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Agrément Certificate
03/4058
Product Sheet 3

WETHERBY EXTERNAL WALL INSULATION SYSTEMS

EPSICON 3 – MW EXTERNAL WALL INSULATION SYSTEM

This Agrément Certificate Product Sheet⁽¹⁾ relates to the Epsicon 3 – MW External Wall Insulation System, comprising mechanically-fixed mineral wool insulation slabs, with a glassfibre mesh-reinforced basecoat and render finish, for use on the outside of external walls in new or existing domestic and non-domestic buildings.

(1) Hereinafter referred to as 'Certificate'.

CERTIFICATION INCLUDES:

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

KEY FACTORS ASSESSED

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

Strength and stability — the system can adequately resist wind loads and impact damage (see section 7).

Behaviour in relation to fire — the system has a Class O/'low risk' reaction to fire classification as defined in the national Building Regulations (see section 8).

Risk of condensation — the system can contribute to limiting the risk of interstitial and surface condensation (see section 10).

Durability — when installed and maintained in accordance with the Certificate holder's recommendations and the terms of this Certificate, the system will remain effective for at least 30 years. The durability can be extended to 60 years by using different fixings and by following a planned inspection with an effective maintenance schedule as described in sections 11 and 12.



The BBA has awarded this Certificate to the company named above for the system described herein. This system has been assessed by the BBA as being fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of First issue: 22 May 2015

Simon Wroe
Head of Engineering

Claire Curtis-Thomas
Chief Executive

The BBA is a UKAS accredited certification body — Number 113. The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at www.bbacerts.co.uk

Readers are advised to check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA direct.

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Regulations

In the opinion of the BBA, the Epsicon 3 – MW External Wall Insulation System, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements of the following Building Regulations (the presence of a UK map indicates that the subject is related to the Building Regulations in the region or regions of the UK depicted):



The Building Regulations 2010 (England and Wales) (as amended)

Requirement: A1	Loading
Comment:	The system can sustain and transmit wind loads to the substrate wall. See section 7.4 of this Certificate.
Requirement: B4(1)	External fire spread
Comment:	The system can satisfy this Requirement. See sections 8.1 to 8.5 of this Certificate.
Requirement: C2(b)	Resistance to moisture
Comment:	The system provides a degree of protection against rain ingress. See sections 4.5 and 9.1 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 10.1, 10.2 and 10.4 of this Certificate.
Requirement: L1(a)(i)	Conservation of fuel and power
Comment:	The system can contribute to satisfying this Requirement. See sections 6.2 and 6.3 of this Certificate.
Regulation: 7	Materials and workmanship
Comment:	The system is acceptable. See section 12.1 and 12.2 and the <i>Installation</i> part of this Certificate.
Regulation: 26	CO₂ 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 6.2 and 6.3 of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation: 8(1)(2)	Durability, workmanship and fitness of materials
Comment:	The system can contribute to a construction satisfying this Regulation. See sections 11, 12.1 and 12.2 and the <i>Installation</i> 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 section 7.4 of this Certificate.
Standard: 2.6	Spread to neighbouring buildings
Comment:	The external face of the system is classified as 'low risk' with reference to clauses 2.6.1 ⁽¹⁾⁽²⁾ , 2.6.2 ⁽¹⁾⁽²⁾ , 2.6.4 ⁽¹⁾⁽²⁾ , 2.6.5 ⁽¹⁾ and 2.6.6 ⁽²⁾ . See sections 8.1 to 8.4 and 8.6 to 8.8 of this Certificate.
Standard: 2.7	Spread on external walls
Comment:	The external face of the system is classified as 'low risk' with reference to clauses 2.7.1 ⁽¹⁾⁽²⁾ and 2.7.2 ⁽²⁾ and Annex 2A ⁽¹⁾ . See sections 8.1 to 8.4 and 8.6 to 8.8 of this Certificate.
Standard: 3.10	Precipitation
Comment:	Walls insulated with the system will contribute to a construction satisfying this Standard, with reference to clauses 3.10.1 ⁽¹⁾⁽²⁾ and 3.10.6 ⁽¹⁾⁽²⁾ . See sections 4.5 and 9.1 of this Certificate.
Standard: 3.15	Condensation
Comment:	The system will contribute to a construction 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 10.3 and 10.4 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⁾ , 6.1.4 ⁽²⁾ , 6.1.6 ⁽¹⁾ , 6.1.8 ⁽²⁾ , 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⁾ , 6.2.11 ⁽¹⁾ and 6.2.13 ⁽²⁾ . See sections 6.2 and 6.3 of this Certificate.
Standard: 7.1(a)(b)	Statement of sustainability
Comment:	The system can contribute to satisfying the relevant requirements of Regulation 9, Standards 1 to 6, and therefore will contribute to a construction meeting the bronze level of sustainability as defined in this Standard. In addition, the 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 sections 6.2 and 6.3 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 12.1 and 12.2 and the <i>Installation</i> part of this Certificate.
Regulation:	28(b)	Resistance to moisture and weather
Comment:		The system provides protection against rain ingress. See sections 4.5 and 9.1 of this Certificate.
Regulation:	29	Condensation
Comment:		The system can contribute to minimising the risk of interstitial condensation. See section 10.4 of this Certificate.
Regulation:	30	Stability
Comment:		The system can sustain and transmit wind loads to the substrate wall. See section 7.4 of this Certificate.
Regulation:	36(a)	External fire spread
Comment:		The system can satisfy or contribute to satisfying this Regulation. See sections 8.1 to 8.5 of this Certificate.
Regulation:	39(a)(i)	Conservation measures
Regulation:	40	Target carbon dioxide emission rate
Comment:		The system can contribute to satisfying these Regulations. See sections 6.2 and 6.3 of this Certificate.

Construction (Design and Management) Regulations 2015

Construction (Design and Management) Regulations (Northern Ireland) 2007

Information in this Certificate may assist the client, Principal Designer/CDM co-ordinator, designer and contractors to address their obligations under these Regulations.

See section: 3 *Delivery and site handling* (3.2 and 3.4) of this Certificate.

Additional Information

NHBC Standards 2014

NHBC accepts the use of Epsicon 3 — MW External Wall Insulation System, provided it is installed, used and maintained in accordance with this Certificate, in relation to *NHBC Standards, Part 6 Superstructure (excluding roof), Chapter 6.9 Curtain walling and cladding*.

