks	8	35	0.9	2
Koelner TFIX-8S	11/0144	Concrete (C12/15) Solid clay bricks	8	25	1.2	2
Koelner TFIX-8ST	11/0144	Concrete (C12/15) Solid clay bricks	8	25	1.2	2
Koelner TFIX-8M	07/0336	Concrete (C12/15) Solid clay bricks	8	25	1.5	2
Bravoll PTH-KZ 60/8	05/0055	Concrete (C12/15) Solid clay bricks	8	25	0.7 0.9	2
Bravoll PTH-KZL 60/8	05/0055	Perforated clay bricks	8	55	0.6	2
Bravoll PTH-S	08/0267	Concrete (C12/15) Solid clay bricks	8	45	1.5	2
Spit ISO 10	04/0076	Concrete (C12/15) Clay bricks	10	30	0.2 0.3	2

(1) The minimum value for plate stiffness of fixings is 0.6 $kN \cdot mm^{-1}$ and the load resistance is 2.04 KN.
(2) Values are determined in accordance with EAD 330196-01-0604 : 2016 and are dependent on the substrate. The use categories are defined in the corresponding ETA.

7.9 The characteristic pull-through resistance of the fixings was determined from tests using a 60 mm diameter fixing plate with either a 90 or 140 mm diameter extension washer, and minimum insulation thickness of 100 mm. The design resistance per fixing (N_{RD3}) is obtained by applying an appropriate partial factor of 2.5 as shown in Table 6.

Table 6 Design pull through resistances

Factor (unit)	**MWDD 036 (1200 x 600 mm)**	
Tensile resistance of the insulation (kPa)	≥ 10	
Fixing type(1)	Koelner TFIX-8S + 90 mm KWL washer	Koelner TFIX-8S + 140 mm KWL washer
Fixing plate diameter (mm)	60 + 90 mm washer	60 + 140 mm washer
Insulation thickness (mm)	100	
Characteristic pull through resistance(2) per fixing kN	0.464	0.532
Partial factor(3)	2.5	
Design pull through resistance per fixing (N_{rd3}) kN	0.185	0.213
Design pull through resistance per slab kN (based on the minimum number of fixings)(4)	0.928	1.064
Design pull through resistance per slab kN (based on maximum number of fixings)(5)	2.227	2.554

(1) See Table 5 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 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 the above Table. 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 12 fixings per slab (1200 x 600 mm), which equates to approximately 17 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 the above Table. 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 slab 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:

$Rd \geq W_e$
$Rd_{b.ins/rend} = A_r * N_{RD1}$
$Rd_{pull\text{-}out} = n * N_{RD2}$
$Rd_{pull\text{-}through} = (N_{RD3panel} * n_{panel}) + (N_{RD3joint * njoint})/A_{slab}$

Where:

Rd	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 maximum design 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 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 fixing not placed at the panel joint, based on test (kN)
$N_{RD3joint}$	is the design pull-through resistance per fixing placed at the panel joint, based on test (kN)
n_{panel}	is the number of internal fixings in a panel
n_{joint}	is the number of joint fixings in a panel
A_{slab}	is the area of the slab (m^2)

7.12 The insulation system is mechanically fixed to the substrate wall with a minimum of five fixings per slab or approximately seven fixings per square metre, as per the fixing pattern 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 7 of this Certificate.

Table 7 System impact resistance

Render systems:	Category[1]
Basecoat (+ primer + finishing coats indicated below):	Single mesh
Lightweight basecoat render + lightweight dash receiver + dry dash aggregates	Category II

(1) The 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.
- 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 system can have a reaction to fire classification[1] of A2-s1, d0 in accordance with BS EN 13501-1 : 2018

(1) Warrington Fire WF 420637.

8.2 The fire classification applies to the full range of thicknesses covered by this Certificate and in 'Green Granite' colour for the dash aggregate. The classification of other colours should be confirmed by reference to the documents supporting the national Building Regulations.

8.3 The insulation material in isolation has a Class A1 reaction to fire classification in accordance with BS EN 13501-1 : 2018.

8.4 The system described in 8.2 is suitable for use on, or at any distance from, the boundary and without height restrictions. The use of other colours of the system must be considered by a suitably experienced and competent individual on the basis of the fire classification achieved.

8.5 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.

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

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

9 Proximity of flues and appliances

When the system is installed in close proximity to certain flue pipes, the relevant provisions of the national Building Regulations should be satisfied.

