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Agrément Certificate
09/4625
Product Sheet 2

WETHERBY EXTERNAL WALL INSULATION SYSTEMS

EPSIWALL EXTERNAL WALL INSULATION SYSTEM

This Agrément Certificate Product Sheet(1) relates to the Epsiwall External Wall Insulation System, comprising mechanically fixed grey enhanced expanded polystyrene (Epsitherm 70E and 90E) or phenolic (PF) insulation boards, with supplementary adhesive where required (adhesive is compulsory when using phenolic insulation), a reinforced basecoat and render finishes. The system is suitable for use on the outside of external masonry walls of new or existing domestic and non-domestic buildings, with height and boundary restrictions.

(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 masonry 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 has a reaction to fire classification of B-s1, d0 in accordance with BS EN 13501-1 : 2007 and its use is restricted (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 the Certificate, the system will remain effective for at least 30 years. The durability can be extended to 60 years by using different fixings and supplementary adhesive, and by following a planned inspection and 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 Fourth issue: 28 May 2021

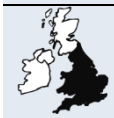
Originally certificated on 19 February 2010

Hardy Giesler
Chief Executive Officer

This Certificate was amended on 22 May 2024 as part of a transition of The BBA Agrément Certificate scheme delivered under the BBA's ISO/IEC 17020 accreditation. This Certificate was issued originally under accreditation to ISO/ IEC 17065. Sections marked with the symbol † are not issued under accreditation. Full conversion to the ISO/IEC 17020 format will take place at the next Certificate review. The BBA is a UKAS accredited Inspection Body (No.4345). ***Readers MUST check the validity of this Agrément Certificate by either referring to the BBA website or contacting the BBA directly.*** *Any photographs are for illustrative purposes only, do not constitute advice and must not be relied upon.*

Regulations

In the opinion of the BBA, the Epsiwall 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 7.13 of this Certificate.
Requirement:	**B4(1)**	**External fire spread**
Comment:		The system is restricted by this Requirement. See sections 8.1 to 8.4 of this Certificate.
Requirement:	**C2(b)**	**Resistance to moisture**
Comment:		The system can provide 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 restricted 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 7.13 of this Certificate.
Standard:	2.6	Spread to neighbouring buildings
Comment:		The system is restricted by this Standard, with reference to clauses 2.6.4(1)(2), 2.6.5(1) and 2.6.6(2). See sections 8.1 to 8.3, 8.5 and 8.6 of this Certificate.

Standard:	2.7	Spread on external walls
Comment:		The system is restricted by this Standard, with reference to clause 2.7.1(1)(2). See sections 8.1 to 8.3, 8.5 and 8.6 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:		Walls insulated with the system can satisfy this Regulation. See section 10.1 of this Certificate.
Regulation:	**29**	**Condensation**
Comment:		Walls insulated with the system can satisfy the requirements of 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 7.13 of this Certificate.
Regulation:	**36(a)**	**External fire spread**
Comment:		The system is restricted by 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 6.1 and 6.2 of this Certificate.

Regulation:	**40**	**Target carbon dioxide emission rate**
Comment:		The system can contribute to satisfying this Regulation. 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 3.4) and 12 *Maintenance and repair* of this Certificate.

Additional Information

NHBC Standards 2021

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

(1) There is a general requirement in *NHBC Standards* 2021, Chapter 6.9, for fire-retardant-treated EPS insulation in accordance with BS EN 13163 : 2012 to be used with the system.

Technical Specification

1 Description

1.1 The Epsiwall External Wall Insulation System comprises grey enhanced expanded polystyrene (Epsitherm 70E and 90E) or phenolic (PF) insulation boards, mechanically fixed to the external masonry wall, with supplementary adhesive(1) where required (with a minimum 40% coverage of adhesive), with reinforcement glass fibre mesh embedded in the basecoat, and silicone render finishes. The system can be designed to achieve either a 30- or 60-year durability (see Table 1 and Figure 1).

(1) Supplementary adhesive is compulsory for the 60-year durability system and when using phenolic (PF) insulation boards and for the system combinations specified in section 1.3.

Table 1 Epsiwall External Wall Insulation System – options

Components	Option 1	Option 2
Supplementary adhesive(1)	Wetherby Bedding Adhesive	
Insulation	Wetherby Epsitherm 70E Wetherby Epsitherm 90E	Phenolic (PF)(2)
Basecoat	Heck K+A Basecoat	
Reinforcement	Reinforcement mesh	
Primer	Wetherby Silicone Primer	
Finish	Heck SHP Siliconharzputz K render topcoat Heck Siliconharzputz R render topcoat	

(1) Supplementary adhesive is not required for the allowable dry fix configurations
(2) Phenolic insulation is not permitted for dry fix application.

1.2 The system can be designed to achieve either a 30- or 60-year service life durability (see Figure 1 for both applications, and section 16). Mechanical fixings are applied through the insulation boards (only when using EPS) for a 30-year system, or through the reinforcement mesh and insulation boards (either EPS or PF) for a 30-or 60-year system, to the external surface of the substrate wall (see sections 1.3 and 1.4 for more information).

1.3 The fixing combinations covered under this Certificate are:

- All system combinations using EPS insulation that are mechanically fixed through the insulation only (that is, not through the mesh and insulation) and which use supplementary adhesive (minimum coverage of 40%). Suitable for 30-year durability only
- All system combinations, using EPS or PF insulation that are mechanically fixed through the mesh/insulation and which use supplementary adhesive (minimum coverage of 40%). Suitable for 30-year or 60-year durability
- Dry fix system, using EPS insulation (70E and 90E), plus Heck SHP Siliconharzputz K or Heck Siliconharzputz R render finishes. Phenolic insulation cannot be used for dry fixed applications. The system may be fixed through the insulation only or through the mesh/insulation. Suitable for 30-year durability only.

30-year durability

1.4 For EPS insulation, after the boards have been secured to the wall, and mechanical fixings installed through the insulation, the basecoat is trowel-applied to the specified thickness, followed by the reinforcement mesh, which is fully embedded within the basecoat. The system is left to cure before application of the primer, and render finish.

1.5 For PF insulation, the system can only be installed when mechanical fixings are applied through the reinforcement mesh (see section 1.6 of this Certificate).