Technical Specification

1 Description

1.1 The Epsicon 3 — MW External Wall Insulation System consists of mineral wool insulation slabs which are mechanically fixed to the substrate wall, with a reinforcing glassfibre mesh embedded in the basecoat and dash render finish. The system can be designed to achieve either a 30 year or 60 year durability (see Figure 1 for both applications, and section 16).

1.2 The system is mechanically fixed through the insulation boards (for 30 year durability) or through the mesh (for 60 year durability) into the external surface of the substrate wall. For 60 year durability applications : additional mechanical fixings are applied through the mesh while the basecoat is wet. Mesh patches are then applied over the fixing heads and fully embedded. Further basecoat is applied to achieve the same thickness as applied over the insulation boards for 30 year durability applications, when measured from the top of the fixing plate. When the basecoat has dried, the finish coat is applied.

1.3 The system comprises the following components:

Supplementary adhesive

- WBS Bedding Adhesive — a cement based, polymer-modified adhesive, applied to a nominal thickness of 4 mm to 6 mm
- Wetherby Bedding Adhesive — a cement based, polymer-modified adhesive, applied to a nominal thickness of 4 mm to 6 mm

Insulation

- mineral wool insulation slabs — 1200 mm by 600 mm in a range of thicknesses between 30 mm⁽¹⁾ and 240 mm, with a nominal density of 140 kg·m⁻³ and a minimum tensile strength of 10 kN·m⁻². The slabs are manufactured to comply with the requirements of BS EN 13162 : 2012. The slabs have a thermal conductivity value of 0.037 W·m⁻¹·K⁻¹.

(1) For details of insulation less than 30 mm thick, the advice of the Certificate holder should be sought.

mechanical fixings

- mechanical fixings⁽¹⁾⁽²⁾ — anchors with adequate length to suit the substrate and the insulation thickness, approved and supplied by the Certificate holder, and selected from:
 - Ejotherm NT U — high-density polyethylene with stainless steel or electro-galvanized pins
 - Ejotherm STR U — high-density polyethylene with stainless steel or electro-galvanized screws
 - Fischer Termoz 8U — polyamide with stainless steel or electro-galvanized steel pins
 - Fischer Termoz 8UZ — polypropylene sleeve with polyimide GF screw
 - Fischer Termoz 8N — polyamide with steel, stainless steel or electro-galvanized steel pins
 - Fischer Termoz CN8 — polyethylene with polyamide or electro-galvanized steel pins
 - TFIX-8S — polypropylene sleeve with electro-galvanized-steel pins
 - TFIX-8ST — polypropylene sleeve with steel, electro-galvanized-steel screw and polyamide GF expansion screw head
 - TFIX-8M — polypropylene sleeve with electro-galvanized-steel pin
 - Bravoll PTH-KZ 60/8-La - copolymer polypropylene with electro-galvanized pin
 - Bravoll PTH-KZL 60/8-La - copolymer polypropylene with electro-galvanized pin
 - Bravoll PTH-S - copolymer polypropylene with electro-galvanized screw.

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

(2) Polyethylene, PE-HD or polyamide ribbed or anchor sleeve with a stainless pin to achieve a 60 years durability performance.

Basecoat

- lightweight basecoat render — a cement-based, ready-mixed render supplied as a powder to which clean water is added and comprising limestone sand conforming to BS EN 13139 : 2002, cement to BS EN 197-1 : 2011, lightweight aggregates and polypropylene fibres.

Reinforcement

- reinforcing mesh — an alkali-resistant glassfibre mesh, with a 4 mm by 4 mm mesh size and a nominal weight of 160 g·m⁻².

Finish

- lightweight dash receiver — a cement-based, ready-mixed render supplied as a powder to which clean water is added and comprising limestone sand conforming to BS EN 13139 : 2002, cement to BS EN 197-1 : 2011, hydrated lime to BS EN 459-1 : 2001, lightweight aggregates, polypropylene fibres and polymers
- Dry dash — aggregates up to 8 mm and available in a range of colours.

1.4 Ancillary materials used with the system, but outside the scope of the Certificate include:

- profiles, comprising:
 - aluminium, powder-coated galvanized steel, PVC-U or stainless steel base profile, and edge, corner, render stop ends
 - aluminium, powder-coated galvanized steel, PVC-U or stainless steel edge profile
 - aluminium, powder-coated galvanized steel, PVC-U or stainless steel corner profile
 - aluminium, powder-coated galvanized steel, PVC-U or stainless steel stop profile
 - aluminium, powder-coated galvanized steel, PVC-U or stainless steel V expansion and movement joint profiles
- profile connectors and fixings
- silicone-based joint sealant
- algae and fungal wash
- PU foam filler
- sealing tape.