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 weathertight prior to the application of the system. The system must only be installed where there are no signs of dampness on the inner 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 The guidance given in BRE Report BR 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 coping, 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 construction, including openings and penetrations at junctions between the insulation system, to minimise the risk of condensation. The recommendations of the 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 8, Annex D) and BRE Report BR 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, Annexes D and G) and section 11.5 of this Certificate.

11.5 The water vapour resistance factor (μ) for the insulation component may be taken as 1, and the equivalent air layer thickness (S_d) of the reinforced basecoat with finish coat may be taken as 0.50 m for a render system of 8.5 mm thickness.

Table 8 Equivalent air layer thickness (S_d) and water vapour resistance factor (μ)

Description	Thicknesses (mm)	S_d (m)	μ
Mineral wool	80 to 240	—	1(1)
Lightweight basecoat render + lightweight dash receiver + dry dash aggregate	8.5	0.50	—

(1) Taken from BS EN ISO 10456 : 2007, Table 5

12 Maintenance and repair

12.1 An initial inspection should be made within 12 months and regularly checked thereafter to include:

- visual inspection of the render for signs of damage. Cracks in the render exceeding 0.2 mm must be repaired
- examination of the sealant around openings and service entry points
- visual inspection of architectural details designed to shed water to confirm that they are performing properly
- visual inspection to ensure that water is not leaking from external downpipes or gutters; such leakage could penetrate the rendering
- necessary repairs effected immediately and 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 For a 60-year durability, a detailed maintenance plan must be prepared and provided to the building manager/owner on completion. As a minimum, this should include an inspection for evidence of defects 12 months after the application and subsequently every five years. This plan should include full details of the required inspection regime; a record of these inspections should be retained.

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

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 The system's service life can be extended to 60 years provided a planned inspection and maintenance programme is introduced, in accordance with section 12. An extended 60 years' service life requires the use of stainless steel base, stop end and corner profiles, stainless steel fixings or centre pin Grade 1.4301 and plastic anchor sleeve materials such as polyamide (PA6 and PA6.6), polyethylene (PE) or polypropylene (PP) and the following of an appropriate repair and maintenance schedule as covered by the Certificate holder's repair and maintenance manual. In order to achieve this, and depending on the building's location, degree of exposure and detailing, it may be necessary to repair or replace isolated areas. Any damage to the surface finish must be repaired within a time period agreed by the Certificate holder's repair and maintenance manual.

13.3 The render finish 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 overcoating.

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
- additional corner mesh and reinforcement, where required
- areas where flexible sealants must be used
- any alterations to external plumbing, if required.

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 for proposed mechanical fixings for the appropriate substrate. 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 fixing's pull-out resistance (see section 7). The advice of the Certificate holder should be sought to ensure the proposed fixing pattern (and supplementary adhesive) is sufficient.

14.3 All modifications, such as alterations to external plumbing and 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 one metre, 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 window sills must be fitted to extend beyond the finished face of the system. New buildings should incorporate suitably deep sills.

14.7 In new buildings, internal wet work, eg screed or plastering, should be completed and allowed to dry prior to the application of the system.

15 Approved installers

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

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

16.2 Weather conditions should be monitored to ensure correct application and curing conditions. Application of render must not be carried out at temperatures below 5°C or above 30°C, or if exposure to frost is likely, and the coating must be protected from rapid drying. Installation should not take place during rainfall or if rain is anticipated. In addition, renders must not be applied if the temperature will fall below 0°C within 72 hours of completion.

