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Agrément Certificate
09/4670
Product Sheet 2

WEBER EXTERNAL WALL INSULATION SYSTEMS

WEBERTHERM XP EXTERNAL WALL INSULATION SYSTEM

This Agrément Certificate Product Sheet(1) relates to the Webertherm XP External Wall Insulation System, comprising mineral wool (MFD) insulation slabs, mechanically fixed, with supplementary adhesive where required, a reinforced basecoat and render finishes. The system is suitable for use, without height restrictions, on the outside of external masonry walls in new and existing domestic and non-domestic buildings.

(1) Hereinafter referred to as 'Certificate'.

CERTIFICATION INCLUDES:

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

KEY FACTORS ASSESSED

Thermal performance — the system can be used to improve the thermal performance of external 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 has satisfactory resistance to impact damage. (see section 7).

Behaviour in relation to fire — the system has 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 this Certificate, the system will remain effective for at least 30 years. The durability can be extended to 60 years by using specific fixings, supplementary adhesive and by following a planned inspection and 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

Hardy Giesler
Chief Executive Officer

Date of Second issue: 1 December 2020

Originally certificated on 10 May 2016

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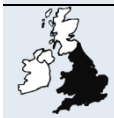
Regulations

In the opinion of the BBA, the Webertherm XP 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 7.16 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 rate for new buildings**
Regulation:	**26A**	**Fabric energy efficiency rates for new dwellings (applicable to England only)**
Regulation:	**26A**	**Primary energy consumption rates for buildings (applicable to Wales only)**
Regulation:	**26B**	**Fabric performance values for new dwellings (applicable to Wales only)**
Comment:		The system can contribute to satisfying these Regulations; however, compensating fabric/services measures may be required. 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 7.16 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 satisfy the requirements of this Standard, with reference to clauses 3.15.1[(1)(2)], 3.15.4[(1)(2)] and 3.15.5[(1)(2)]. See sections 11.3 and 11.4 of this Certificate.
Standard:	6.1(b)	Carbon dioxide emissions
Standard:	6.2	Buildings insulation envelope
Comment:		The system can contribute to satisfying these Standards, with reference to clauses, or 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[(2)], 6.2.5[(2)], 6.2.6[(1)], 6.2.7[(1)], 6.2.8[(2)], 6.2.9[(1)(2)], 6.2.10[(1)], 6.2.11[(1)], 6.2.12[(2)] and 6.2.13[(1)(2)]. See sections 6.1 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**
Comment:		Comments in relation to the 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 and surface 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 7.16 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)**	**Condensation 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* (3.1) and 12 *Maintenance and repair* of this Certificate.

Additional Information

NHBC Standards 2020

In the opinion of the BBA, the Webertherm XP 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 2020*, Part 6 *Superstructure,* Chapter 6.9 *Curtain Walling and Cladding*.

Technical Specification

1 Description

1.1 The Webertherm XP External Wall Insulation System comprises mineral wool (MFD) insulation slabs, mechanically fixed to the substrate wall with supplementary adhesive where required(1) (with a minimum of 50% coverage of adhesive), reinforced basecoat and render finishes (see Table 1).

(1) Supplementary adhesive is compulsory for 60-year durability system

Table 1 Options for Webertherm XP

Components	Option 1	Option 2
Supplementary adhesive(1)	weberend LAC weberend LAC Rapid	weberend LAC weberend LAC Rapid
Insulation	webertherm MFD	webertherm MFD
Basecoat	webertherm M1	webertherm M1
Reinforcement	weber mesh	weber mesh
Finishing coat	webertherm M1 (scrape texture/spray roughcast or ashlar marking)	webertherm M1 (weber dry dash) with weber dry dash aggregate

(1) Supplementary adhesive is not required for the allowable dry fix configurations.

1.2 The system can be designed to achieve either a 30- or 60-year service life (see Figure 1). Mechanical fixings are applied through the insulation slabs for the 30-year system or through the reinforcing mesh and insulation slabs for 30-year or 60-year systems, to the external surface of the substrate wall.

1.3 The system configurations, by method of fixing, covered under this Certificate include:

- All system combinations that are mechanically fixed through the insulation only (that is, not through the mesh and insulation) and use supplementary adhesive (minimum of 50%) – 30-year durability systems only.
- All system combinations that are mechanically fixed through mesh/insulation and use supplementary adhesive (minimum 50%).

- Dry-fixed system, 30-year durability system only; the permissible insulation thicknesses along with the combinations of the basecoat, finishes and permissible fixings are shown below. The system may be fixed through the insulation only or through the mesh/insulation

  - 40 to 160 mm insulation thickness with webertherm M1 basecoat and any finish
  - the EJOT H1 eco fixing.

30-year durability (see Figure 1)

1.4 After the slabs have been secured to the wall with mechanical fixings, and supplementary adhesive where required, the basecoat is trowel or spray applied to the specified thickness, followed by the reinforcing mesh, which is fully embedded within the basecoat. This is followed by a second layer of basecoat which is ruled to produce a flat, in-plane surface in preparation for the desired scrape texture, ashlar marking, spray roughcast or dry dash finish. For the system fixed through the reinforced basecoat, the installation procedure for 60-year durability should be followed.

60-year durability (see Figure 1)

1.5 After the slabs have been secured to the wall with supplementary adhesive (minimum 50%) and two mechanical fixings through each insulation slab, the basecoat is trowel-applied to the specified thickness, followed by the reinforcing mesh, which is fully embedded within the basecoat. While the basecoat is still wet, mechanical fixings are applied through the mesh and insulation slabs into the substrate, before mesh patches are applied over the fixing heads and fully embedded. This is followed by a second layer of basecoat which is ruled to produce a flat, in-plane surface in preparation for the desired scrape texture, ashlar marking, spray roughcast or dry dash finish.

1.6 Additionally, for the 60-year durability system, the requirements of sections 1.7 (Mechanical fixings), 4.13 and 4.14 must be satisfied.

1.7 The system comprises:

Adhesive (supplementary)

- weberend LAC — a polymer-modified cementitious basecoat mortar, supplied as a powder to which 5 litres of clean water is added. Applied at a coverage of 3 $kg \cdot m^{-2}$

- weberend LAC Rapid — a polymer-modified cementitious basecoat mortar, supplied as a powder to which 5 litres of clean water is added. Applied at a coverage of 3 $kg \cdot m^{-2}$

Insulation(1)

- webertherm MFD (mineral fibre dual-density) insulation slabs — 1200 by 600 mm in a range of thicknesses between 50 and 200 mm, with an average density of 110 $kg \cdot m^{-3}$, a minimum compressive strength of 10 kPa and a minimum tensile strength perpendicular to the faces of 10 $kN \cdot m^{-2}$. Slabs are manufactured to comply with BS EN 13162 : 2012 and are classified as Euroclass A1 in accordance with BS EN 13501-1 : 2007

(1) For the declared thermal conductivity (λ_D) value, see section 6.1.

Mechanical fixings

- mechanical fixings(1)(2)(3) — fixing anchors with various lengths to suit the substrate and insulation thickness, approved and supplied by the Certificate holder, and selected from:
  - Fischer Termoz CS 8 — polypropylene with stainless steel or electro-galvanized screw
  - EJOT NT U(4) — HDPE anchor sleeve with a stainless steel or electro-galvanized centre pin
  - EJOT STR U(4) — HDPE anchor sleeve with a stainless steel or electro-galvanized centre screw.
  - EJOT STR U 2G(4) — HDPE anchor sleeve with a stainless steel or electro-galvanized centre screw
  - EJOT H1 eco(5) — HDPE anchor sleeve with an electro-galvanized pin and a polyamide, PA GF 50 mounting plug(2)

(1) Other fixings may be used provided they can be demonstrated to have equal (or higher) pull-out strength, plate diameter and plate stiffness characteristics to the fixing used for the tests in section 7 of this Certificate, and provided that a steel pin or screw is used.
(2) Fixing must be surface mounted only, ie not embedded into the insulation.

(3) High density polyethylene (HDPE), polyamide or polypropylene anchor sleeve with a stainless steel pin or screw to grades 1.4301 or 1.4401 to BS EN 10088-2 : 2014 are required in order to achieve a 60-year durability performance.
(4) Only these fixings are suitable for application where the system is fixed through minimum 50 mm thick webertherm MFD insulation slabs where the design pull-through resistance value of 63 N applies (see section 7).
(5) EJOT H1 eco is the only fixing that can be used for the dry-fix system – see section 7.5 of this Certificate; footnote (1), therefore, does not apply in this case.