60-year durability

1.6 After the insulation boards have been secured to the wall with insulation adhesive and one mechanical fixing through each insulation board, the basecoat is trowel applied to the specified thickness, followed by the reinforcement mesh, which is fully embedded within the basecoat. While the basecoat is still wet, mechanical fixings are applied through the mesh and insulation boards into the substrate, followed by the application of mesh patches or a second layer of mesh over the fixing heads, with more basecoat applied to fully embed the fixing plate and the mesh. Additional basecoat is applied to achieve the required thickness measured from the top of the fixing plate. The system is left to cure before application of the primer, and render finish.

1.7 Additionally, for the 60-year durability system, the requirements of sections 1.8 (Mechanical fixings) and 4.14 must be satisfied.

1.8 The system comprises the following components:

Adhesive (supplementary)

- Wetherby Bedding Adhesive — a polymer-modified cementitious adhesive, including limestone sand, and additives. Supplied as a 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 with a coverage of 7.2 to 10.8 $kg \cdot m^{-2}$.

Insulation

- Wetherby Epsitherm 70E and 90E[(1)(2)] – grey enhanced expanded polystyrene (EPS) 70 and 90 insulation boards — 1200 by 600 mm in a range of thicknesses between 40 and 240 mm, with a nominal density of 15 $kg \cdot m^{-3}$ for Epsitherm 70E, and 19 $kg \cdot m^{-3}$ for Epsitherm 90E, a minimum tensile strength (perpendicular to the faces) of ≥ 100 $kN \cdot m^{-2}$ and a minimum compressive strength of 70 $kN \cdot m^{-2}$ and 90 $kN \cdot m^{-2}$ respectively. The boards are manufactured to comply with the requirements for EPS 70 and 90, Class E material to BS EN 13163 : 2012

  (1) For declared thermal conductivity values (λ_D), see Table 2
  (2) For details of insulation less than 40 mm thick, the advice of the Certificate holder should be sought.

- Phenolic insulation boards[(1)(2)] — 1200 by 600 mm in a range of thicknesses between 60 and 120 mm, with a nominal density of 40 $kg \cdot m^{-3}$, a minimum tensile strength (perpendicular to the faces) of 50 $kN \cdot m^{-2}$ and a minimum compressive strength of 150 $kN \cdot m^{-2}$. The boards are manufactured to comply with the requirements of BS EN 13166 : 2012.

  (1) For declared thermal conductivity values (λ_D), see Table 2
  (2) For details of insulation less than 60 mm thick, the advice of the Certificate holder should be sought.

Mechanical fixings

- mechanical fixings[(1)(2)(3)(4)] — 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 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
  - Fischer Termoz 8SV — polyamide anchor sleeve with galvanized steel screw
  - 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-S — copolymer polypropylene with electro-galvanized screw
  - Bravoll PTH-KZ 60/8 — polypropylene anchor sleeve with stainless steel or electro-galvanized pin
  - Spit ISO 10[(5)] — polypropylene plastic expansion sleeve with a polypropylene or polyamide 6 plastic nail.

(1) Other fixings may be used provided it can be demonstrated that they have equal (or higher) pull-out strength, plate diameter, plate stiffness and load resistance characteristics to the fixing used for the relevant test (see section 7 and Table 7)
(2) High density polyethylene or polyamide anchor sleeve with a stainless steel pin (grade 1.4301 or 1.4401 to BS EN 10088-2 : 2014) is required to achieve 60-year durability performance
(3) Only metal fixing pins/screws are allowed for dry fix systems
(4) Fixings must be surface mounted only
(5) Fixing can only be specified for 30-year durability applications – and cannot be used in dry fix applications.

Basecoat

- Heck K+A Basecoat — a cementitious, ready-mixed render conforming to BS EN 13139 : 2002, supplied as a 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 with a coverage of 8 $kg.m^{-2}$.

Reinforcement

- Reinforcement mesh – an alkali-resistant scrim cloth reinforcement mesh, 1 m wide (grid size 3.5 by 3.8 mm), of multi-strength glass fibres, with a polymer coating, organic content of 20%, PCS value of 5.80 $MJ \cdot kg^{-1}$ and a nominal weight of 160 $g \cdot m^{-2}$.

Primer

- Wetherby Silicone Primer— a silicone primer emulsion, used as a bonding agent and pre-coat, with a coverage rate of 0.2 to 0.3 litres per m^2.