16.3 One coat of fungicidal wash is applied by brush, roller or spray to the entire surface of the wall, where required.

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

16.5 All rendering should be in accordance with the relevant recommendations of BS EN 13914-1 : 2016.

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

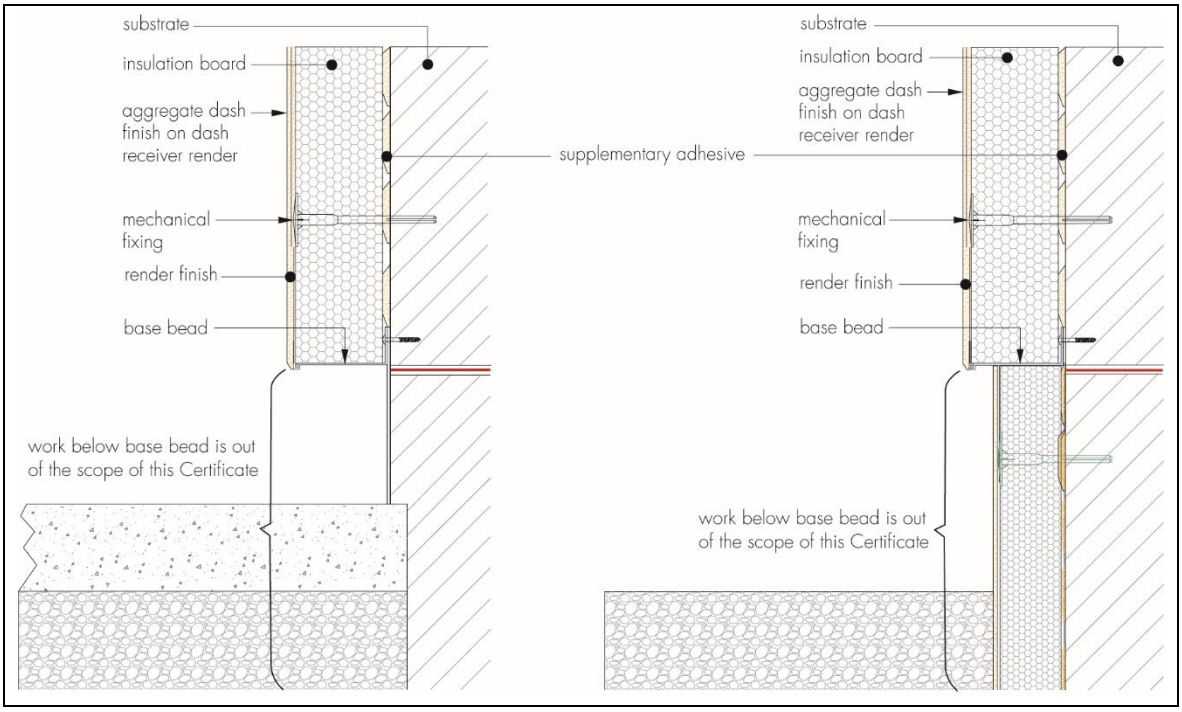
16.7 For a 30-year durability system, the mechanical fixings are applied through the insulation slabs and for 60-year durability, the mechanical fixings are applied through the mesh. The initial installation procedure is common to both systems.

Positioning and securing insulation slabs

16.8 The base profile is secured to the external wall above the dpc using the approved profile fixings at approximately 300 mm centres. Starter track connectors are inserted at all profile joints. For 60-year durability applications, the starter track must be constructed from stainless steel.

16.9 The supplementary bedding adhesive is prepared by adding 5 to 6 litres of clean water per 25 kg bag and mixing with a paddle mixer for a minimum of 5 minutes until the desired consistency is achieved. It is applied in a continuous strip around the perimeter of the slab, with three dabs (approximate widths between 10 and 40 mm) distributed uniformly over the remaining surface. Alternatively, a serrated edge trowel with 10 mm serrations can be used to apply the adhesive to the entire rear surface of the insulation slab. The adhesive must cover at least 40% of the slab overall.

Figure 2 Typical section of base profile



16.10 The first run of insulation slabs is positioned on the perforated base profile, which is securely fixed to the substrate using the project-specific fixing type and butted tightly together with the vertical joints staggered by at least 200 mm (see Figures 4 and 6). Joints greater than 2 mm between slabs should be filled with MW slivers. 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.

16.11 After the insulation is positioned on the wall, mechanical fixings are applied through each insulation slab to secure them during installation of the system. Care should be taken to ensure that the depth of embedment of the fixing into the substrate is as specified. Allowance should be made where either existing render is on the wall or dubbing out render has been used to align the slabs as the effective embedment will be reduced. Depending on the project design requirements, mechanical fixings are inserted directly through the insulation or the reinforcing mesh (after the basecoat has been applied) and insulation – see 30 or 60- year application sections for more information.

16.12 To fit around details such as doors and windows, the slabs may be cut with a sharp knife or a fine-toothed 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, but their performance is outside the scope of this Certificate.