Basecoat

- webertherm M1 — a polymer-modified cementitious basecoat/render mortar, supplied as a powder to which 5 litres of clean water is added. Applied in two passes at an overall coverage of 15 to 26 kg·m^{-2} and an overall thickness of between 12 and 16 mm (including the initial basecoat thickness of approximately 6 to 7 mm) depending on the chosen finish

Reinforcement

- weber mesh — a woven glass fibre reinforcing mesh (3.8 by 3.5 mm) with a polymer coating and a nominal weight of 160 gm^{-2}

Finishing coats

- webertherm M1 — a one-coat cementitious render supplied as a powder to which 5 litres of clean water is added, applied in two layers to obtain scrape texture, ashlar marking and spray roughcast finishes:

  - scraped texture applied at a coverage of 19 kg·m^{-2} to give a minimum overall rendering system finish thickness of 12 mm
  - spray roughcast applied at a coverage of 26 kg·m^{-2} to give an overall rendering system finish thickness of 15 to 16 mm
  - ashlar features applied at a coverage of 23 kg·m^{-2} to give a minimum overall rendering system finish thickness of 15 mm
  - weber dry dash finish applied at a coverage of 15 kg·m^{-2} to give an overall rendering system finish thickness of 12 mm

Dry dash aggregates

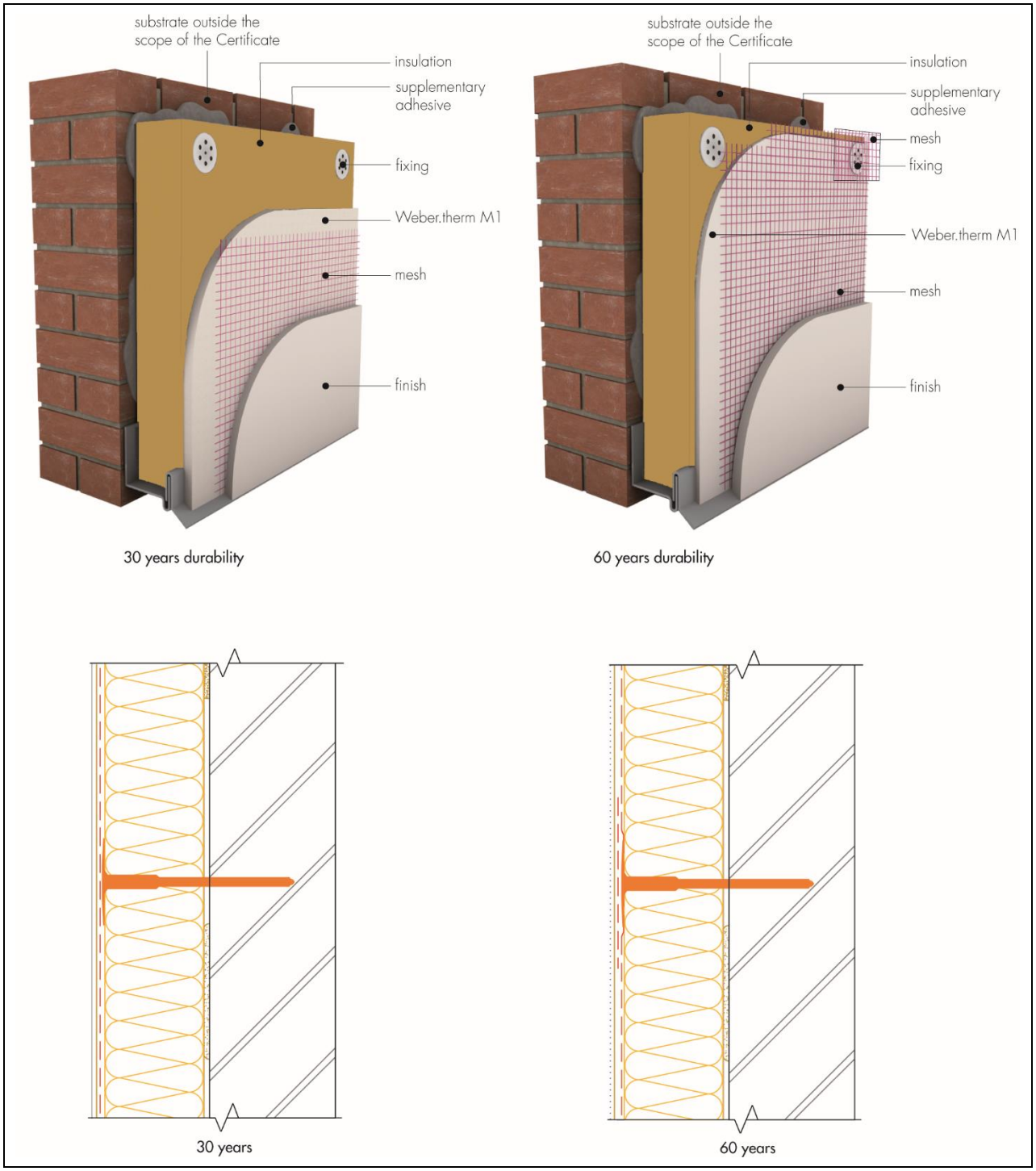
- weber Dry Dash Aggregate — sized up to 6 mm and applied at a coverage of 10 to 15 kg·m^{2} to webertherm M1.

1.8 Ancillary materials also used with the system, but outside the scope of this Certificate, 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
  — movement joint
  — expansion joint
- profile connectors and fixings
- fungicidal wash
- silicone sealant in accordance with BS EN ISO 11600 : 2003
- expansion foam — polyurethane foam used for filling gaps between insulation slabs.

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

Figure 1 Webertherm XP External Wall Insulation System



2 Manufacture

2.1 The system components are manufactured by the Certificate holder or bought in from suppliers, to an agreed specification.

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

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

- undertaken to carry out the above measures on a regular basis through a surveillance process, to verify that the specifications and quality control operated by the manufacturer are being maintained.

2.3 The management system of Saint-Gobain Construction Products UK Limited t/a Saint-Gobain Weber has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2015 by BSI (Certificates FM 641234 and FM 01209).

3 Delivery and site handling

3.1 The system components are delivered to site in the packaging and quantities listed in Table 2. Each package carries the product identification and batch number.

Table 2 Component supply details

Components	Quantity and packaging
weberend MFD	Shrink-wrapped in polyethylene (on pallets)
weberend LAC Rapid or weberend LAC	20 kg bags
webertherm M1	20 kg bags
weber mesh	50 m roll, 1 m wide
weber dry-dash aggregate	25 kg bags
mechanical fixings	boxed by manufacturer, 100 per box

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

3.3 The insulation must be protected from prolonged exposure to sunlight, either by storing opened packs under cover or re-covering with opaque polythene sheeting. Slabs that become damaged, soiled or wet should be discarded.

3.4 The powder components must be stored in dry conditions between 5 and 30°C, off the ground and protected from moisture. Contaminated materials should be discarded.

3.5 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 Webertherm XP External Wall Insulation System.

Design Considerations

4 General

4.1 The Webertherm XP 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 no height restrictions. 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.

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.

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 Webertherm XP External Wall Insulation System can achieve a service life of 60 years (see sections 1 and 16). For the 60-year durability system, the insulation slab adhesive must be used and 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 finishing coat
• corner profile (if exposed after application of the system)
• pin or screw for mechanical fixings.

5 Practicability of installation

The system should only be installed by specialist 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's website (www.bbacerts.co.uk).

6 Thermal performance

6.1 Calculations of thermal transmittance (U value) should be carried out in accordance with BS EN ISO 6946 : 2017 and BRE Report BR 443 : 2006, using the declared thermal conductivity (λ_D) value of 0.036 $W \cdot m^{-1} \cdot K^{-1}$ for the insulation.

6.2 The U value of a completed wall will depend on the selected insulation thickness, the fixing method and type and number of fixings, and the insulating value of the substrate masonry and its internal finish. Calculated U values for sample constructions in accordance with the national Building Regulations are given in Tables 3 and 4, and are based on the thermal conductivity value given in section 6.1.

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

U value ($W \cdot m^{-2} \cdot K^{-1}$)	**Thickness of Insulation (mm)**	
	215 mm brickwork, $\lambda = 0.56\ W \cdot m^{-1} \cdot K^{-1}$	**200 mm dense blockwork, $\lambda = 1.75\ W \cdot m^{-1} \cdot K^{-1}$**
	webertherm MFD	webertherm MFD
0.18	—[4]	—[4]
0.19	200	—[4]
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 (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 $W \cdot m^{-1} \cdot K^{-1}$). Declared thermal conductivity (λ_D) of insulation is as shown in section 6.1. A render thickness of 12 mm (with λ = 1.0 $W \cdot m^{-1} \cdot K^{-1}$) is also included. A 5 mm thick adhesive layer (λ = 1 $W \cdot m^{-1} \cdot K^{-1}$) covering 50% of the area is also included, together with a slab emissivity of 0.9 and an external render thickness of 12 mm (λ = 1 $W \cdot m^{-1} \cdot K^{-1}$).
(2) Calculations based on a mechanical system that included 7 galvanized steel fixings per m^2 with 8 mm diameter and a point thermal transmittance (x_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) See section 4.2.