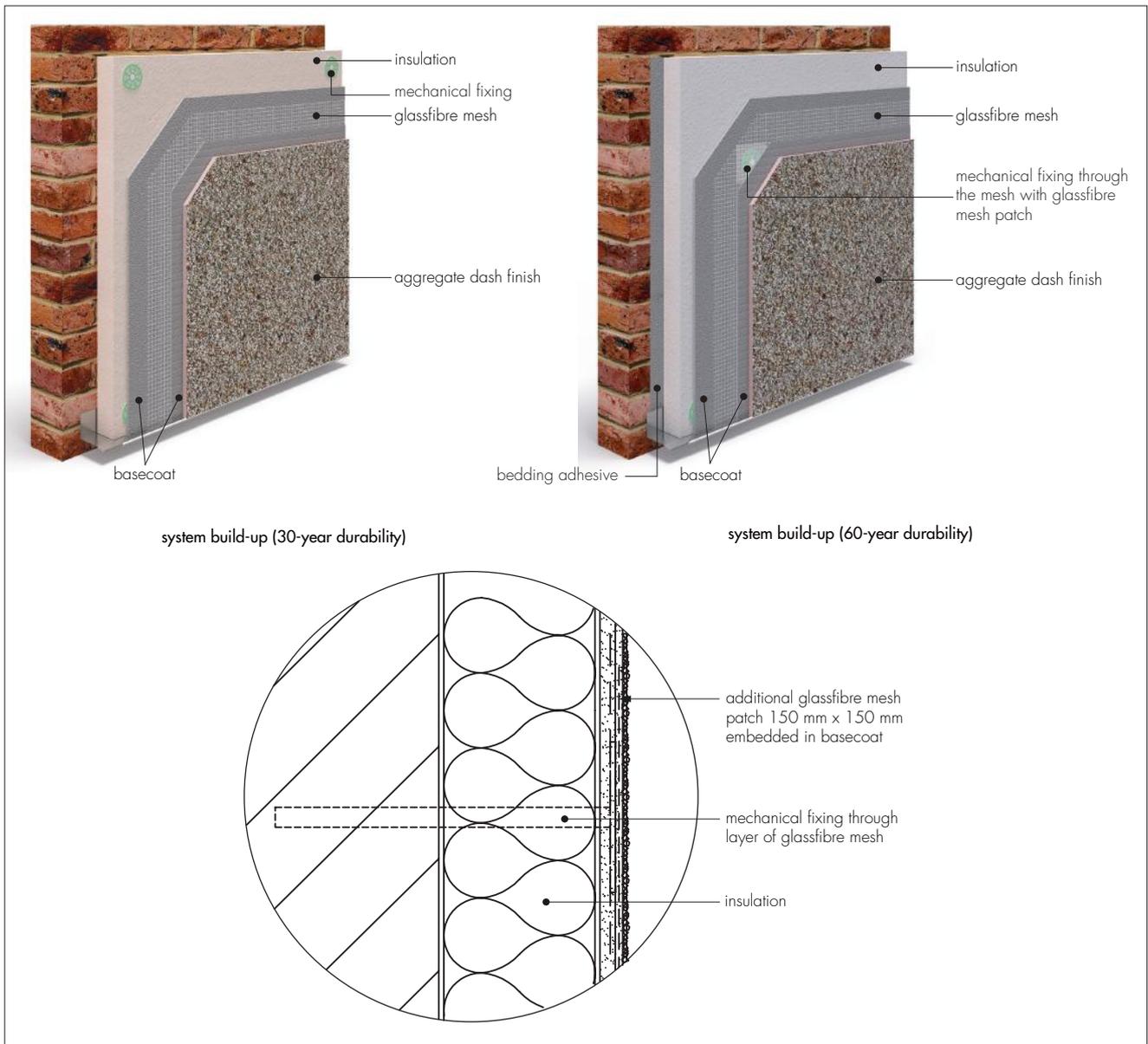
2 Manufacture

2.1 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.

2.2 The management system of Wetherby Building Systems Limited has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 and BS EN ISO 14001 : 2004 by Bureau Veritas Certification (Certificate UK 9000006).

Figure 1 Epsicon 3 – MW External Wall Insulation System



3 Delivery and site handling

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

3.2 Components are delivered in the quantities and packages listed in Table 1. Each package carries the manufacturer's and product identification marks and batch number. The basecoat and render also include the BBA logo incorporating the number of this Certificate.

Table 1 Component supply details

Component	Quantity and packaging
Dash receiver	25 kg bag
Dry dash	25 kg bag
Bedding adhesive	25 kg bag
Basecoat	15 kg bag
Reinforcing mesh	1 m x 50 m roll
Fixings	boxed by the 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 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 and dash receiver must be stored in dry conditions, off the ground, and protected from frost at all times. Bags of unopened render will have a shelf-life of 12 months when stored correctly. Damaged, wet or contaminated products must not be used and should be discarded.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on the Epsicon 3 – MW External Wall Insulation System.

Design Considerations

4 General

4.1 Epsicon 3 – MW External Wall Insulation System, when installed in accordance with this Certificate, is effective in reducing the thermal transmittance (U value) of the walls in new and existing buildings. It is essential that detailing techniques specified in this Certificate are carried out to a high standard if the ingress of water into the insulation is to be avoided and the full thermal benefit obtained from treatment with the system (eg window sills should be designed and installed so as to direct water away from the building). Only details specified by the Certificate holder should be used.

4.2 For further improvement in the thermal/carbon-emissions performance, the designer should consider additional/alternative fabric and/or services measures.

4.3 The system will improve the weather resistance of a wall and provide a decorative finish. However, it may be installed only where other potential sources of moisture penetration have been dealt with separately and where there are no signs of dampness on the inner surface of the wall, other than those caused solely by condensation.

4.4 The system is applied to the outside of external walls and is suitable for use on solid masonry, concrete and no-fines concrete of new or existing domestic or non-domestic buildings (with or without an existing render). Prior to installation of the system, the wall surfaces should comply with section 14 of this Certificate.

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

- BS EN 1996-2 : 2006 — the designer should select a construction appropriate to the local wind-driven rain index, paying due regard to the design detailing, workmanship and materials to be used
- BS 8000-3 : 2001.

4.6 Other new buildings, not subject to any of the previous requirements, should also be built in accordance with section 4.5 of this Certificate.

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

4.8 The fixing of rainwater goods, satellite dishes, clothes lines, hanging baskets and similar items is outside the scope of this Certificate.

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

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

4.11 The Epsicon 3 – MW External Wall Insulation System can be adapted to achieve an extended service life of 60 years instead of the standard 30 year durability. For applications requiring 30 year durability, the system is directly fixed through the insulation boards. However, where 60 years durability is required, a single mechanical fixing is installed through each insulation board and then the mechanical fixings are applied through the reinforcing mesh before the application of a decorative coat. See Figure 1 (for both applications) and section 16 of this Certificate.

4.12 For a 60 year durability, the following components must be constructed from stainless steel grade 1.4301 to BS EN 10088-2 : 2005:

- starter track and render stop end, including the fixings
- pins or screw for mechanical fixings.

5 Practicability of installation

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

Note: The BBA operates a UKAS-Accredited Approved Installer System for external wall insulation; details of installer companies approved are included on the BBA's website (www.bbacerts.co.uk).

6 Thermal performance

6.1 Calculations of thermal transmittance (U value) should be carried out in accordance with BS EN ISO 6946 : 2007 and BRE Report BR 443 : 2006 using the thermal conductivity (λ_p value) of $0.037 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$. The insulation thickness range is 30 mm to 240 mm.