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

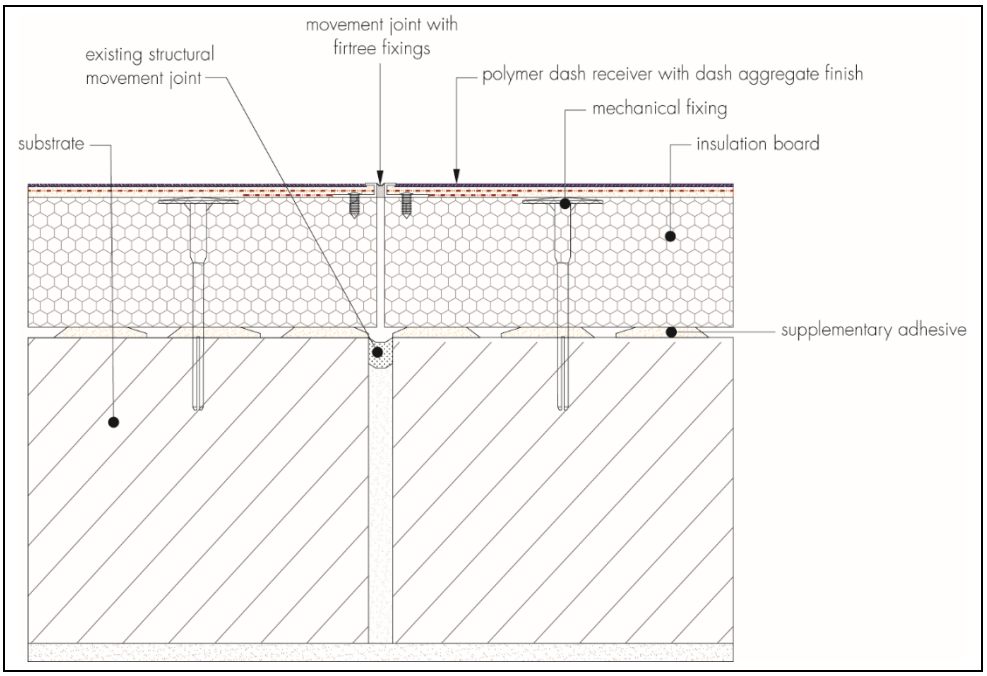
16.14 Periodic checks should be carried out as work proceeds.

16.15 Corner profiles are fixed to all building corners. For a 60-year durability, the corner profiles should be constructed from stainless steel unless they are fully embedded in the render and so protected from atmospheric exposure.

Movement joints

16.16 Where an expansion joint is incorporated in the substrate, then movement joints must be carried through the insulation system (see Figure 3). Expansion beads are fixed on agreed positions. These beads are positioned at approximately seven-metre centres along a building, the centres depending on the individual requirements of each job.

Figure 3 Movement joint detail



Basecoat

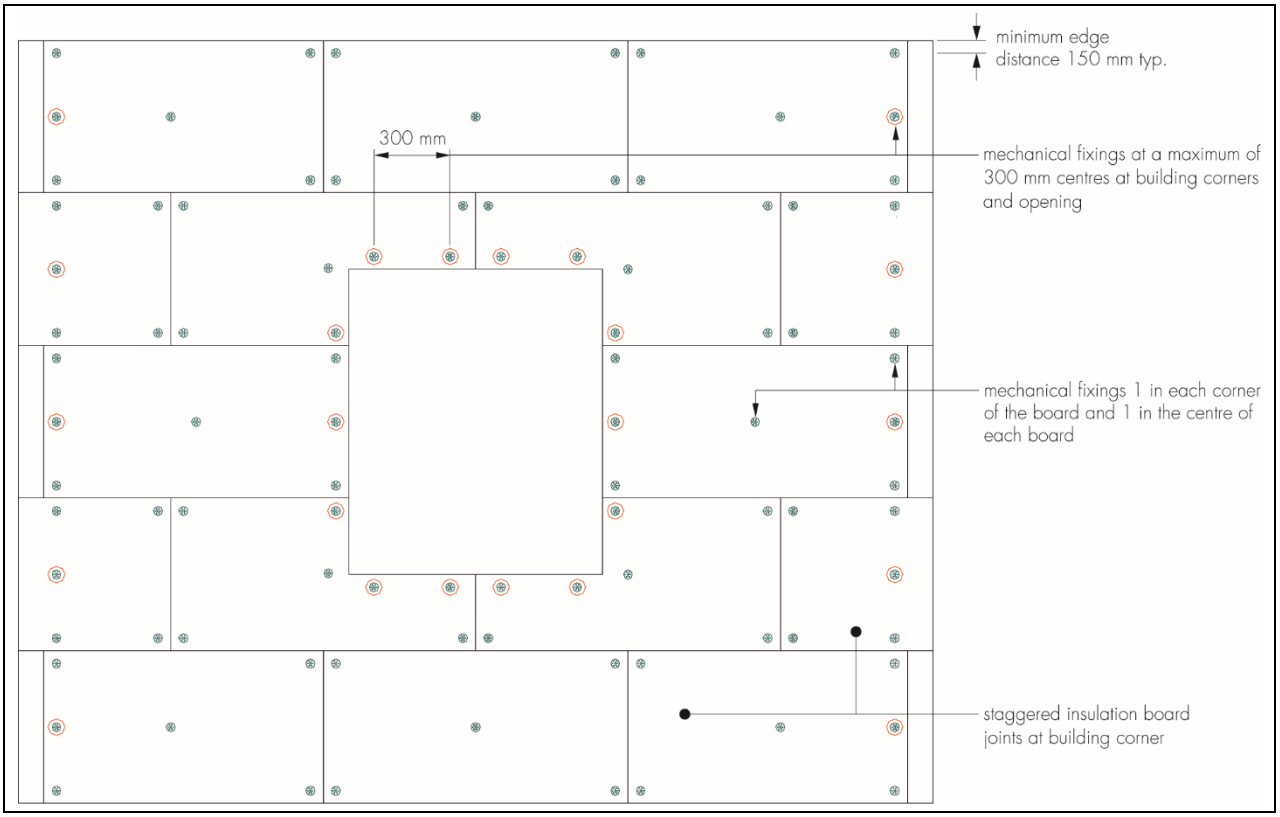
16.17 The basecoat should be mixed with an electric paddle mixer, with 5 to 6 litres of potable water per 25 kg bag for a minimum of 5 minutes, to disperse the additives.