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

U value[4] ($W \cdot m^{-2} \cdot K^{-1}$)	**Thickness of Insulation (mm)**	
	215 mm brickwork, $\lambda = 0.56\ W \cdot m^{-1} \cdot K^{-1}$	**200 mm dense blockwork, $\lambda = 1.75\ W \cdot m^{-1} \cdot K^{-1}$**
	webertherm MFD	webertherm MFD
0.18	190	200
0.19	180	190
0.25	130	140
0.26	120	130
0.28	110	120
0.30	110	110
0.35	90	90

(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 $W \cdot m^{-1} \cdot K^{-1}$). Declared thermal conductivity (λ_D) of insulation are as shown in section 6.1. A 5 mm thick adhesive layer (λ = 1 $W \cdot m^{-1} \cdot K^{-1}$) covering 50% of the area is also included, together with a slab emissivity of 0.9 and an external render thickness of 12 mm (λ = 1 $W \cdot m^{-1} \cdot K^{-1}$).
(2) Calculations based on a mechanical system that included 7 steel fixings with 8 mm diameter and a point thermal transmittance (x_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 a U value of 0.18 $W.m^{-2} \cdot K^{-1}$.

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). 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 7.7 and 7.15).

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 Dry fix installations (ie with no supplementary adhesive) correctly designed in accordance with this Certificate will safely accommodate the applied loads due to the self-weight of the system, wind and impact when using insulation with a maximum thickness of 160 mm, any render system and the EJOT H1 eco fixing only. Installations with minimum 50% supplementary adhesive can safely accommodate such loads for all material combinations covered by this Certificate.

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

7.7 Negative wind load transfer to the substrate wall depends on the application of mechanical fixings and their respective primary resistance mechanisms.

Primary resistance mechanisms of EWIS mechanically fixed, with supplementary adhesive, through insulation, and for dry fix systems[(1)(2)]:

- the bond between the insulation and render system (see section 7.8)
- the pull-out resistance of the fixing from the substrate wall (see section 7.9)
- the pull-through resistance of the fixing (see section 7.10.

(1) For the mechanically fixed system with supplementary adhesive, fixed through insulation, 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).

7.8 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.

7.9 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 must be determined in accordance with the

guidance given in EOTA TR051 : 2016 (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 resistances

Fixing type[1]	ETA number	Substrate	Drill diameter (mm)	Effective anchorage depth (mm)	Characteristic pull-out resistance[2] (kN)	Partial factor
Fischer Termoz CS 8	14/0372	Concrete C12/15 Clay bricks	8	35[3]	1.5 1.2	2
EJOT NT U	05/0009	Concrete C12/15 Clay bricks	8	25	1.2 1.5	2
EJOT H1 eco	11/0192	Concrete C12/15 Clay bricks	8	25	0.9	2
EJOT STR U 2G EJOT STR U	04/0023	Concrete C12/15 Clay bricks	8	25[3]	1.5	2

(1) For the EJOT H1 eco fixing, the minimum values for plate stiffness of fixings is 0.6 kN·mm^{-2} and anchor plate load resistance is 1.4 kN, which relate to resistance values achieved for the relevant pull-through test, dynamic wind uplift test and displacement test. For the EJOT STR U, the minimum anchor plate stiffness is 0.6 kN·mm^{-2} and anchor plate load resistance of 2.08 kN, which relates to resistance values achieved for the relevant pull-through test (see Table 6).

(2) Values are determined in accordance with EAD 330196-00-0604 : 2016 and are dependent on the substrate. The use categories are defined in the corresponding ETA.

(3) The fixing ETA references the effective anchorage depth for other substrates.

7.10 The characteristic pull-through resistance of the fixings was determined from tests using a 60 mm diameter fixing plate and minimum insulation thickness of 50 mm. The design resistance per fixing (N_{RD3}) is obtained by applying an appropriate partial factor as shown in Table 6.

Table 6 Design pull-through resistances

Factor (unit)	MFD insulation 1200 x 600 mm	
	Pull through	
Tensile resistance of the insulation (kPa)	≥ 10	
Fixing types[1]	EJOT STR U	EJOT H1 eco
Fixing plate diameter (mm)	60	
Insulation thickness (mm)	50	100
Characteristic pull through resistance[2] per fixing (KN)	0.157	0.301
Partial factor[3]	2.5	
Design pull through resistance per fixing (KN)	0.063	0.121
Design pull through resistance per slab (KN) (based on the minimum number of fixings)[4]	0.315	0.605
Design pull through resistance per slab (KN) (based on maximum number of fixings)[5]	0.504	0.968

(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 6 and minimum insulation thickness specified in this 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 8 fixings per slab (1200 x 600 mm), which equates to approximately 11 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 slab.

7.11 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.

7.12 The data obtained from sections 7.7 to 7.10 must be assessed against the design wind load and the following expression must be satisfied:

For safe design:

$Rd \geq W_e$

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

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 anchor fixings per m^2
N_{RD2} is the design pull-out resistance per fixing based on test (kN)
$N_{RD3panel}$ is the design pull-through resistance per anchor not placed at the panel joint, based on test (kN)
$N_{RD3joint}$ is the design pull-through resistance per anchor placed at the panel joint, based on test (kN)
n_{panel} is the number of internal anchors in a panel
n_{joint} is the number of joint anchors in a panel
A_{panel} is the area of the panel (m^2).

7.13 The insulation system is mechanically fixed to the substrate wall with 5 fixings per slab or approximately 7 fixings per metre square (1200 by 600 mm), as per the fixing pattern shown in Figure 6, and in conjunction with a minimum 50% coverage of supplementary adhesive (see section 16). Additional fixings may be required, depending on the results of the calculations detailed above for the specific site.

Primary resistance mechanisms of EWIS mechanically fixed through mesh/insulation, including dry fix systems(1)(2):

- the cohesion resistance of the rendering system
- the pull-out resistance of the fixing from the substrate wall (see section 7.8)
- the resistance of the anchor plate to breakdown or detachment
- the resistance of mesh fabric to tearing around the anchor plate.

(1) For the mechanically fixed system with supplementary adhesive fixed through the mesh/insulation, the resistance of the system to negative wind load is obtained from the Dynamic Wind Uplift (DWU) test.
(2) Further guidance is available from BBA Guidance Note 1, available on the BBA website (www.bbacerts.co.uk).

7.14 The DWU test was carried out on Webertherm XP External Wall Insulation System, mechanically fixed onto a masonry substrate. Mineral wool slabs of 100 mm(1) thickness were initially fixed with two EJOT H1 eco fixings through each insulation slab and then a further 4 EJOT H1 eco fixings per m^2 were applied through the reinforced basecoat/insulation, providing an overall fixing frequency of 7 fixings per m^2 before the render finish was applied. The maximum characteristic negative wind load resistance that can be sustained by the system as determined from the DWU test is 3.96 $kN \cdot m^{-2}$. The maximum design wind load resistance (Rd_{Test}) is derived by dividing the maximum characteristic wind load resistance by a partial safety factor of 1.5, and equals 2.64 $kN \cdot m^{-2}$(2)(3)(4)(5)(6).

(1) The DWU maximum design wind load resistance only applies to a system with mineral wool slab thicknesses from 100 to 200 mm. The pull-through resistance from Table 6 must be used for the 60-year durability system and the dry-fix system that uses less than 100 mm thick insulation.

(2) The maximum design wind load that can be resisted by the system corresponds to the maximum allowed spacing, centres and layout of fixings. This fixing configuration with the appropriate fixings will also adequately transfer the system's self-weight, wind and impact loads to a suitable substrate wall.
(3) The test was undertaken without supplementary adhesive
(4) The partial factor for the DWU test is based on the mode of failure obtained in the test.
(5) The design resistance is determined by dividing the characteristic resistance value obtained from a DWU test by a partial safety factor of 1.5.
(6) Alternative fixings may be used provided it can be demonstrated that they have equal or higher plate diameter (minimum 60 mm), plate stiffness (≥ 0.6 kN·mm^{-2}) and anchor plate load resistance (≥ 1.4 kN) characteristics.