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

Table 2 Insulation thickness required to achieve U values⁽¹⁾⁽²⁾⁽³⁾ given in the national Building Regulations (30 and 60 years durability)

U value ⁽⁴⁾ ($\text{W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$)	200 mm dense blockwork $\lambda = 1.75 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$	200 mm dense blockwork $\lambda = 1.75 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$
0.18	200	210
0.19	190	200
0.25	140	150
0.26	130	140
0.28	120	130
0.30	110	120
0.35	90	100

- (1) Wall construction inclusive of 13 mm plaster ($\lambda = 0.57 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$), brickwork (protected) with 17.1% mortar or dense blockwork with 6.7% mortar ($\lambda = 0.88 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$). Declared thermal conductivity (λ_p) of insulation is as shown in clause 6.1.
- (2) Calculations based on a bonded system that included 7 stainless steel fixings per square metre, with 8 mm diameter sleeve and a point thermal transmittance (χ_p) of $0.002 \text{ W}\cdot\text{K}^{-1}$ per steel pin. Use of other types of fixings should be calculated in accordance with BS EN ISO 6946 : 2007.
- (3) Based upon incremental insulation thickness of 10 mm.
- (4) When applying the maximum available insulation thickness, these walls can achieve U values of $0.16 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$.

6.3 The system can contribute to maintaining continuity of thermal insulation at junctions between elements and other openings. For Accredited Construction Details, the corresponding Ψ -values (Psi) in BRE Information Paper IP 1/06, Table 3, may be used in carbon emission calculations in Scotland and Northern Ireland. Detailed guidance for other junctions and on limiting heat loss by air infiltration can be found in the supporting documents to the national Building Regulations.

7 Strength and stability

General

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

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

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



7.4 The wind loads on the walls should be calculated in accordance with BS EN 1991-1-4 : 2005. Special consideration should be given to locations with high wind-load pressure coefficients, as additional fixings may be necessary. In accordance with BS EN 1990 : 2002, it is recommended that a load factor of 1.5 is used to determine the ultimate wind load to be resisted by the system.

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

- the substrate wall has adequate strength to resist additional loads that may be applied as a result of installing the system, ignoring any positive contribution from the insulation system
- the proposed system and associated fixing layout (see Figures 4 and 6) provides adequate resistance to negative wind loads, based on the results of site investigation and test results (given in section 7.7)
- an appropriate number of site-specific pull-out tests are conducted on the substrate of the building to determine the minimum resistance to failure of the fixings. The characteristic pull-out resistance should be determined in accordance with the guidance given in ETAG 014 : 2011, Annex D.

7.6 The number and centre of fixings should be determined by the system designer, but must be at the minimum spacings given in this Certificate. Provided the substrate wall is suitable and an appropriate fixing selected, the fixings will adequately support and transfer the weight of the render insulation system to the substrate wall.

7.7 Typical characteristic pull-out strengths for the fixings taken from the corresponding European Technical Assessment (ETA) are given in Table 3; however, these values are dependent on the substrate, and the fixing must be selected to suit the loads and substrate concerned.

Table 3 Fixings — typical characteristic pull-out strengths

Fixing type	ETA Number	Substrate	Drill diameter (mm)	Effective anchorage depth (mm)	Typical pull-out strength ⁽¹⁾ (kN)
Fischer Termoz 8U	02/0019	Concrete(C12/15)/ Solid clay bricks	8	70	1.5
Fischer Termoz 8N	03/0019	Concrete(C16/20)/ Solid clay bricks	8	50	1.5 1.2
Fischer Termoz CN8	09/0394	Concrete(C12/15)/ Solid clay bricks	8	35	0.9
Fischer Termoz 8UZ	02/0019	Concrete(C12/15)/ Solid clay bricks	8	35	1.2 1.5
Ejot NT U	05/0009	Concrete(C12/15)/ Solid clay bricks	8	25	1.2 1.5
Ejot STR U	04/0023	Concrete(C12/15)/ Solid clay bricks	8	25	1.2 1.5
TFIX-8ST	11/0144	Concrete(C12/15)/ Solid clay bricks	8	25	1.2
TFIX-8S	11/0144	Concrete(C12/15)/ Solid clay bricks	8	25	1.2
TFIX-8M	07/0336	Concrete(C12/15)/ Solid clay bricks	8	25	1.5
Bravoll PTH-KZ 60/8-L _q	05/0055	Concrete(C12/15)/ Solid clay bricks	8	25	0.7 0.9
Bravoll PTH-KZL 60/8-L _q	05/0055	Perforated clay bricks	8	55	0.6
Bravoll PTH-S	08/0267	Concrete(C12/15)/ Solid clay bricks	8	45	1.5 1.5

7.8 The design pull-through resistance data given in Table 4 is the result of calculation based upon pull-through resistances determined by BBA from tests on anchors with 60 mm diameters and with a 140 mm diameter anchor extension washer.

Table 4 Pull-through resistances

Factor (unit)	Mineral wool
Insulation thickness (mm)	50
Plate diameter of anchor (mm)	60
Characteristic pull-through resistance ⁽¹⁾ (per anchor) (N)	360
Factor of safety ⁽²⁾	2.5
Design pull-through resistance (N)	144

(1) Characteristic value in accordance with BS EN 1990 : 2002, Annex D7.2.

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

Impact resistance

7.9 Hard body impact tests were carried out in accordance with ETAG 004 : 2011. The system is suitable for Use Categories II and III⁽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 Class 0 or 'low risk', as defined in the national Building Regulations.

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

8.3 The mineral wool insulation is classified as 'non-combustible'.

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



8.5 The system is suitable for use without height restrictions.



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

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

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

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

9 Water resistance



9.1 The system will provide a degree of protection against rain ingress. Care should be taken to ensure that walls are adequately weathertight prior to the application of the system. The system should only be installed where there are no signs of dampness on the inner substrate other than those caused solely by condensation.

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

9.3 The guidance given in BRE Report BR 262 : 2002 should be followed in connection with the water resistance 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.

9.4 At the tops 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 16.29).

10 Risk of condensation



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

Surface condensation



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



10.3 Walls will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed $1.2 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$ at any point. Guidance may be obtained from BS 5250 : 2011 (Section 8, Annex D) and BRE Report BR 262 : 2002.

Interstitial condensation



10.4 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 10.5 of this Certificate.