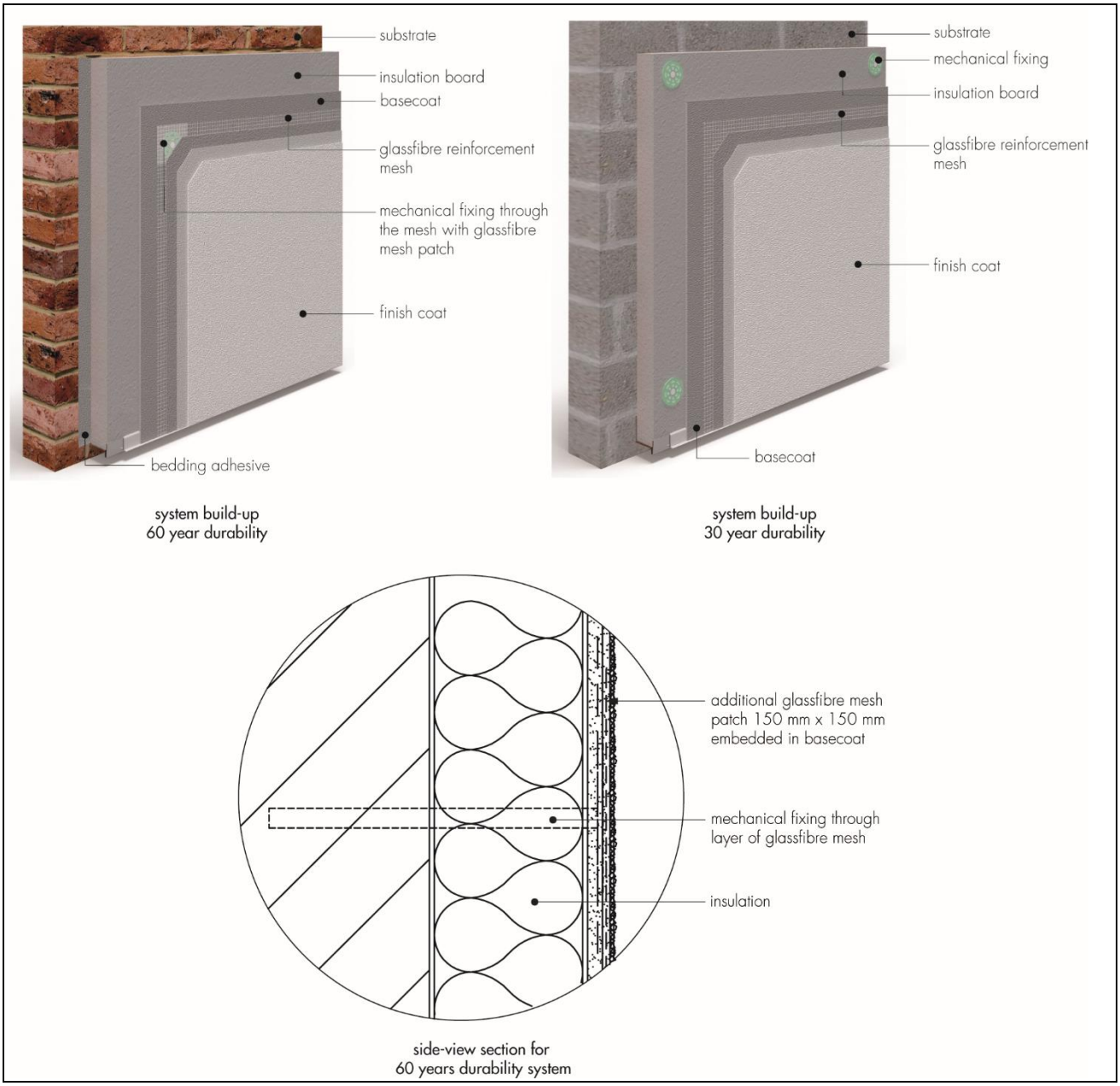
Finish

- Heck SHP Siliconharzputz K and Heck SHP Siliconharzputz R render topcoats — silicone-based ready mixed renders supplied as pastes, with particle sizes and coverage rates as shown in Table 2. If necessary, water can be added to adjust the consistency.

Table 2 Topcoat particle size and coverage

Product	Particle size (mm)	Coverage rate ($kg.m^{-2}$)
Heck SHP Siliconharzputz K	1.0	1.8 to 2.0
	1.5	2.0 to 2.4
	2.0	2.8 to 3.2
	3.0	3.8 to 4.2
Heck SHP Siliconharzputz R	2.0	2.6 to 2.8
	3.0	3.2 to 3.4

Figure 1 Epsiwall External Wall Insulation System



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

1.10 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
- fungicidal wash
- PU foam filler
- sealing tape.

2 Manufacture

2.1 The system 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 Certificate's holder and product identification marks and batch numbers.

3.2 Components are delivered in the quantities and packages listed in Table 3. Each package carries the Certificate holder's and product identification marks and the batch number.

Table 3 Component supply details

Component	Quantity and packaging
Wetherby bedding adhesive	25 kg bags
Heck K+A Basecoat	25 kg bags
Reinforcement mesh	50 by 1 m rolls
Primer	23 kg tubs
Finishing coats	25 kg tubs
Mechanical fixings	boxed by manufacturer

3.3 The insulation boards 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 by re-covering with opaque polythene sheeting.

3.4 Care must be taken when handling the insulation boards to avoid both damage and contact with solvents or bitumen products. The boards must not be exposed to open flame or other ignition sources. Boards that become damaged, soiled or wet should be discarded.

3.5 The basecoat must be stored in dry conditions within 5 and 30 °C, off the ground and protected from frost and moisture 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 primer and finish coats should be stored in a safe area, under cover and protected from excessive heat and frost.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on the Epsiwall External Wall Insulation System.

Design Considerations

4 General

4.1 The Epsiwall 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) with height restrictions (See section 8 of this Certificate). 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. The difference between a 30- and 60-year durability system is covered in section 1, with the detailed installation procedures covered in section 16.

4.14 For a 60-year durability system, the insulation adhesive must be used, and 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).

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 insulation Certificate's holder declared thermal conductivity (λ_D value) of the insulation, as given in Table 4.

Table 4 Declared thermal conductivity values (λ_D) and available thicknesses

Insulation type	Thickness (mm)	Thermal conductivity ($W \cdot m^{-1} \cdot K^{-1}$)
Wetherby EPS Epsitherm 70E	40 to 240	0.032
Wetherby EPS Epsitherm 90E	40 to 240	0.030
Phenolic insulation board	40 to 45	0.021
	45 to 120	0.020

6.2 The U value of a completed wall will depend on the selected insulation type and thickness, fixing method and type and number of fixings, the insulating value of the substrate masonry and its internal finish. Calculated U values for sample constructions in accordance with the national Building Regulations are given in Table 5, and are based on the thermal conductivities given in Table 4.

Table 5 Insulation thickness required to achieve U values[1][2][3] given in the national Building Regulations (30- and 60-year durability)

U value[4] ($W \cdot m^{-2} \cdot K^{-1}$)	Thickness of insulation[3] (mm)					
	215 mm brickwork (λ = 0.56 $W \cdot m^{-1} \cdot K^{-1}$)			200 mm dense blockwork (λ = 1.75 $W \cdot m^{-1} \cdot K^{-1}$)		
	Epsitherm 70E	Epsitherm 90E	Phenolic foam (PF)	Epsitherm 70E	Epsitherm 90E	Phenolic foam (PF)
0.18	170	160	105	180	170	115
0.19	160	150	105	170	160	105
0.25	120	110	75	130	120	85
0.26	110	110	75	120	110	75
0.28	100	100	65	110	100	75
0.30	100	90	65	100	100	65
0.35	80	70	55	90	80	55

(1) Wall construction inclusive of 13 mm plaster (λ = 0.57 $W \cdot m^{-1} \cdot K^{-1}$), brickwork (protected) with 17.1% mortar or dense blockwork with 6.7% mortar (λ = 0.88 $W \cdot m^{-1} \cdot K^{-1}$) and external render thickness of 5.5 mm (λ = 1 $W \cdot m^{-1} \cdot K^{-1}$). Declared thermal conductivity of insulation (λ_D) is as shown in Table 4.

(2) Calculations based on a system that included 7 fixings per square metre with a point thermal transmittance (x_p) of 0.003 $W \cdot K^{-1}$ per steel 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 $W \cdot m^{-2} \cdot K^{-1}$ to 0.18 $W \cdot m^{-2} \cdot K^{-1}$ depending on insulation type and wall type.

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 (also see 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, 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 system 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 86 $kN \cdot m^{-2}$ for the EPS insulation. 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 4; 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 6.