7.15 The data derived from sections 7.8 and 7.14 must be assessed against the design wind load, and the following expressions must be satisfied:

For safe design:

$R_{dTest} \geq W_e$ and $n_{RD2} \geq W_e$

where:

R_{dTest} is the design negative wind load resistance of the system based on test (kN.m^{-2})
W_e is the maximum design wind load (kN·m^{-2})
n_{RD2} is the design pull-out resistance of the system based on characteristic values from site tests; the number of fixings per unit area must be ≥ that tested in Static Foam Block test (kN·m^{-2}).

7.16 The insulation system is mechanically fixed through mesh/insulation to the substrate wall with a minimum of 6.8 fixings per square metre, as per the fixing pattern shown in Figure 7. The design wind load resistance is only applicable to the system tested and as described in 7.14. Additional fixings may be required, depending on the design and installation conditions. However, any resulting additional wind load resistance cannot be quantified by the results of the test and as such enhancements are outside the scope of the Certificate.

Impact resistance

7.17 Hard body impact tests were carried out in accordance with ETAG 004 : 2013. The system is suitable for use in the Categories up and including those specified in Table 7(1).

Table 7 Impact resistance of system

Render systems: Basecoat + finishing coats indicated below:	Use Category(1)
webertherm M1 (dry dash; scrape texture; ashlar marking or spray roughcast)	I

(1) The Categories are defined in ETAG 004 : 2013 as:
• Category I — a zone readily accessible at ground level to the public and vulnerable to hard body impacts but not subjected to abnormally rough use
• Category II — a zone liable to impacts from thrown or kicked objects, but in public locations where the height of the systems will limit the size of the impact; or at lower levels where access to the building is primarily to those with some incentive to exercise care.
• 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 A2-s1, d0 in accordance with BS EN 13501-1 : 2018(1).

(1) Warringtonfire Testing and Certification Ltd. Report numbers 428756 and 428757

8.2 The classification applies to the full range of thicknesses, finishes and colours covered by this Certificate.

8.3 The MW insulation material in isolation is classified as 'non-combustible'.

8.4 The system is not subject to any restriction on building height or proximity to boundaries.

8.5 For application to second storey walls and above, it is recommended that the designer considers at least one stainless steel mechanical 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 reinforcement 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

Where 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 water ingress. However, care should be taken to ensure that substrate walls are adequately watertight prior to application of the system. The system must only be installed where there is no sign of dampness on the inner surface of the substrate other than that 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 is given in BRE Report 262 : 2002 should be followed in connection with the water tightness 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 a coping, adequate overhang or other detail designed for use with this type of system (see section 16).

11 Risk of condensation

11.1 Designers must ensure that an appropriate condensation risk analysis has been carried out for all parts of the construction, including openings and penetrations at junctions between the insulation system and windows, to minimise the risk of condensation. The recommendations of BS 5250 : 2011 should be followed.

Surface condensation

11.2 Walls will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed 0.7 $W \cdot m^{-2} \cdot K^{-1}$ at any point and junctions with other elements and openings comply with section 6.3.

11.3 Walls will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed 1.2 $W \cdot m^{-2} \cdot K^{-1}$ at any point. Guidance may be obtained from BS 5250 : 2011 Section 4 and Annex G, and BRE Report 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 and Annexes D and G.

11.5 The water vapour resistance (μ) factor (for the insulation slab) and equivalent air layer thickness (s_d) (for the render system) are shown in Table 8.

Table 8 Water vapour resistance factor and equivalent air layer thickness

Layer	s_d (m)	μ
Mineral wool thicknesses: 50 to 200 mm	—	1
webertherm M1 basecoat + any finish	0.78	—

12 Maintenance and repair

12.1 An initial inspection should be made within 12 months and regularly 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 twelve months after the application and subsequently every five years. This plan should include full details of the required inspection regime and 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.

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 insulation slab adhesive, stainless steel base and corner profiles, stainless steel fixings or centre pin grades 1.4301 or 1.4401 and plastic anchor sleeve material 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 in the Certificate holder's Maintenance Manual.

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

13.4 The finishes 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, provided the coating does not adversely affect the water vapour transmission or fire characteristics of the system. The advice of the Certificate holder should be sought as to the suitability of a particular product.

Installation

14 Site survey and preliminary work

14.1 A pre-installation survey of the property must be carried out to determine suitability for treatment and the need for any necessary repairs to the building structure before application of the system. A specification is prepared for each elevation of the building indicating:

- the position of beads
- detailing around windows and doors and at eaves
- damp-proof course (dpc) level
- exact position of expansion joints, if required
- areas where flexible sealants must be used
- any alterations to external plumbing
- 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 of the specified 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 test data and pull-out resistance (see section 7). The advice of the Certificate holder should be sought to ensure the proposed bonding pattern (insulation slab adhesive) is sufficient.

14.3 Surfaces should be sound, clean, and free from loose material. The flatness of surfaces must be checked; this may be achieved using a straight edge spanning the storey height. Any excessive irregularities, ie greater than 10 mm in 1 m, must be made good prior to installation, to ensure that the insulation slabs are installed with a smooth, in-plane finished surface.

14.4 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.

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

14.6 In new buildings, internal wet work (eg, screeding or plastering) should be completed and allowed to dry prior to the application of the system.

14.7 All modifications, such as alterations to external plumbing and necessary repairs to the building structure, must be completed before installation commences.

15 Approved installers

Application of the system, within the context of this Certificate, must be carried out by installers approved, 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 should be carried out in accordance with the Certificate holder's current installation instructions and this Certificate.

16.2 Weather conditions should be monitored to ensure correct application and curing conditions. Application of coating materials must not be carried out at temperatures below 5°C or above 30°C, 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 24 hours of completion.

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

16.4 Where required, a fungicidal wash is applied to the entire surface of the external wall by brush or spray and left for a minimum of 48 hours before removing dead growth with a stiff bristle or wire brush or alternatively by power washing.

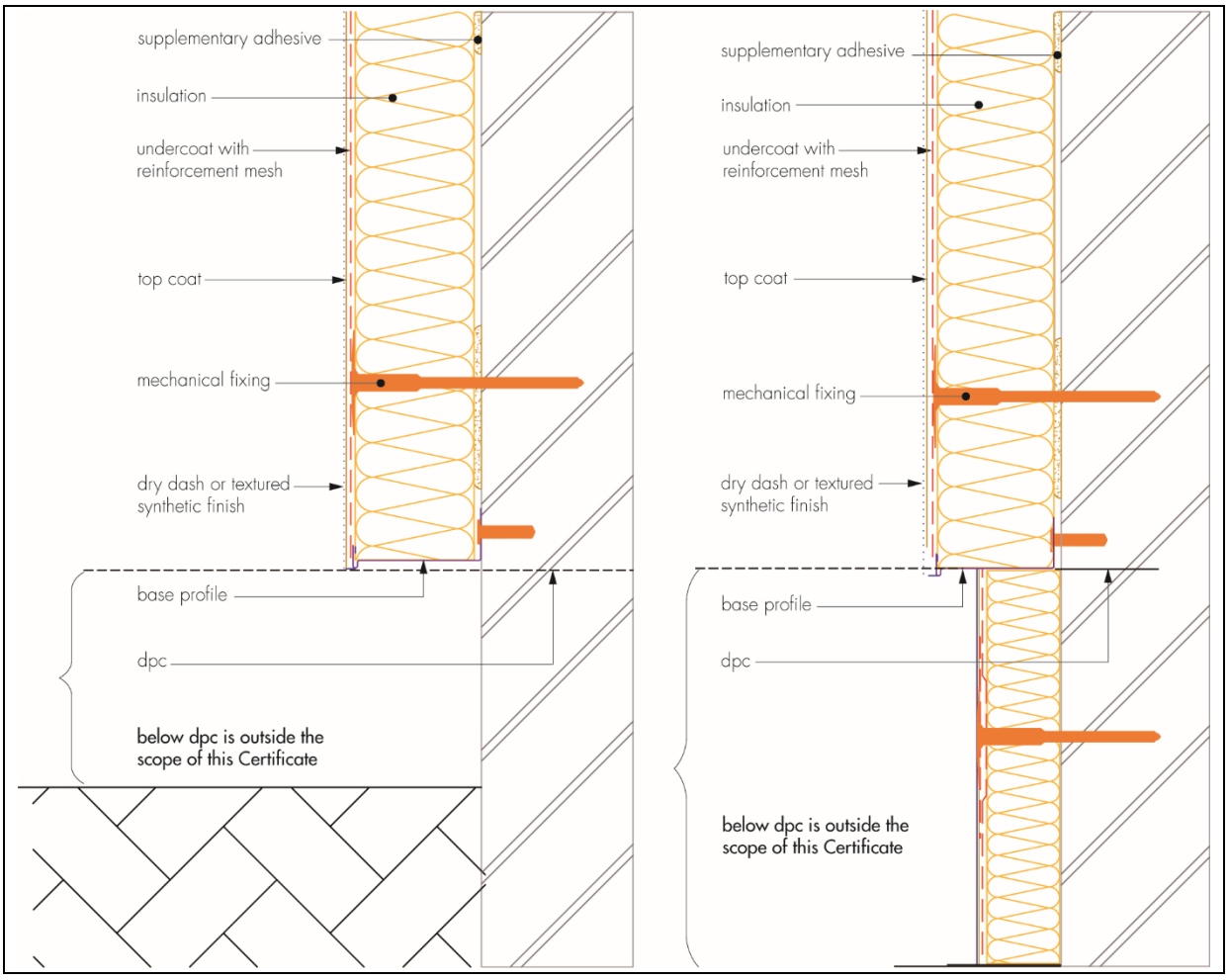
16.5 All rendering should be in accordance with the relevant recommendations of BS EN 13914-1 : 2016.