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

11 Maintenance and repair



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

- visual inspection of the render for signs of damage. Cracks in the render exceeding 0.2 mm must be repaired
- examination of the sealant around openings and service entry points
- visual inspection of architectural details designed to shed water to confirm that they are performing properly
- visual inspection to ensure that water is not leaking from external downpipes or gutters; such leakage could penetrate the rendering
- necessary repairs effected immediately and the sealant joints at window and door frames replaced at regular intervals
- maintenance schedules, which should include the replacement and resealing of joints, for example between the insulation system and window and door frame.

11.2 Damaged areas must be repaired using the appropriate components and procedures detailed in the Certificate holder's installation instructions and in accordance with BS EN 13914-1 : 2005.

11.3 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.

12 Durability



12.1 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 11 of this Certificate.

12.2 The system's service life can extend to 60 years provided the system is fixed through the reinforcement mesh and a planned inspection and maintenance programme is introduced in accordance with Section 12. An extended 60 years' service life requires the use of stainless steel base and corner profiles, stainless steel centre pin fixings [304 Grade (1.4301)] and plastic anchor sleeve materials such as polyamide (PA6 and PA6.6), polyethylene (PE) or polypropylene (PP) and following an appropriate repair and maintenance schedule as covered by the Certificate holder's Repair and maintenance manual. Any damage to the surface finish must be repaired within a time period agreed by the Certificate holder.

12.3 The render may become discoloured with time, the rate depending on the initial colour, the degree of exposure and atmospheric pollution, as well as the design and detailing of the wall. In common with traditional renders, discoloration by algae and lichens may occur in wet areas. The appearance may be restored by a suitable power wash.

Installation

13 Site survey and preliminary work

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

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

13.2 The survey should include tests conducted on the walls of the building by the Certificate holder or their approved installers (see section 14) 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. In addition, the type and number of fixings are selected (see sections 7, 15.15 and 15.22). The advice of the Certificate holder should be sought to ensure the proposed fixing pattern is sufficient.

13.3 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 one metre, must be made good prior to installation to ensure that the insulation boards are installed with a smooth, in-plane finished surface.

13.4 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.

13.5 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.

13.6 Internal wet work, eg screed or plastering, should be completed and allowed to dry prior to the application of the system.

13.7 All modifications and necessary repairs to the building structure should be completed before installation commences.

13.8 In multi-storey at least one fixing per square metre should be of a non-combustible type to provide the increased stability that may be required in a fire (see section 8.7).

14 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.

15 Procedure

General

15.1 Application is carried out in accordance with the Certificate holder's current installation instructions.

15.2 Weather conditions should be monitored to ensure correct application and curing conditions. Application of coating materials must not be carried out at temperatures below 5°C or above 30°C, nor if exposure to frost is likely, and the coating must be protected from rapid drying.

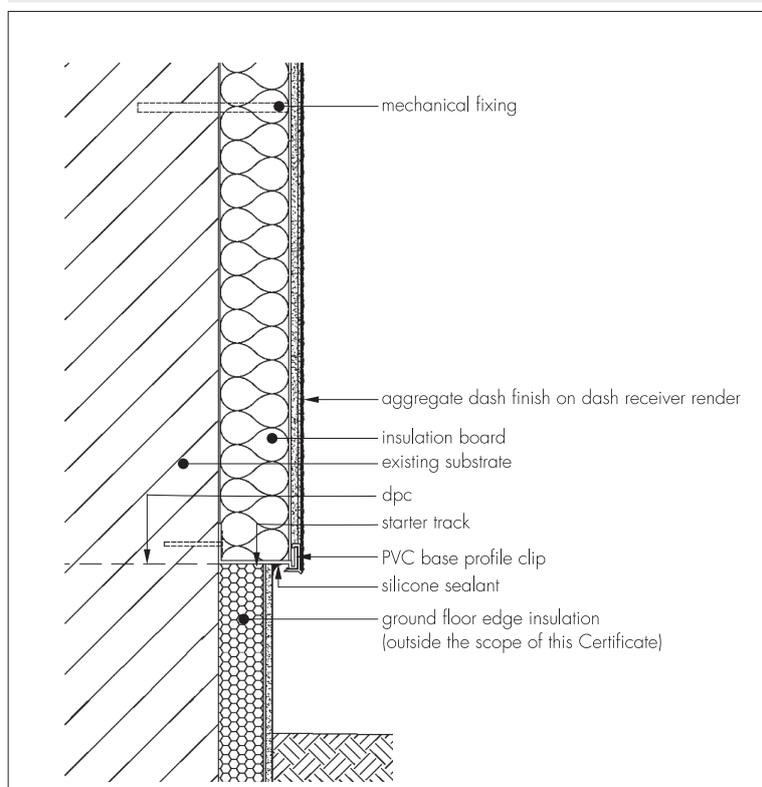
15.3 All rendering should be in accordance with the relevant recommendations of BS EN 13914-1 : 2005.

15.4 For a 30 year durability system, the mechanical fixings are applied mainly through the insulation boards and for 60 year durability the mechanical fixings are applied through the mesh. The initial installation procedure is common to both systems and is described in sections 15.5 to 15.14.

Positioning and securing insulation boards

15.5 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 rail joints.

Figure 2 Typical section of base profile



15.6 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 (see Figures 4 and 6). 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.

15.7 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 reinforcing 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.

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

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

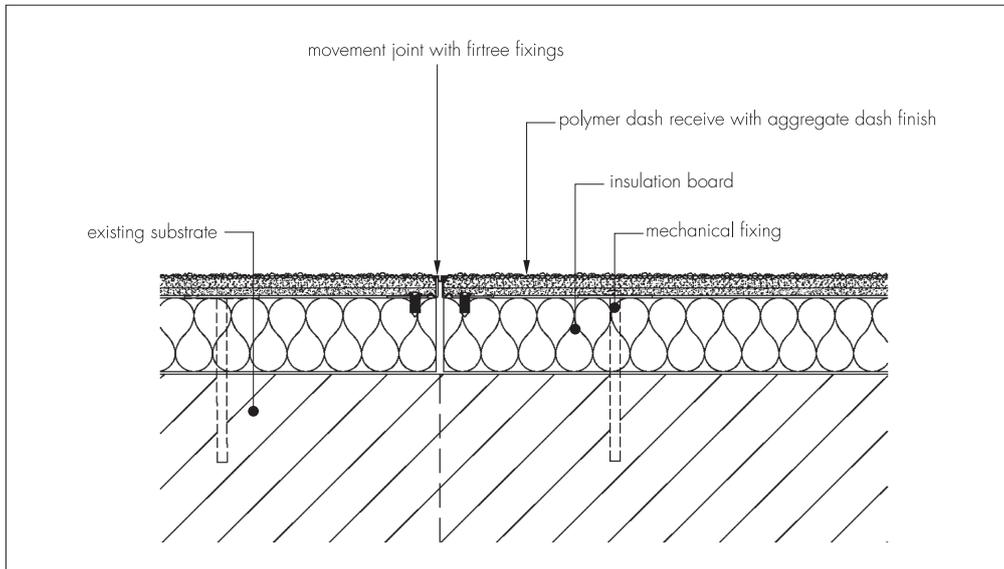
15.10 Periodic checks should be carried out as work proceeds.