16.18 Building corners, door and window heads and jambs are formed using mesh angle profiles bonded to the insulation in accordance with the manufacturer's instructions.

Application of 30-year durability system — mechanical fixings through the insulation slabs

16.19 After the insulation slabs are initially fixed to the wall, holes are drilled through the insulation slab into the substrate wall to the required depth at the specified frequency and pattern – 7 fixings per square metre (see Figure 4). The mechanical fixings are inserted and tapped or screwed firmly into place, securing the insulation slabs to the substrate.

Figure 4 Typical fixing pattern — 30-year durability



16.20 Basecoat (4 to 6 mm thickness) should be applied to the surface of the insulation using a stainless steel trowel or a render pump.

16.21 The glass fibre mesh is applied and immediately embedded in the wet basecoat using the trowel. The sheets of mesh should be lapped by a minimum of 75 mm. Diagonal patches of mesh approximately 200 by 200 mm should also be installed at the corners of window/door openings (see Figure 5).

16.22 It is important to ensure that the mesh is free of wrinkles and completely covered with basecoat.

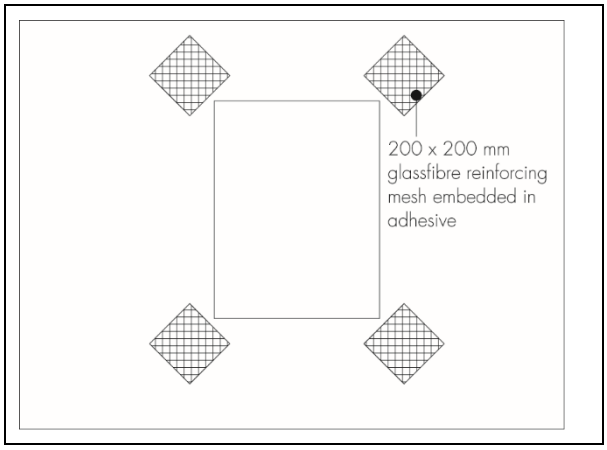
Application of 60-year durability system — mechanical fixings through the reinforcing mesh

16.23 After the insulation slabs are initially fixed to the wall with a single fixing (see Figure 6), the basecoat (4 mm thick) should be applied to the surface of the insulation using a stainless steel trowel.

16.24 The glass fibre mesh is applied and embedded in the wet render using the trowel. The sheets of mesh should be lapped by a minimum of 75 mm and diagonal patches of mesh approximately 200 by 200 mm should also be installed at the corners of window/door openings (see Figure 5).