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.

Positioning and securing insulation slabs

16.7 The base profile is secured to the external wall above the dpc using mechanical fixings at maximum 700 mm centres. Base rail connectors are installed at all profile joints. Extension profiles are fixed at the front lip of the base rail or stop end profile as appropriate. Profiles and expansion joints are fitted as specified (see Figure 2). For 60-year durability applications, the starter track must be constructed from stainless steel.

Figure 2 Typical section at base profile



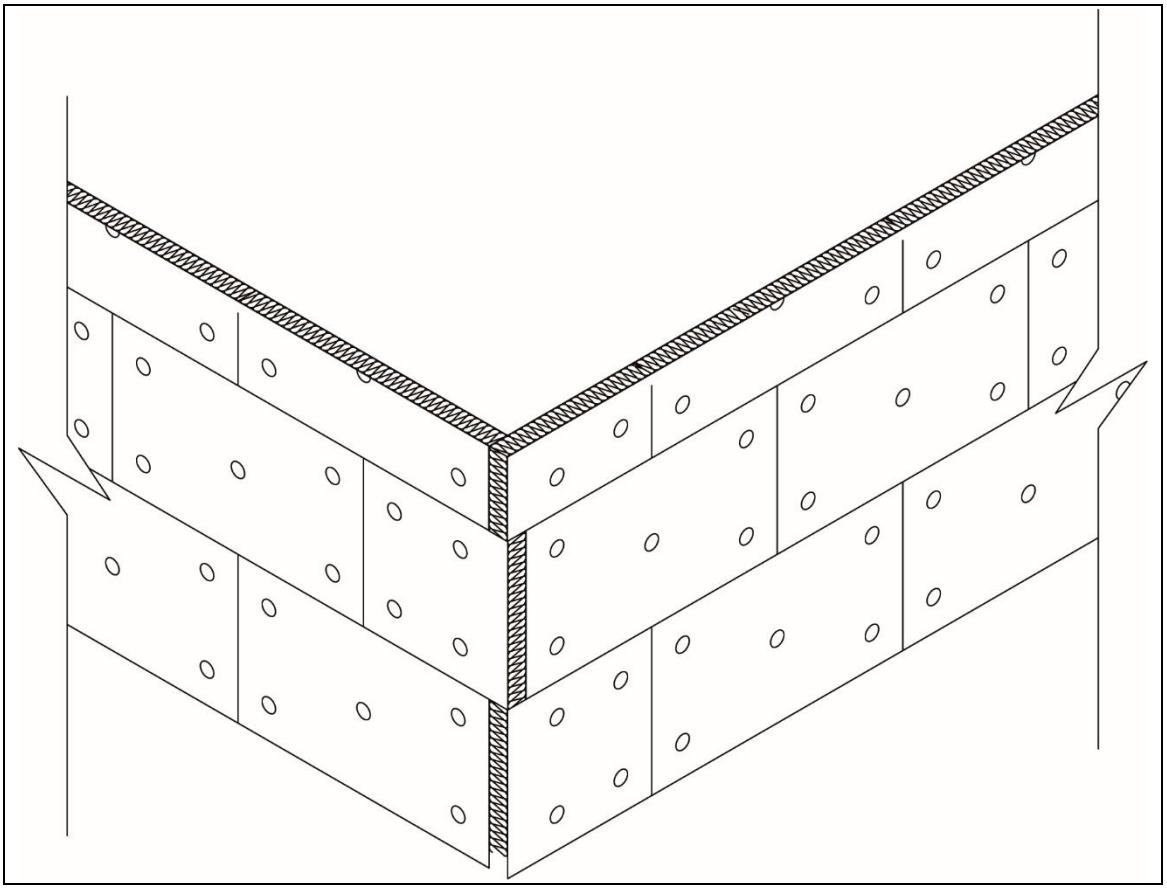
16.8 The insulation slabs should be bonded to the wall using the supplementary adhesive when required (the supplementary adhesive is mandatory with the 60-year durability system). The adhesive is prepared with the required

amount of water (20 kg of weberend LAC or weberend LAC Rapid to 5 litres of potable water), and mixed with a paddle mixer until the desired consistency is achieved. After allowing the adhesive to rest for 5 minutes, it is stirred again. The adhesive is applied to the insulation in four vertical strips, 100 mm wide and 25 to 30 mm thick. The adhesive should cover a minimum 50% of the slab, and care must be taken to ensure that any incidental vertical cavities resulting from the staggered insulation slab layout are closed at each row with the adhesive.

16.9 The first run of insulation slabs are positioned on the base profile with adhesive applied and pressed firmly against the wall, butted tightly together and aligned to achieve a level finish.

16.10 Subsequent rows of slabs are positioned so that the vertical slab joints are staggered and overlapped at the building corners and so that the slab joints do not occur within 250 mm of the corners of openings (see Figure 3) and any incidental vertical cavities are closed at each row with the supplementary adhesive. Joints between slabs greater than 2 mm should be filled with slivers of insulation slab or expansion foam. Gaps greater than 10 mm should be closed by repositioning or, where appropriate, by cutting slabs to fit.

Figure 3 Slab layout on the wall and at corners of a building



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

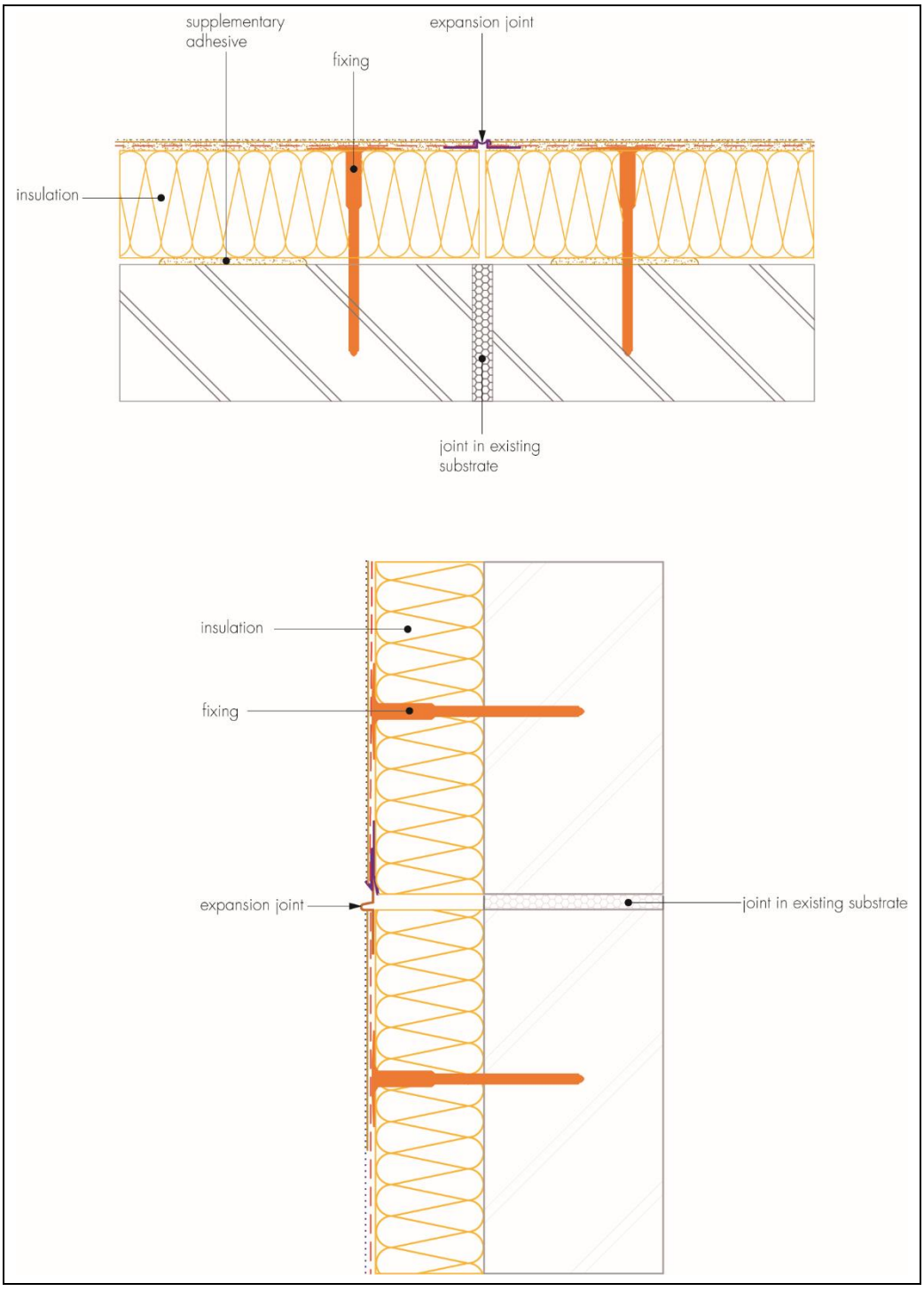
16.12 Installation continues until the whole wall is completely covered including, where appropriate, the building soffits. Building corners, door and window heads and jambs are formed using mesh angle profiles bonded to the insulation. Where appropriate, application-specific profiles are installed to allow rainwater to drain, in accordance with the manufacturer's instructions.