(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 6 Fixings — typical characteristic pull-out resistances

Fixing type[1][2]	ETA number	Substrate	Drill diameter (mm)	Effective anchorage depth (mm)	Characteristic pull-out resistance (kN)[3]	Partial factor
Ejotherm NT U	05/0009	Concrete C12/15 Clay bricks	8	25	1.2 1.5	2
Ejotherm STR U	04/0023	Concrete C12/15 Clay bricks	8	25	1.5	2
Fisher Termoz 8U	02/0019	Concrete C12/15 Clay bricks	8	70	1.5	2
Fischer Termoz 8UZ	02/0019	Concrete C12/15 Clay bricks	8	35	1.2 1.5	2
Fisher Termoz CN8	09/0394	Concrete C12/15 Clay bricks	8	35	0.9	2
Koelner TFIX-8S	11/0144	Concrete C12/15 Clay bricks	8	25	1.2	2
Koelner TFIX-8ST	11/0144	Concrete C12/15 Clay bricks	8	25	1.2	2
Koelner TFIX-8M	07/0336	Concrete C12/15 Clay bricks	8	25	1.2	2
Bravoll PTH-KZ 60/8	05/0055	Concrete C12/15 Clay brickwork	8	25	0.7 0.9	2
Bravoll PTH-S	08/0267	Concrete C12/15 Clay bricks	8	45	1.5	2
Fischer Termoz 8 SV	06/0180	Concrete C12/15 Clay bricks	8	30	1.5	2
Spit ISO 10	04/0076	Concrete C12/15 Clay bricks	10	30	20 30	2

(1) The minimum values for plate stiffness of fixings installed with the EPS 70E insulation is 0.3 kN·mm^{-2} and the load resistance is 1.38 kN. All the fixing types listed (with the exception of Spit ISO) can be used with EPS 70E insulation for dry fixed application.
(2) The minimum values for plate stiffness of fixings installed with the phenolic insulation is 0.5 kN·mm^{-2} and the load resistance is 1.44 kN. All the fixing types listed (with the exception of Spit ISO) can be used with phenolic insulation
(3) 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.

7.9 The characteristic pull-through resistance of the fixings was determined from tests using the diameter fixing plate and minimum insulation thickness shown in Table 7. The design resistance per fixing (N_{RD3}) is obtained by applying a partial factor of 2.5.

Table 7 Design pull-through resistances

Factor (unit)	Pull-through data for a 30- and 60-year durability system	
	Enhanced grey EPS 70/90	Phenolic
Tensile resistance of the insulation (kN.m^{-2})	≥ 100	≥ 50
Fixing type[1]	All fixings listed in Table 6	
Fixing plate diameter (mm)	60	60
Insulation thickness (mm)	60	60
Characteristic pull through resistance[2] per fixing kN	0.51	0.52
Partial factor[3]	2.5	
Design pull through resistance per fixing (N_{RD3}) kN	0.204	0.208
Design pull through resistance per board (kN) (based on the minimum number of fixings)[4]	1.02	1.04
Design pull through resistance per board (kN) (based on the maximum number of fixings)[5]	2.448	2.496

(1) See Table 6 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 boards are quality controlled and tested to establish tensile strength perpendicular to the face of the board

(4) The minimum design pull through resistance per board is based on a minimum of 5 fixings per board (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 5 of this Certificate and minimum insulation specified in this Table. The fixing pattern and interaction of the fixings should be considered when calculating the design resistance per board

(5) The maximum design pull through resistance per board is based on a maximum of 12 fixings per board (1200 x 600 mm), which equates to approximately 16 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 this Table. The fixing pattern, insulation thickness and interaction of the fixings should be considered when calculating the design resistance per board.

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 Dry fix installations (that is, with no supplementary adhesive) correctly designed in accordance with this Certificate (see section 1.3) will safely accommodate the applied loads due to the self-weight of the system, wind and impact when using EPS insulation with a maximum thickness as per section 1.3 of this Certificate. Also see section 1.8 for acceptable fixings. Seals and interfaces with the render system should be designed and detailed to accommodate this movement.

7.12 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:

$Rd \geq W_e$

$Rd_{b.ins/rend} = A_r * N_{RD1}$

$Rd_{pull\text{-}out} = n * N_{RD2}$

$Rd_{pull\text{-}through} = (N_{RD3panel} * n_{panel}) + (N_{RD3joint * njoint})/A_{board}$

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_{board}	is the area of the board (m^2)

7.13 The insulation system is mechanically fixed to the substrate wall with a minimum of 5 fixings per board or approximately 7 fixings per square metre, as per the fixing pattern shown in Figure 5 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

7.14 Hard body impact tests were carried out in accordance with ETAG 004 : 2013 and the system is suitable for use in all Categories(1).

(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 reaction to fire classification for the system is B-s1, d0(1) in accordance with BS EN 13501-1 : 2007.

(1) Exova Warringtonfire. WF 407100.

8.2 The fire classification applies to the full range of thicknesses covered by this Certificate and render colour 'White'. The classification of other colours of the system should be confirmed by reference to the requirements of the documents supporting the national Building Regulations.

8.3 The EPS insulation materials in isolation have a classification of an E in accordance with BS EN 13501-1 : 2002 . The Phenolic insulation materials in isolation have a classification of C-s2, d0 in accordance with UNE-EN 13501-1 : 2019.

8.4 In England and Wales, and Northern Ireland, the system defined in section 8.2 may be used on buildings at any proximity to a boundary. The system is restricted for use in buildings up to 18 m in height.

8.5 In Scotland, the system may be used on buildings more than 1 m from a boundary and, on houses, 1 m or less from a boundary. With minor exceptions, the system should be included in calculations of unprotected area, except on houses where the external wall behind has the appropriate fire resistance.