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

Movement joints

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

Figure 3 Movement joint detail



Basecoat and reinforcement

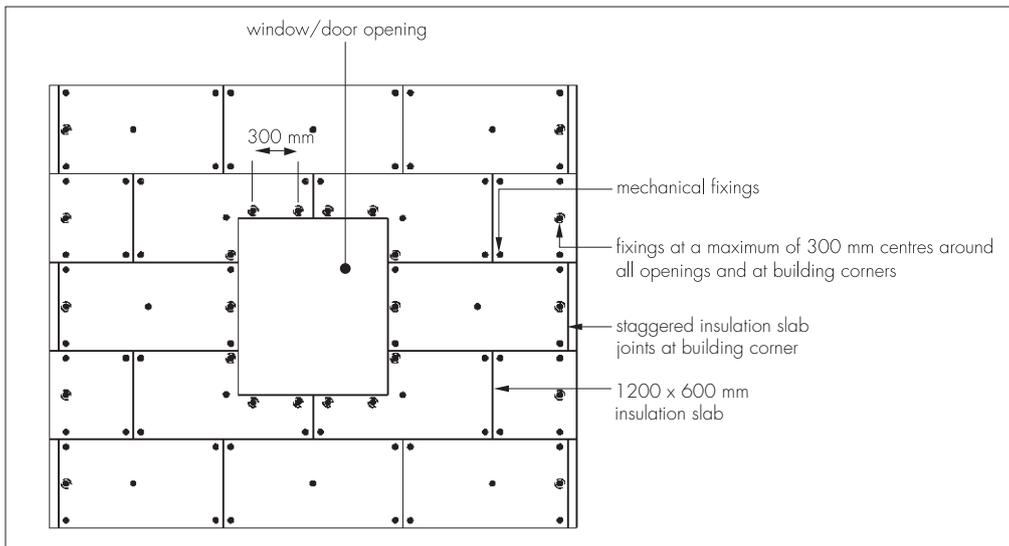
15.13 The basecoat should be mixed with 4 to 5 litres of potable water per 25 kg bag for a minimum of 5 minutes with an electric paddle mixer to disperse the additives.

15.14 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

15.15 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, six to eight fixings per square metre (Figure 4). The mechanical fixings are inserted and tapped or screwed firmly into place, securing the insulation boards to the substrate.

Figure 4 Typical fixing pattern — 30 year durability



15.16 A thickness of 4 mm to 6 mm of the basecoat should be applied to the surface of the insulation using a stainless steel trowel.

15.17 The glassfibre mesh is 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 mm by 200 mm should also be installed at the corners of window/door openings (see Figure 5).

15.18 It is important to ensure that the mesh is free of wrinkles, completely covered.

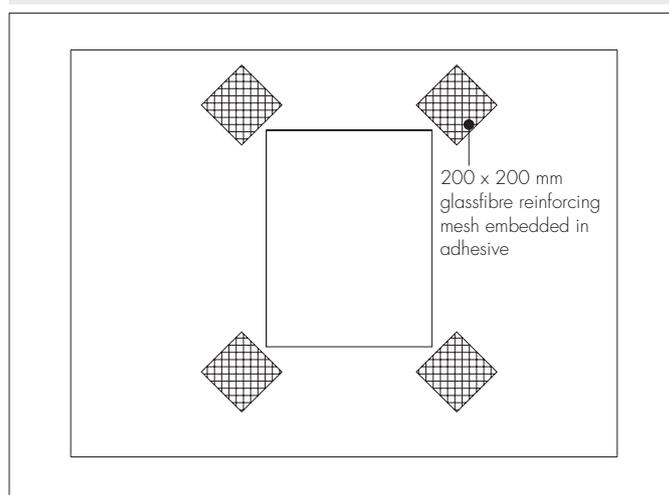
Application of 60 year durability system — mechanical fixings through the reinforcement mesh

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

15.20 The glassfibre mesh should be embedded in the wet render using the trowel. The sheets of mesh should be lapped by a minimum of 100 mm and diagonal patches of mesh approximately 200 mm by 200 mm should also be installed at the corners of window/door openings (see Figure 5).

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

Figure 5 Additional reinforcement at openings



15.22 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, six to eight fixings per square metre (see Figure 6). 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.

15.23 While the basecoat is still wet, 150 mm by 150 mm stress patches of reinforcing mesh are applied over the mechanical fixing heads and fully embedded within the basecoat. If required, further basecoat is applied to maintain approximately 3 mm thickness when measured from the top of the fixings.