16.13 Periodic checks should be carried out as work proceeds. 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. Window and door reveals should be insulated wherever possible to minimise the effects of cold bridging.

Movement joints

16.14 Generally, movement joints in the substrate must be continued through the system by cutting through the insulation slabs to coincide with the building's movement joint. The weber expansion joint profile is fully bedded in mortar on the insulation slab's surface (see Figure 4). Unbroken panels of render should be restricted to areas between 45 and 50 m^2, with an aspect ratio no greater than 4:1.

Figure 4 Vertical and horizontal movement joints



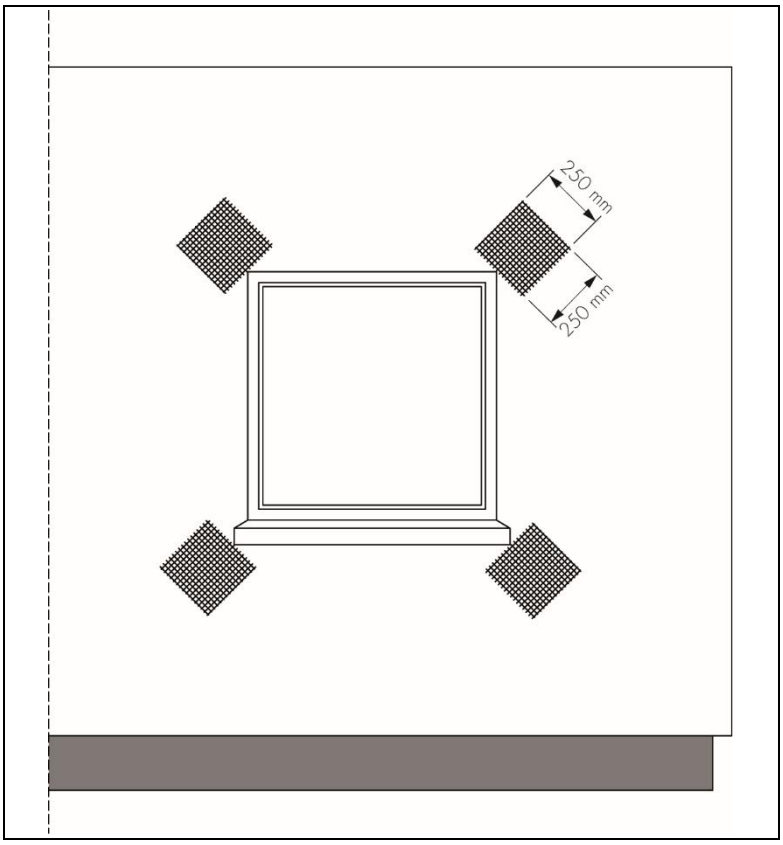
Application of the basecoat and reinforcing mesh

16.15 The basecoat ('basecoat/render') is prepared (20 kg of webertherm M1 to 4.5 to 5 litres of potable water).

16.16 To provide the necessary reinforcement, stress patches of reinforcement mesh (approximate size 250 by 250 mm) are applied with basecoat, diagonally over the insulation slabs at the corners of openings so that they extend

equally either side of the corner (see Figure 5). Angle beads and stop beads are positioned in accordance with the Certificate holder's installation instructions.

Figure 5 Additional reinforcement at openings

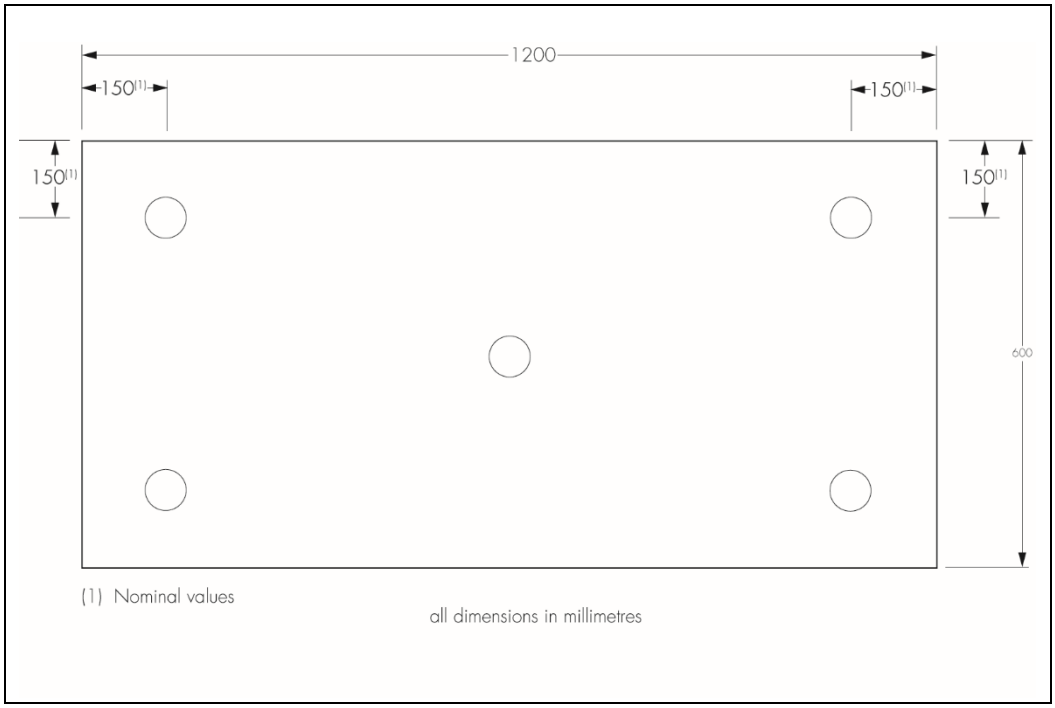


16.17 Installation procedures specific to 30- and 60-year durability systems are described in sections 16.18 to 16.27.

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

16.18 Details of mechanical fixings (including their layout) are specified in the project-specific design requirements based on pull-out test results and wind-loading data. Holes are drilled through the insulation slab into the substrate wall and mechanical fixings (minimum of 7 per square metre) are inserted and tapped or screwed firmly into place, following the fixing pattern shown in Figure 6. If required, extra fixings can be applied at the edge zones to satisfy the wind load conditions. Installation of the fixings must commence whilst the supplementary adhesive (if required) is wet, unless the system is a dry fix system. Care must be taken to ensure that the fixings are not overdriven.

Figure 6 Typical fixing pattern



16.19 The basecoat/render is applied in two passes. The first layer of the basecoat is applied progressively by trowel or spray machine to the surface of the dry insulation to achieve an approximate thickness of 6 to 7 mm.

16.20 Reinforcing mesh is immediately applied and embedded into the basecoat using the trowel, and overlapped at all mesh joints by at least 100 mm. A further layer of the basecoat/render is applied to give an overall minimum thickness of 12 to 16 mm, depending on the finish chosen.