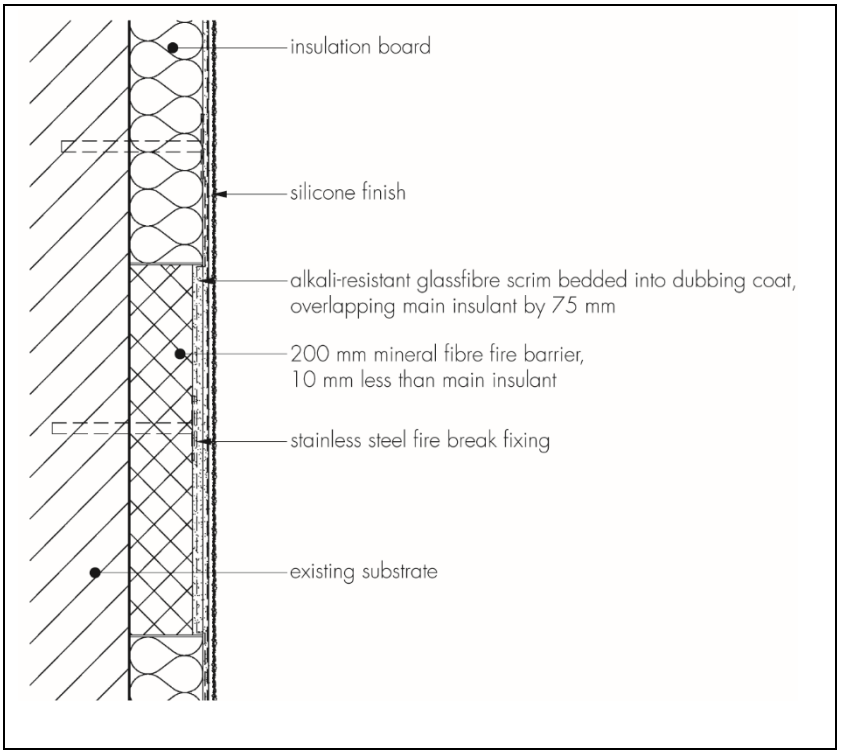
8.6 In Scotland, the system should not be used on any building with a storey more than 11 m above the ground, or on any entertainment or assembly building with a total storey area more than 500 m^2, or on any hospital or residential care building with a total storey area more than 200 m^2.

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

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

8.9 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.

Figure 2 Fire barrier



9 Proximity of flues and appliances

Detailed guidance can be found in the documents supporting the national Building Regulations for the provisions that are applicable when the system is installed in close proximity to certain flue pipes and/or heat-producing appliances.

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 insulation system must only be installed where there are no signs of dampness on the inner surface of the substrate other than those caused solely by condensation.

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

10.3 The guidance given in BRE Report BR 262 : 2002 should be followed in connection with the weathertightness of solid wall constructions. The designer should select a construction appropriate to the local wind-driven 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 a construction, including openings and penetrations at junctions between the insulation system, to minimise the risk of condensation. The recommendations of BS 5250 : 2011 should be followed.

Surface condensation

11.2 Walls will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed 0.7 $W \cdot m^{-2} \cdot K^{-1}$ 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 factors (μ) for the insulation boards, and equivalent air layer thickness (S_d) for the render finish, are shown in Table 8.

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

Description	S_d (m)	μ
Wetherby Epsitherm 70E and 90E	—	20 to 40(1)
Phenolic	—	50(1)
Basecoat + render finishes below:		
Heck K+A Basecoat + Wetherby Silicone Primer + Heck SHP Siliconharzputz K and Heck Siliconharzputz R render topcoats	1.0(2)	—

(1) Taken from BS EN ISO 10456 : 2007, Table 4. It is recommended that the lower figure is used when assessing the interstitial condensation risk.
(2) Taken from BS EN 12524 : 2000, Table 2.

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 system 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 a 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 12.2. A 60 years' service life requires the use of stainless steel base, stop end and corner profiles, stainless steel fixings or centre pin to Grade 1.4301 or 1.4401 to BS EN 10088-2 :

2014 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 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 over coating.

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 must be prepared for each project 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
- the position of fire barriers.

14.2 The survey should include tests conducted on the walls of the building by the Certificate holder or their approved installers (see section 15) to determine the pull-out resistance for 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 test data (see section 7). The advice of the Certificate holder should be sought to ensure the proposed fixing pattern is sufficient.

14.3 All modifications, such as provision for fire barriers (see section 8) 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 boards are installed with a smooth, in-plane finished surface.

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

14.6 On existing buildings, purpose-made 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.

14.8 In multi-storey buildings, at least one stainless steel fixing per square metre is recommended, to provide the increased stability that may be required in the case of a fire (see section 8.7).

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.

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^{o}C or above 30^{o}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, cementitious-based 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.

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.

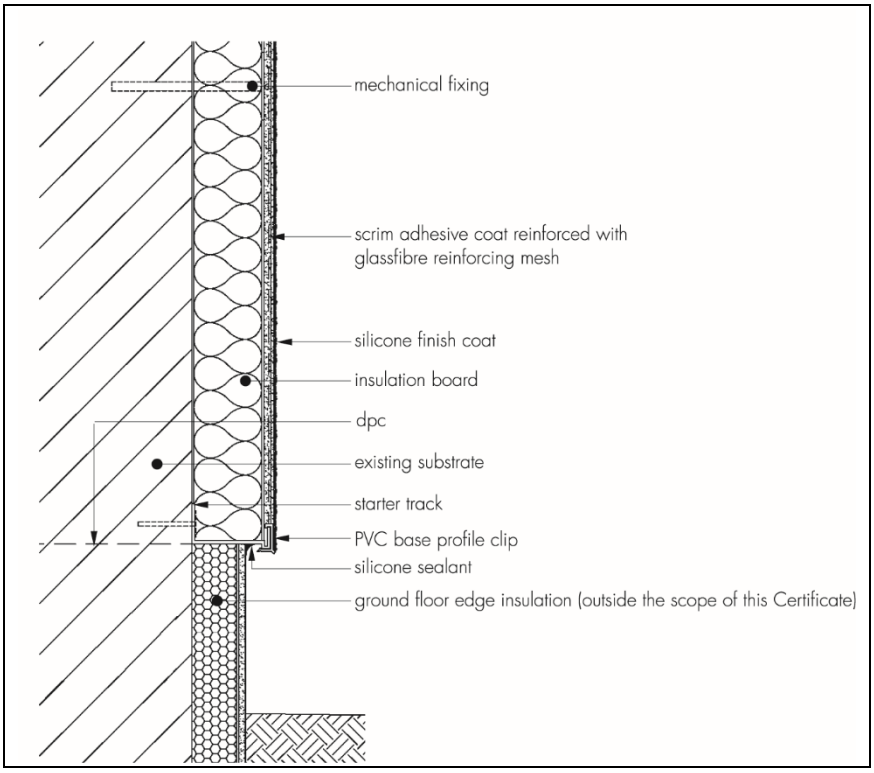
16.7 For a 30-year durability system, the mechanical fixings are applied through the insulation boards (except for the PF insulation, where the mechanical fixings are applied through the reinforcement mesh), and for 60-year durability the mechanical fixings are applied through the reinforcement mesh. The initial installation procedure is common to both systems.