16.25 It is important to ensure that the mesh is free of wrinkles and completely covered with basecoat.

Figure 5 Additional reinforcement at openings



16.26 While the basecoat is still wet, holes are drilled through the reinforcing mesh and insulation slabs into the substrate wall to the required depth at the specified frequency and in a regular pattern, with a total of 9 fixings per square metre (8 through the mesh and 1 directly through the insulation – see Figure 6). The mechanical fixings are inserted and tapped or screwed firmly into place, securing the mesh and insulation slabs to the substrate wall. The fixings are slightly overdriven into the substrate wall in order to allow the fixing plate to partially penetrate through into the face of the insulation.

16.27 Additionally, while the basecoat is still wet, 150 by 150 mm stress patches of reinforcing mesh are applied over the mechanical fixing heads and fully embedded within the basecoat. Alternatively, a second layer of mesh can be applied instead of stress patches. A second layer of basecoat is applied, to maintain a 4 to 6 mm thickness (approximately) when measured from the top of the fixing head.

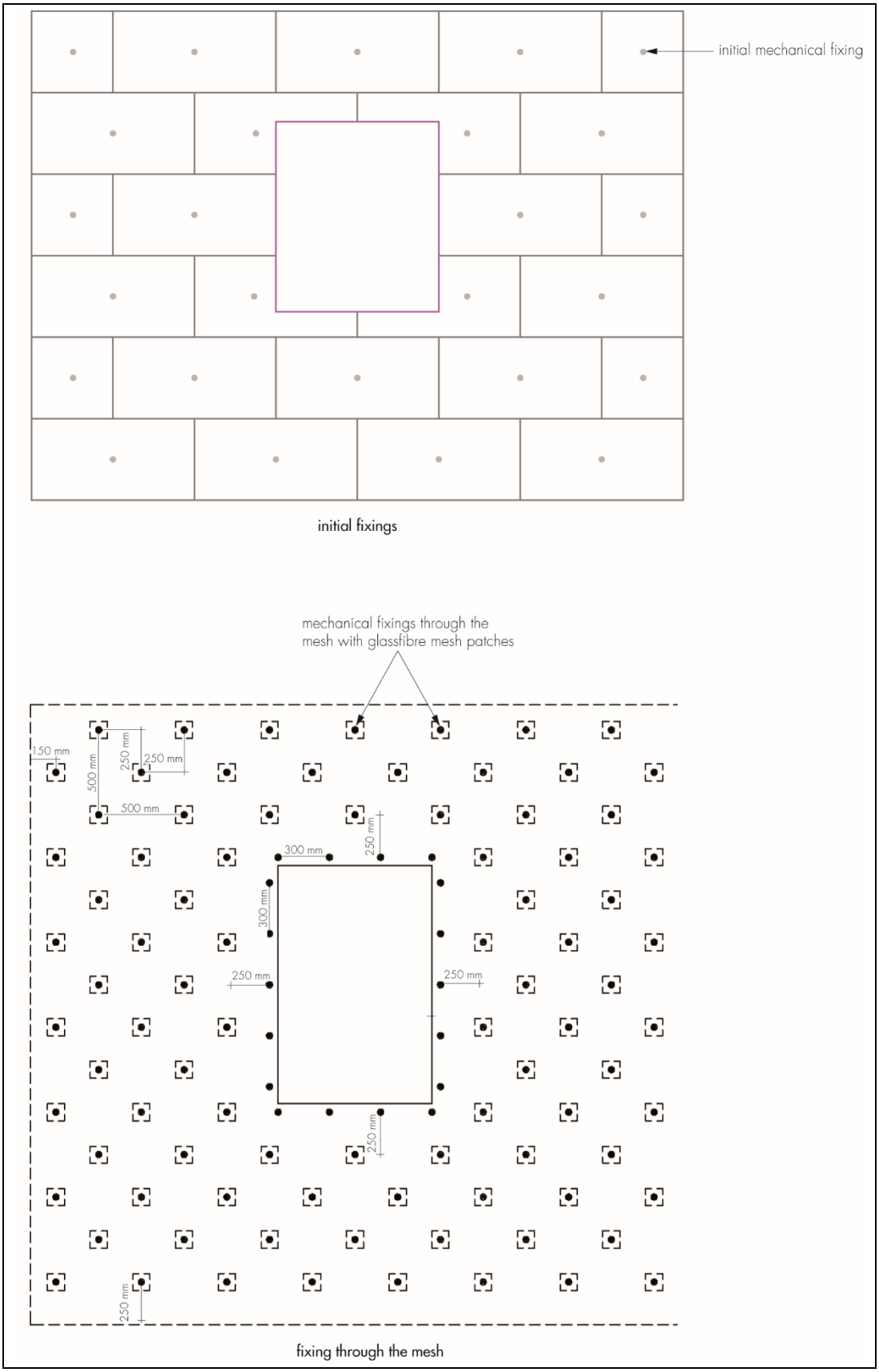
Both the 30- and 60-year durability systems

16.28 The basecoat should be left to dry thoroughly before application of the decorative finish. Depending on conditions, the drying time will be a minimum of 24 hours.