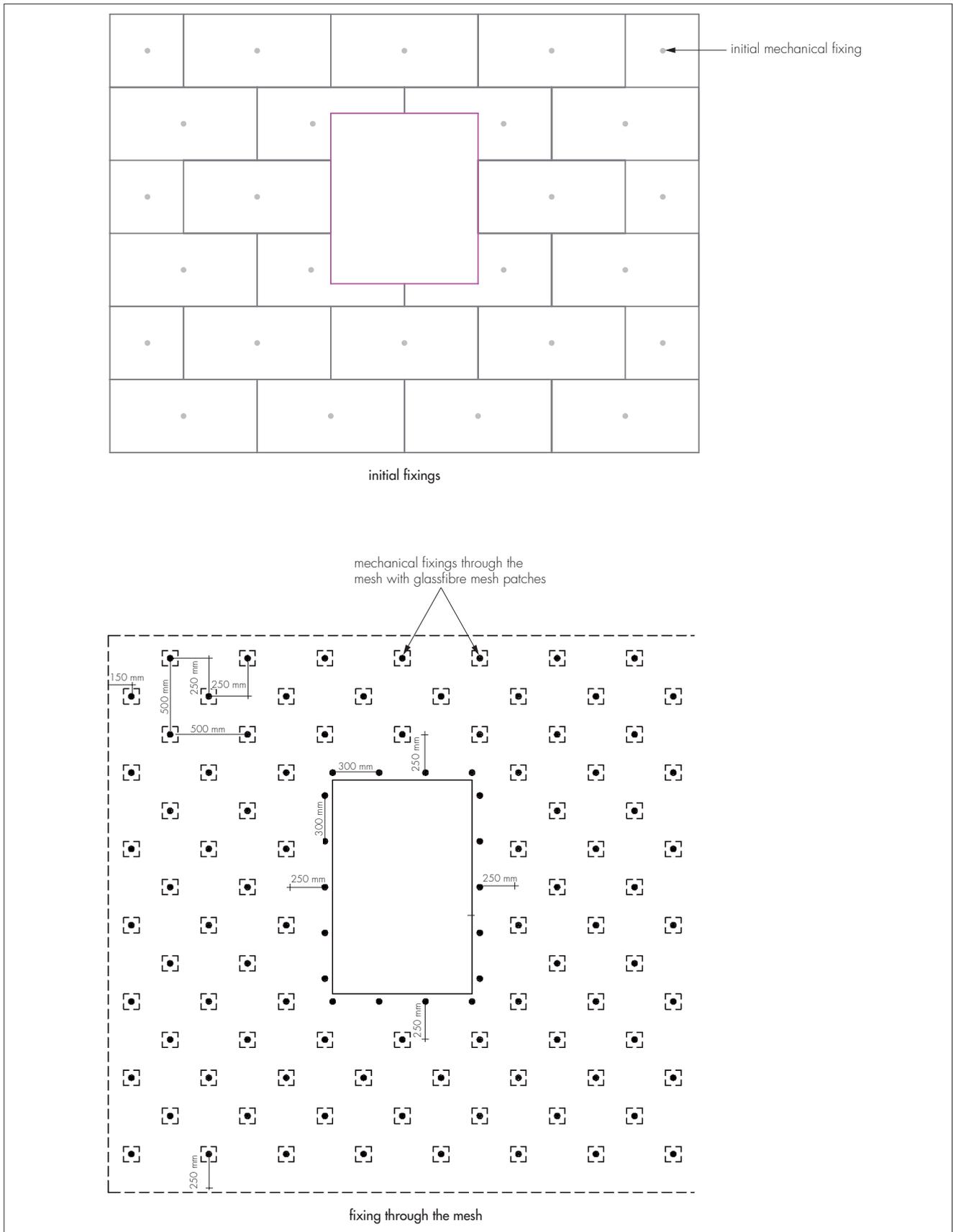
Both the 30 and 60 year durability systems

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

15.25 Prior to the application of the reinforcement coat, 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.

15.26 The system is ready for the application of decorative coat which is described in sections 15.27 to 15.31.

Figure 6 Typical fixing method for 60 year durability



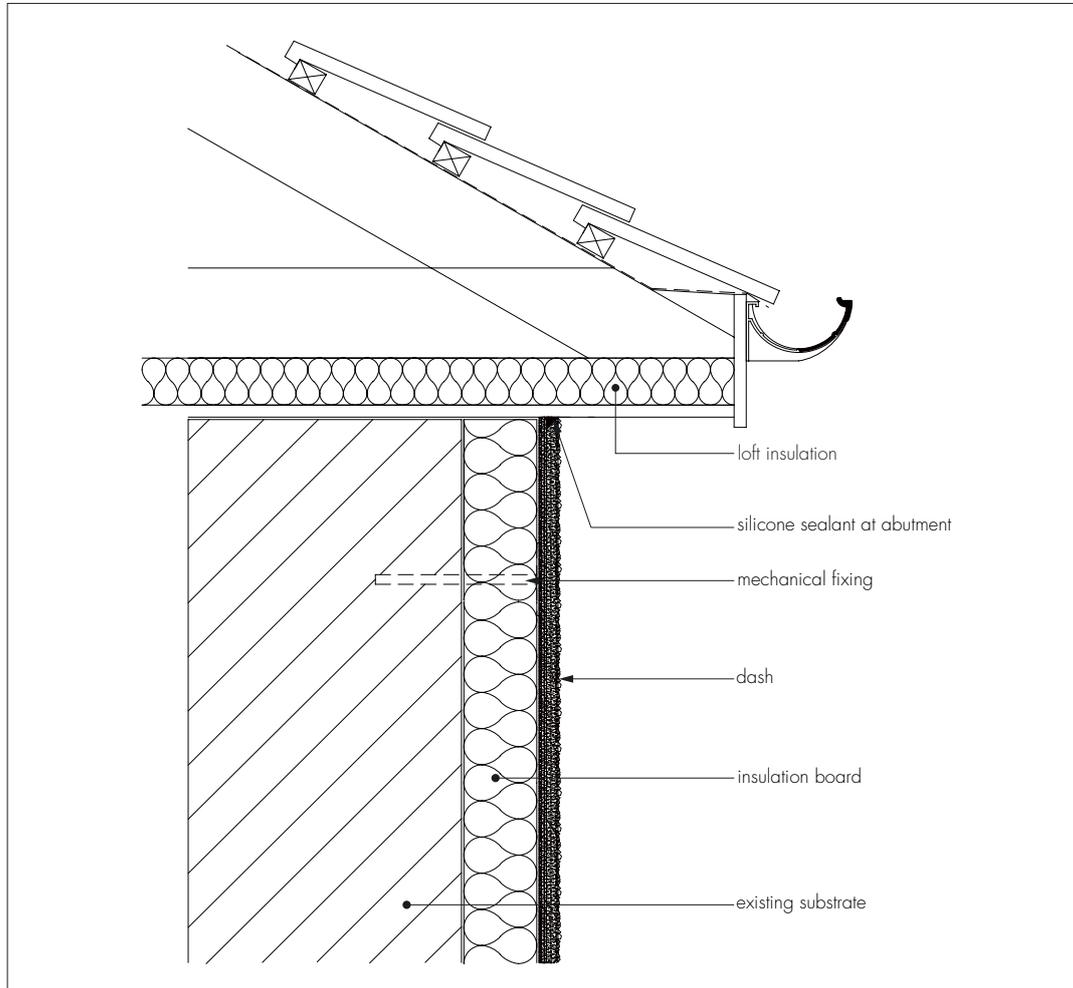
Decorative finish

15.27 The dash receiver is prepared and trowel-applied to a thickness of approximately 8 mm to 10 mm. While the render is still soft, selected clean spar aggregate is thrown or sprayed onto the surface. On completion, the surface must be checked to ensure an even coverage of spar-dash has been achieved. Where necessary, the aggregate should be lightly tamped to ensure that a good bond is achieved.