Positioning and securing insulation boards

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 Where required, 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 board, with three additional dabs (approximate widths between 10 and 40 mm) distributed uniformly over the remaining surface, ensuring a minimum 40% coverage. Alternatively, a serrated edge trowel with 10 mm serrations can be used to apply adhesive to the entire rear surface of the insulation board.

Figure 3 Typical section at base level



16.10 The first run of insulation boards is positioned on the perforated base profile, 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. Joints between boards greater than 2 mm should be filled with PU foam. Gaps greater than 10 mm should be closed by repositioning or, where appropriate, by cutting boards to fit. Alignment should be checked as work proceeds.

16.11 Mechanical fixings are applied through each insulation board to secure them during installation of the system. Holes are drilled into the substrate to a required depth. Care should be taken to ensure that the depth of embedment of the fixing into the substrate is as specified. Allowance is made where either existing render is on the wall or dubbing out render has been used to align the boards as the effective embedment will be reduced. Depending on the project design requirements, mechanical fixings are inserted directly through the insulation or the reinforcement mesh (after basecoat has been applied) and insulation and tapped firmly into place, securing the insulation board to the substrate. The fixings are either hammered or screwed in depending on the type specified.

16.12 To fit around details such as doors and windows, the boards may be cut with a sharp knife or a fine-toothed saw. If required, purpose-made window sills are fitted which are designed to prevent water ingress and incorporate drips to shed water clear of the system, but their performance is outside the scope of this Certificate.

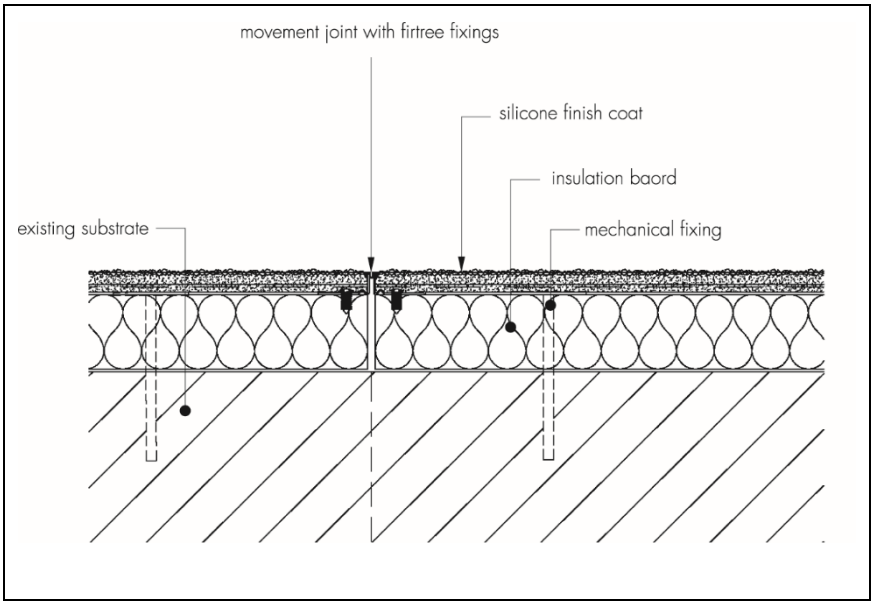
16.13 Installation continues until the whole wall is completely covered including, where appropriate, the building soffits.

16.14 Periodic checks should be carried out as work proceeds.

Movement joints

16.15 Where an expansion joint is incorporated in the substrate, then movement joints must be carried through the insulation system (see Figure 4). Expansion beads are fixed at agreed positions. These beads are positioned at approximately seven metre centres along the building, the centres depending on the individual requirements of each job.

Figure 4 Vertical movement joint



Basecoat and reinforcement

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

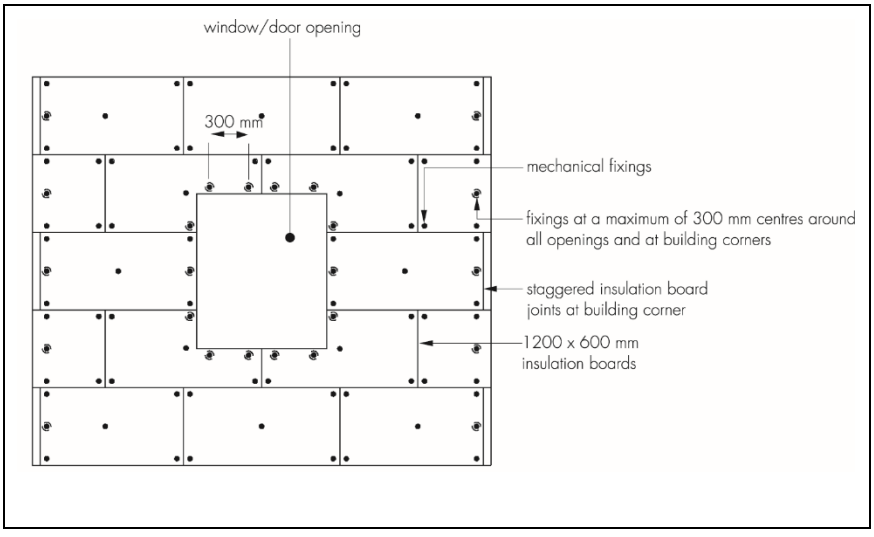
16.17 Building corners, door and window heads and jambs are formed using mesh angle profiles bonded to the insulation in accordance with the manufacturer's instructions.

Application of 30-year durability system (mechanical fixings through the insulation boards)

16.18 For EPS insulation boards, after the insulation boards are initially fixed to the wall, holes are drilled through the insulation board into the substrate wall to the required depth at the specified frequency and pattern, 7 fixings per square metre, including the initial fixing (see Figure 5). The mechanical fixings are inserted and tapped or screwed firmly into place, securing the insulation boards to the substrate.

16.19 For PF insulation, the mechanical fixings are applied through the reinforcement mesh (see Figure 7).

Figure 5 Typical fixing pattern - 30-year durability (as shown on EPS)



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 100 mm. Diagonal patches of mesh approximately 200 by 200 mm should also be installed at the corners of window/door openings (see Figure 6).

16.22 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.

16.23 It is important to ensure that the mesh is free of wrinkles, completely covered and that the 4 to 6 mm basecoat thickness is achieved.