16.21 It is important to make sure that the mesh is free of wrinkles and completely covered, and that the required minimum thickness of basecoat is achieved.

16.22 A 30-year durability may also be achieved with system fixed through the reinforced basecoat; the installation procedures for 60-year durability should be followed, but the adhesive is optional and there is no requirement to use stainless steel components.

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

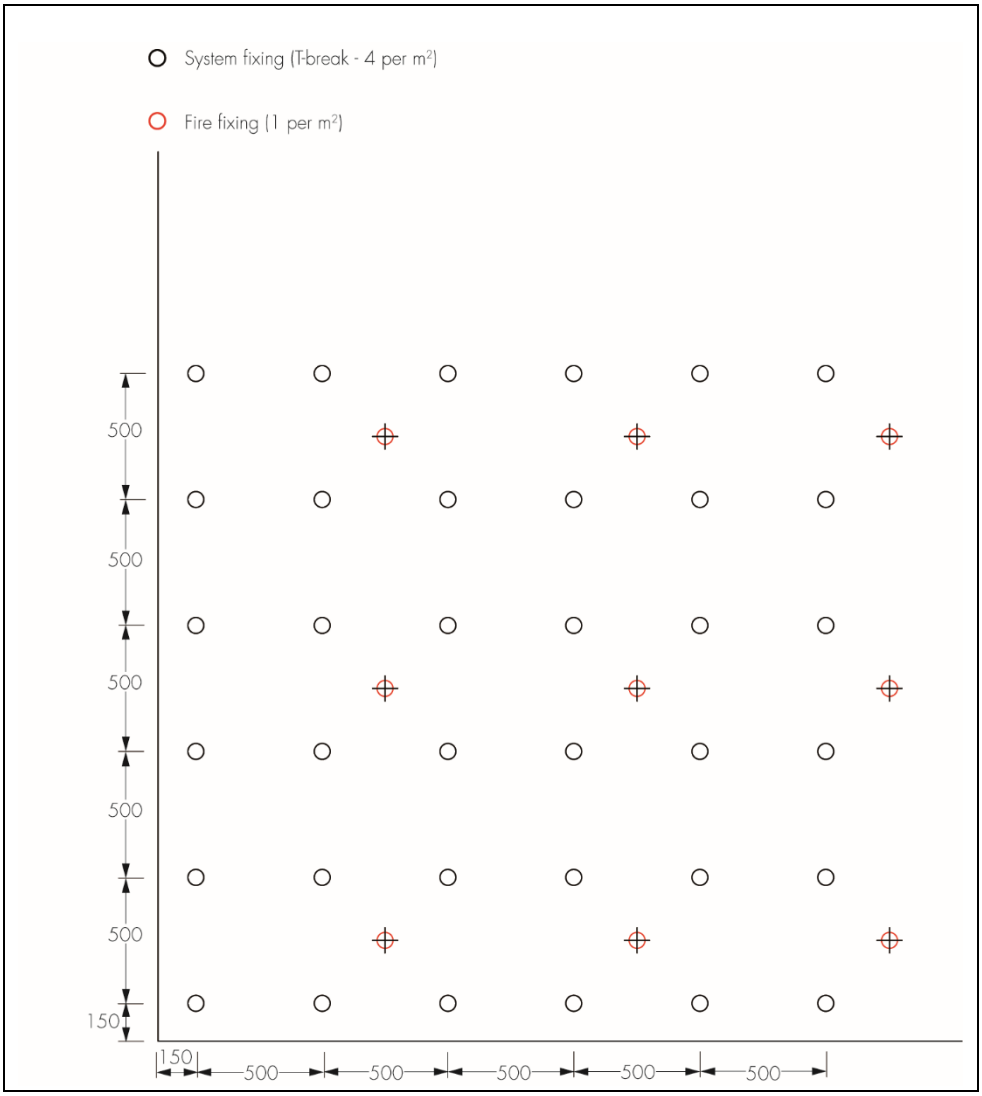
16.23 While the supplementary adhesive is still wet, two mechanical fixings are applied through each insulation slab to secure slabs during installation of the system. The basecoat is applied no earlier than 24 hours after the application of adhesive. The basecoat/render is applied in two passes. The first layer of the basecoat is applied progressively by trowel or spray machine to the surface of the dry insulation to achieve an approximate thickness of 6 to 7 mm.

16.24 Reinforcing mesh is immediately applied and embedded into the basecoat using the trowel and overlapped at all mesh joints by not less than 100 mm.

16.25 It is important to make sure that the mesh is free of wrinkles and completely covered, and that the required minimum thickness of render achieved.

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 pattern, but not less than four fixings per square metre (see Figure 7). The mechanical fixings are inserted and tapped or screwed firmly into place, securing the mesh and insulation slabs to the substrate wall providing an overall minimum fixing frequency of 7 fixings per m^2. The fixings are slightly overdriven into the substrate wall in order to allow the fixing plate to penetrate through onto the face of the insulation slabs.

Figure 7 60 years' durability fixing pattern



16.27 While the basecoat is still wet, 200 by 200 mm stress patches of reinforcing mesh are applied over the head of the fixings and fully embedded within the basecoat. Further basecoat/render is then applied to maintain an approximate thickness of 12 to 16 mm depending on the finish required. The basecoat is applied progressively, working in one-metre sections in a vertical or horizontal direction before being left to set for approximately 18 to 24 hours; depending on weather and substrate conditions, a longer period may be required.

Rendering and finishing

16.28 Prior to applying the finishes, the relevant seals are positioned and installed at all openings (eg windows and doors), overhanging eaves, gas and electric meter boxes, wall vents or where the render abuts any other building material or surface (unless a proprietary sealing bead has been installed prior to application of the basecoat).

16.29 To prevent the finishes from drying too rapidly, they should not be applied in direct sunlight. The finished render surface should be protected from rain and frost until the material is dry and hard (approximately 24 hours in favourable conditions; in winter, this may take at least 48 hours). Continuous surfaces must be completed without a break.

Scrape texture finish

16.30 When the render has set but not fully hardened, the whole surface should be carefully and evenly scraped in a circular motion with a scraping tool, ensuring all laitance is removed. The rendering system should be a minimum of 12 mm.

16.31 When complete, the scraped finish should be brushed thoroughly with a soft bristle brush.

Spray roughcast finish

16.32 The rendering system is applied to a minimum thickness of 12 mm and ruled flat. When the render begins to set, a light spray is applied to achieve an overall thickness of 15 to 16 mm.

Ashlar marking

16.33 The rendering system is applied to a minimum thickness of 15 mm. Light ashlar marking (not more than 3 mm deep) is cut into the surface using the square-edge cutting tool.

Dry dash aggregate finish

16.34 The render is applied to a minimum finished thickness of 12 mm and flattened. While the render is still soft, the weber dry-dash aggregate is applied with a dashing trowel. On competition, the surface should be checked to ensure an even coverage.

16.35 Care should be taken in the detailing of the system around features such as openings, projections and at eaves (see Figures 8 to 11) to ensure adequate protection against water ingress and to limit the risk of water penetrating the system. 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.

16.36 At the top of walls, the system must be protected by a coping, adequate overhang or adequately sealed, purpose-made flashing.