15.28 Continuous surfaces must be completed without a break.

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

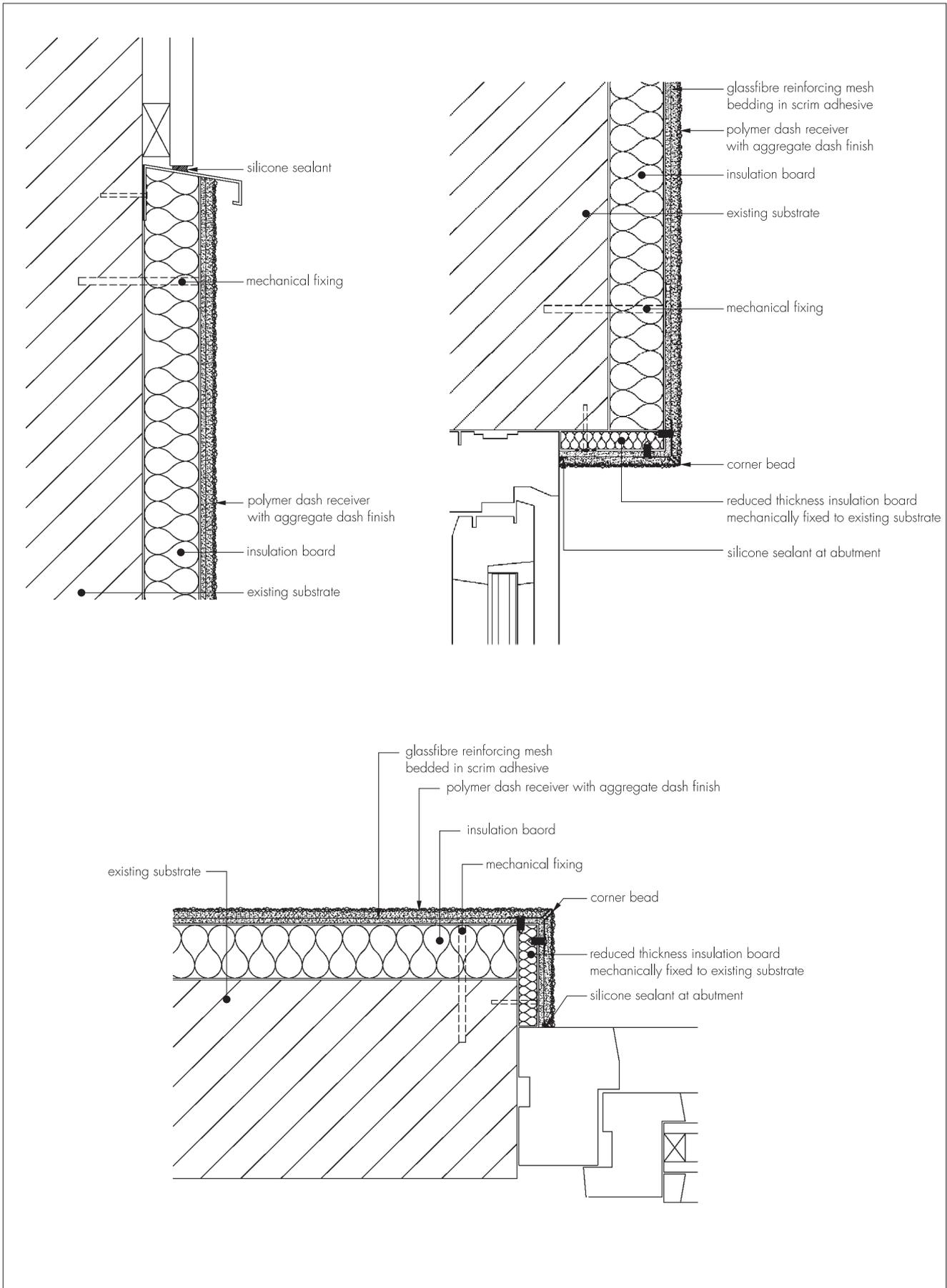
Figure 7 Roof eave detail



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

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

Figure 8 Typical window reveal detail



16 Investigations

16.1 Tests were conducted and the results were assessed to determine:

- wind load resistance
- thermal resistance
- fire performance
- pull-through resistance of fixings
- hygrothermal performance
- resistance to frost
- resistance to impact
- water absorption (capillary test)
- water vapour permeability.

16.2 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.

16.3 An assessment of the risk of interstitial condensation was undertaken.

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

Bibliography

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- BRE Report (BR 443 : 2006) *Conventions for U-value calculations*
- ETAG 004 : 2011 and 2013 *Guideline for European Technical Approval of External Thermal Insulation Composite Systems (ETICS) with Rendering*
- ETAG 014 : 2011 *Guideline for European Technical Approval of Plastic Anchors for fixing of External Thermal Insulation Composite Systems with Rendering*

17 Conditions

17.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page — no other company, firm, organisation or person may hold or claim that this Certificate has been issued to them
- is valid only within the UK
- has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English Law.

17.2 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

17.3 This Certificate will remain valid for an unlimited period provided that the product/system and its manufacture and/or fabrication, including all related and relevant parts and processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

17.4 The BBA has used due skill, care and diligence in preparing this Certificate, but no warranty is provided.

17.5 In issuing this Certificate, the BBA is not responsible and is excluded from any liability to any company, firm, organisation or person, for any matters arising directly or indirectly from:

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- actual installations of the product/system, including their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the product/system is installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the product/system, including its manufacture, supply, installation, use, maintenance and removal
- any claims by the manufacturer relating to CE marking.

17.6 Any information relating to the manufacture, supply, installation, use, maintenance and removal of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used, maintained and removed. It does not purport in any way to restate the requirements of the Health and Safety at Work etc. Act 1974, or of any other statutory, common law or other duty which may exist at the date of issue or reissue of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care.