Application of 60-year durability system (mechanical fixings through the reinforcement mesh)

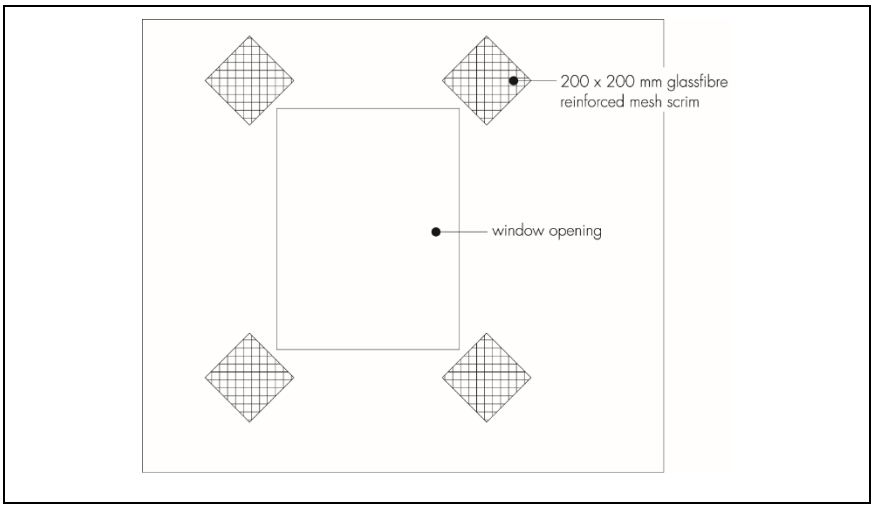
16.24 After the insulation boards are initially fixed to the wall with a single fixing (see Figure 7), the basecoat (4 mm thick) should be applied to the surface of the insulation using a stainless steel trowel.

16.25 The glass fibre mesh should be applied and immediately embedded in the wet basecoat using the trowel. The sheets of mesh should be lapped by a minimum of 100 mm and diagonal patches of mesh (approximately 200 by 200 mm) should also be installed at the corners of window/door openings (see Figure 6).

16.26 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.

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

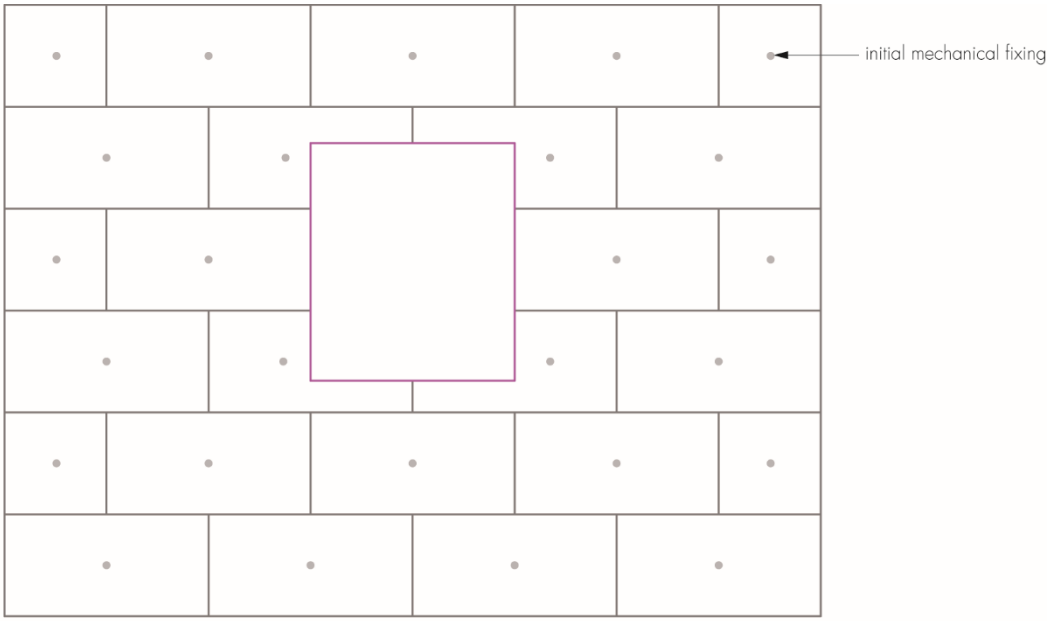
Figure 6 Corner reinforcement



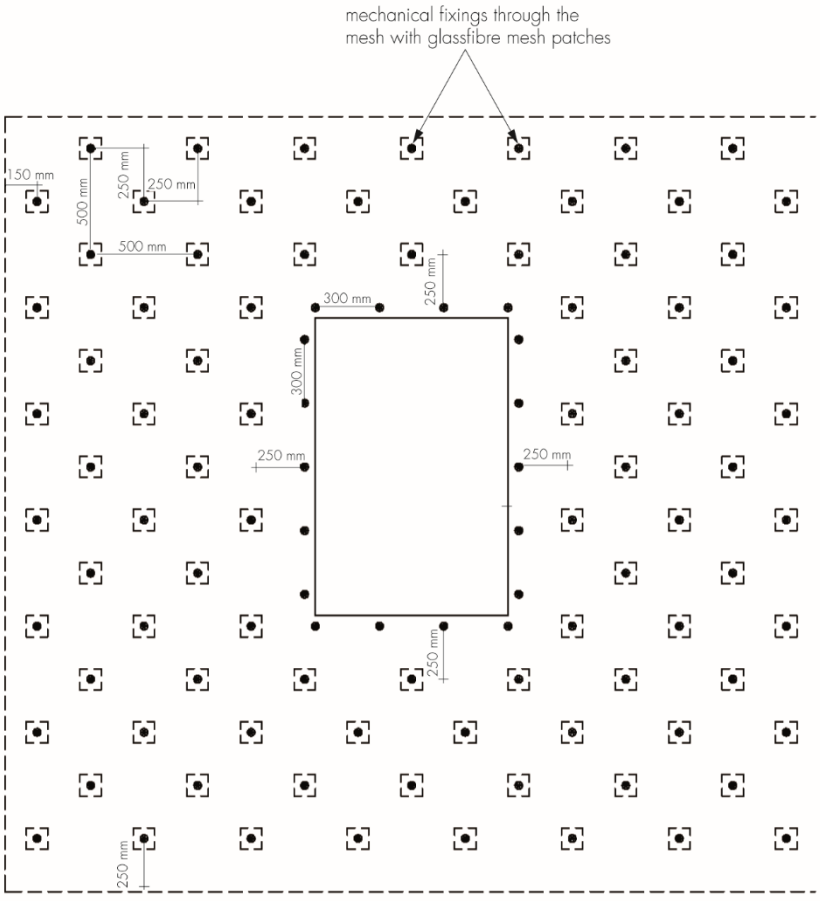
16.28 While the basecoat is still wet, holes are drilled through the reinforcement mesh and insulation boards into the substrate wall to the required depth at the specified frequency and in a regular pattern, with a total of 8 fixings per square metre (7 through the mesh and 1 directly through the insulation – see Figure 7). The mechanical fixings are inserted and tapped or screwed firmly into place, securing the mesh and insulation boards 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 boards.