Figure 8 Typical detail – eaves

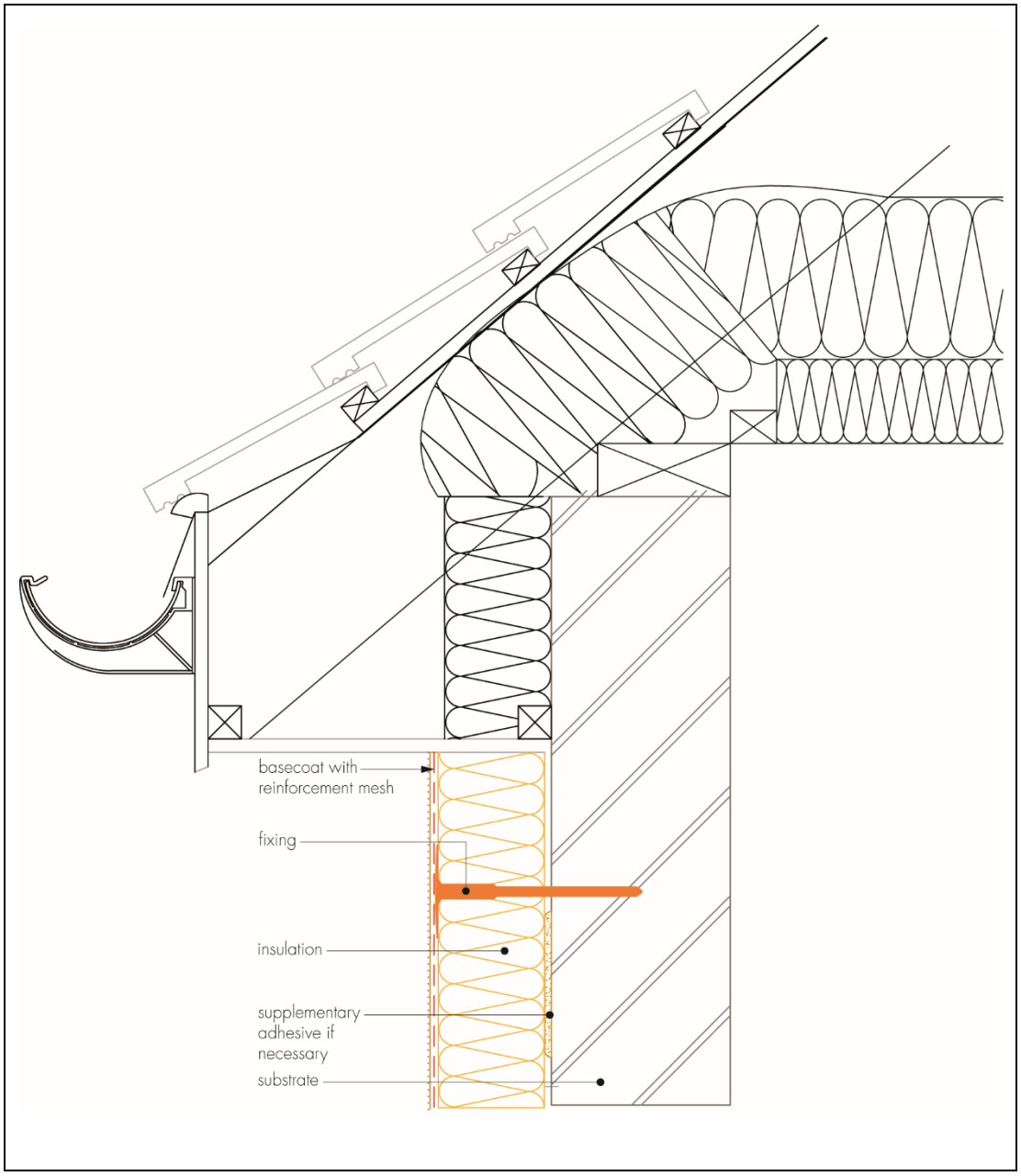


Figure 9 Insulated window reveal details

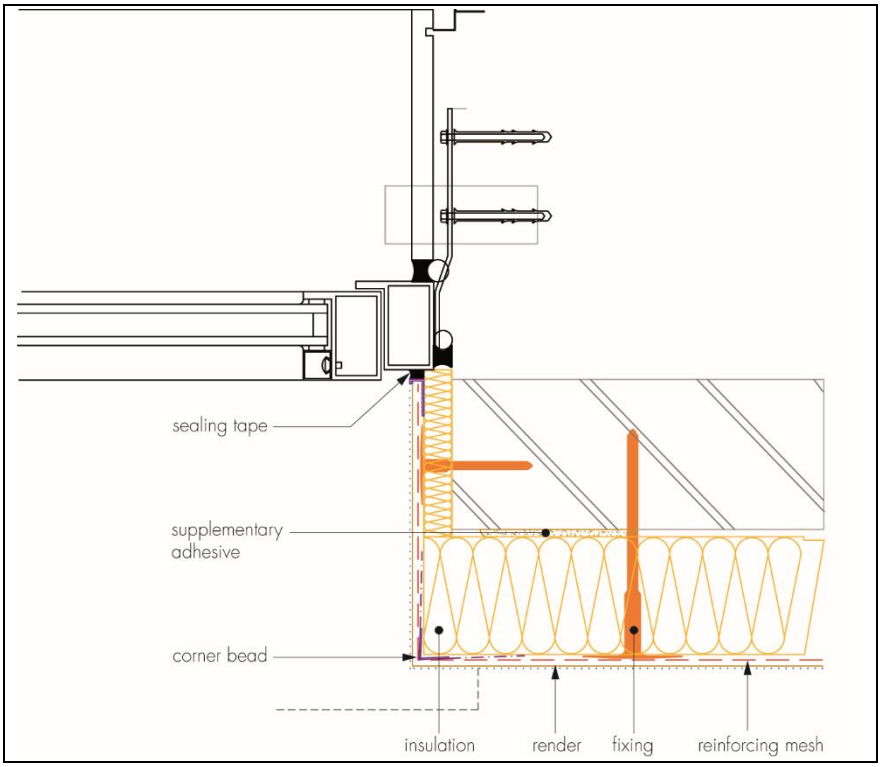


Figure 10 Typical window head detail

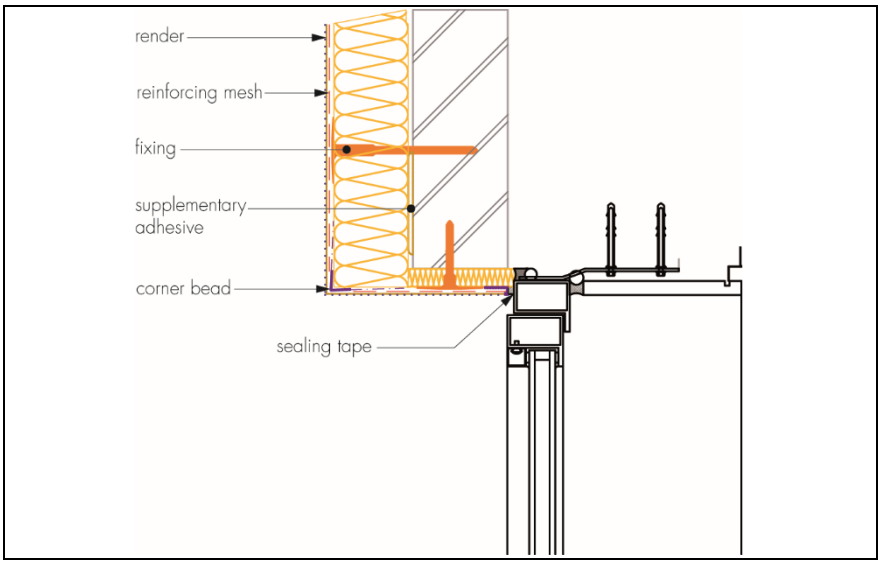
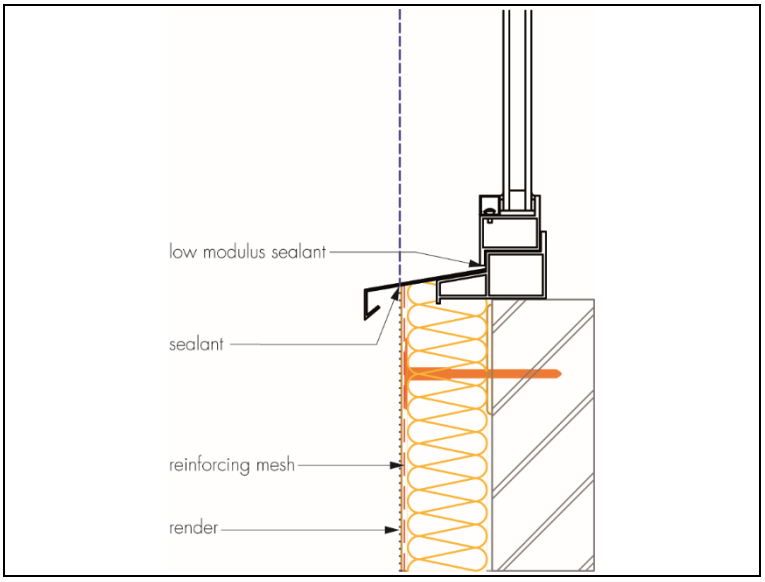


Figure 11 Window sill details



Technical Investigations

17 Tests

17.1 Results of tests were assessed to determine:

- reaction to fire classification in accordance with BS EN 13501-1 : 2007
- hygrothermal performance (heat/spray cycling)
- render/insulation bond strength
- resistance to hard body impact
- water vapour permeability
- water absorption
- pull-through resistance of fixings.

17.2 An examination was made of data relating to:

- durability
- adequacy of the fixing system
- the risk of interstitial condensation
- thermal conductivity and example U values
- system wind load resistance.

18 Investigations

18.1 The practicability of installation and the effectiveness of detailing techniques were assessed.

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

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- any claims by the manufacturer relating to CE marking.

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