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

16.30 The system is ready for the application of the finish coat.

Figure 6 Typical fixing method for 60-year durability



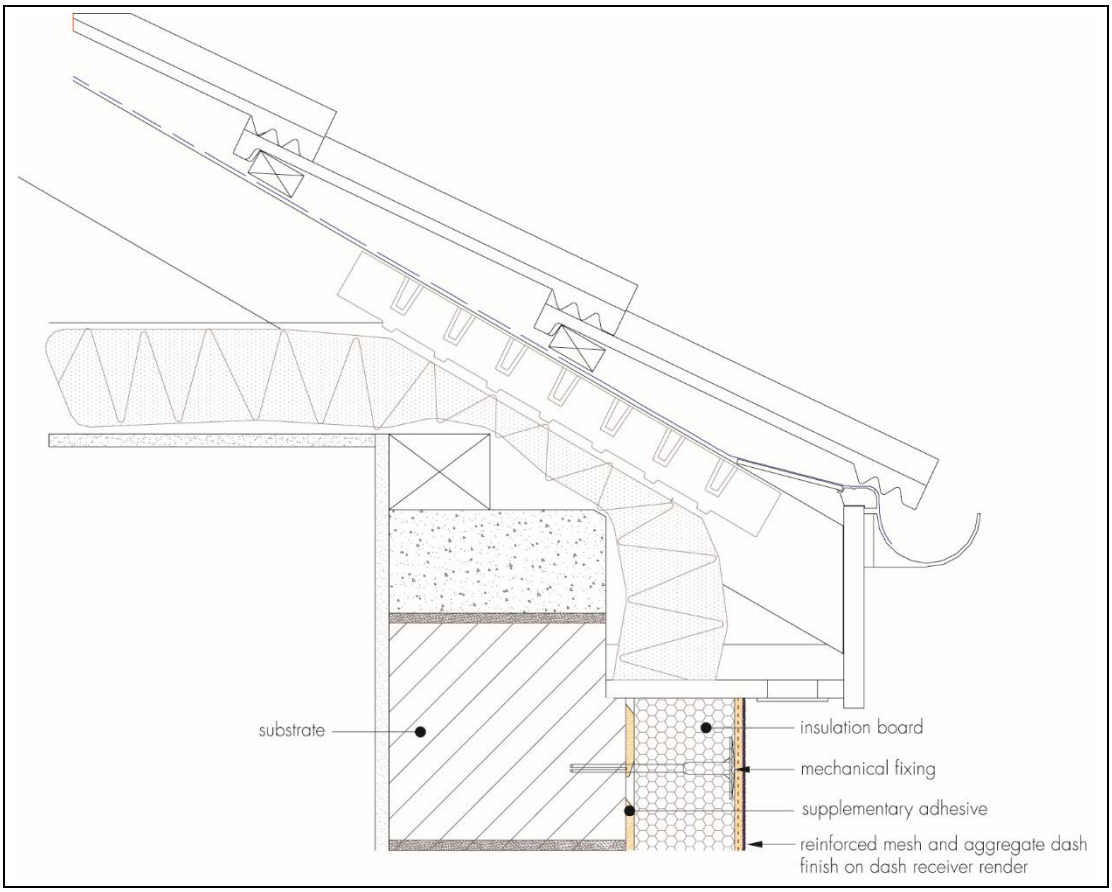
Finish coat

16.31 The dash receiver is prepared and trowel-applied to a thickness of approximately 6 to 10 mm. While the render is still soft, selected clean spar aggregate is thrown or sprayed onto the surface. On completion, the surface must be checked to ensure an even coverage of spar dash has been achieved. Where necessary, the aggregate should be lightly tamped to ensure that a good bond is achieved.

16.32 Continuous surfaces must be completed without a break.

16.33 At the top of walls, the system must be protected by an adequate overhang or by an adequately sealed, purpose-made flashing (see Figure 7).