16.29 Additionally, while the basecoat is still wet, 150 by 150 mm stress patches of reinforcement 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 the basecoat is applied, to maintain 4 to 6 mm thickness (approximately) when measured from the top of the fixings.

Figure 7 Typical fixing method for 60-year durability



initial fixings



fixing through the mesh

Both the 30- and 60-year durability systems

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

16.31 The primer coat is roller applied to the basecoat and must be allowed to fully dry.

16.32 The system is then ready for the application of a render finish.

Render finish

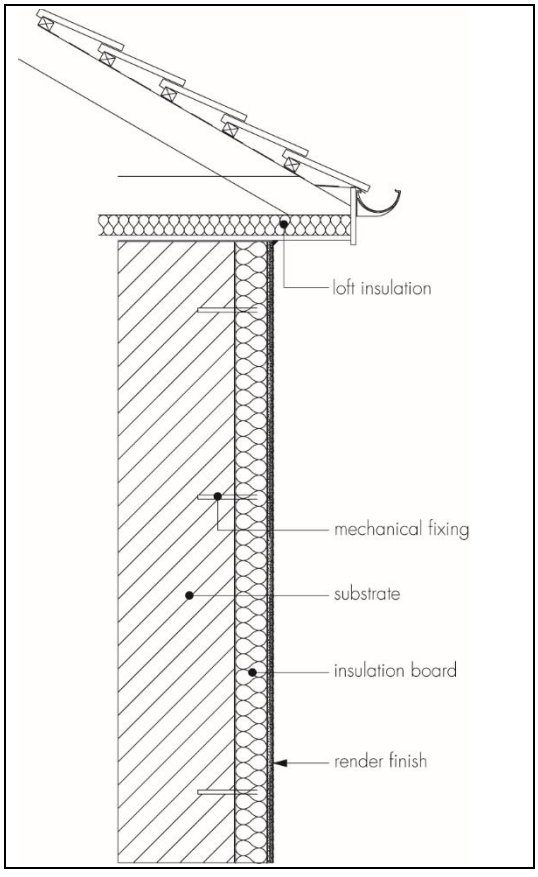
16.33 The topcoat is supplied pre-mixed in a tub and is trowel-applied to a thickness of approximately 1.5 to 3 mm. The silicone texture render is lightly mixed and applied in an even thickness to the grain size. Prior to setting, the render is polished with a plastic float to give a uniform texture and to remove all trowel lines. Elevations should be completed in one application and finished to natural breaks in the render, ie beads or building corners. The texture should be checked to ensure the same batches are applied to each elevation. Where necessary, drums can be batch-mixed to ensure colour consistency.

16.34 Continuous surfaces must be completed without a break, so the coatings must always be applied to a wet edge.

16.35 Once the render finish is dry, 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.

16.36 At the top of walls, the system must be protected by an adequate overhang or by an adequately sealed, purpose-made flashing (see Figure 8).

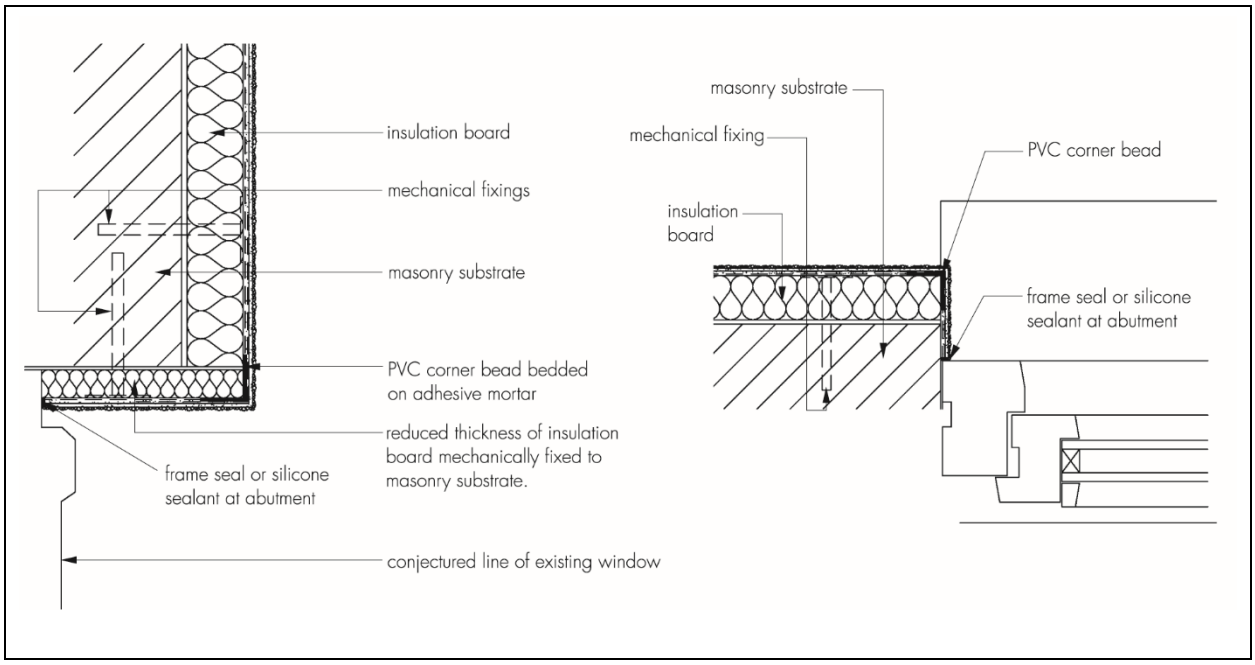
Figure 8 Roof eaves detail



16.37 Care must be taken in the detailing of the system around openings and projections (see Figure 9). To achieve a 60-year service life, the system is finished against a stainless-steel stop bead at reveals, to allow for replacement of windows.

16.38 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 9 Typical opening detail



Technical Investigations

17 Investigations

17.1 The system was examined and assessed to determine:

- fire performance
- pull-through
- hygrothermal performance
- resistance to frost
- resistance to 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
- 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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