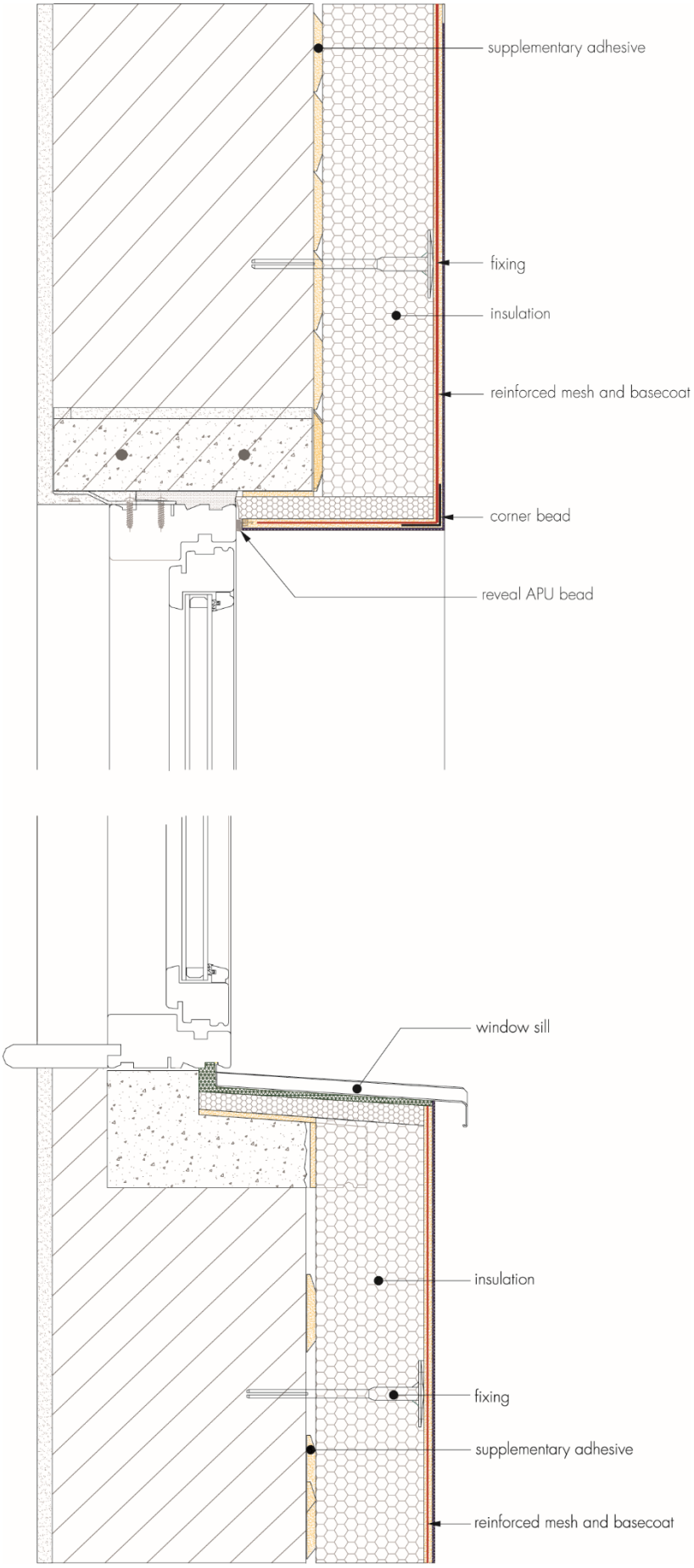
Figure 7 Roof eaves detail



16.34 Care must be taken in the detailing of the system around openings and projections (see Figure 8). To achieve a 60-year service life of an installation, the system is finished against a stainless steel stop bead at reveals, to allow for replacement of windows.

16.35 On completion of the installation, external fittings, eg rainwater goods, are re-fixed through the system into the substrate in accordance with the Certificate holder's instructions.

Figure 8 Typical window reveal detail



17 Investigations

17.1 The system was examined and assessed to determine:

- fire performance
- hygrothermal performance (heat/spray cycling) and resistance to freeze-thaw
- resistance to frost
- resistance to hard body impact
- water absorption of render (capillary test)
- water vapour permeability.

17.2 An examination was made of data relating to:

- thermal resistance
- the risk of interstitial condensation.
- system wind load resistance.

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

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

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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.