JUB kemična industrija d.o.o.
Dol pri Ljubljani 28
SI-1262 Dol pri Ljubljani
Slovenia

Tel: 00 386 1 588 42 82 Fax: 00 386 1 588 42 50
e-mail: danijel.lisicic@jub.eu
website: www.jub.eu

Agrément Certificate
12/4955
Product Sheet 2

JUB EXTERNAL WALL INSULATION SYSTEMS

JUBIZOL MW EXTERNAL WALL INSULATION SYSTEM

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

(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 be designed to resist wind loads experienced for a particular location, and adequate impact resistance. The resistance to impact is dependent on the system chosen (see section 7).

Behaviour in relation to fire — the system has a reaction to fire classification of A2-s1, d0 in accordance with BS EN 13501-1 : 2007 (see section 8).

Condensation — the system can contribute to limiting the risk of interstitial and surface condensation (see section 11).

Durability — when installed and maintained in accordance with the Certificate holder's recommendations and the terms of this Certificate, the system will remain effective for at least 30 years. The durability can be extended to 60 years by using different fixings and by following a planned inspection and an effective maintenance schedule as described in sections 12 and 13.

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

On behalf of the British Board of Agrément

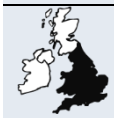
Date of Third issue: 27 January 2022

Originally certificated on 24 January 2014

Hardy Giesler
Chief Executive Officer

Regulations

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



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

Requirement:	**A1**	**Loading**
Comment:		The system can sustain and transmit wind loads to the substrate wall. See sections 7.1 to 7.12 of this Certificate.
Requirement:	**B4(1)**	**External fire spread**
Comment:		The system is unrestricted by this Requirement. See sections 8.1 to 8.4 of this Certificate.
Requirement:	**C2(b)**	**Resistance to moisture**
Comment:		The system provides a degree of protection against rain ingress. See section 10.1 of this Certificate.
Requirement:	**C2(c)**	**Resistance to moisture**
Comment:		The system can contribute to minimising the risk of interstitial and surface condensation. See sections 11.2 and 11.4 of this Certificate.
Requirement:	**L1(a)(i)**	**Conservation of fuel and power**
Comment:		The system can contribute to satisfying this Requirement. See sections 6.1 and 6.2 of this Certificate.
Regulation:	**7(1)**	**Materials and workmanship**
Comment:		The system is acceptable. See sections 13.1 and 13.2 and the *Installation* part of this Certificate.
Regulation:	**7(2)**	**Materials and workmanship**
Comment:		The system is unrestricted by this Regulation. See sections 8.1 to 8.4 of this Certificate.
Regulation:	**26**	**CO_2 emission rates for new buildings**
Regulation:	**26A**	**Fabric energy efficiency rates for new dwellings (applicable to England only)**
Regulation:	**26A**	**Primary energy consumption rates for 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 7.12 of this Certificate.
Standard:	2.6	Spread to neighbouring buildings
Comment:		The system is unrestricted by this Standard, with reference to clauses 2.6.4(1)(2), 2.6.5(1) and 2.6.6(2). See sections 8.1 to 8.4 of this Certificate.

Standard:	2.7	Spread on external walls
Comment:		The system is unrestricted by this Standard, and is acceptable with reference to clause 2.7.1[(1)(2)]. See sections 8.1 to 8.4 of this Certificate.
Standard:	3.10	Precipitation
Comment:		The system can contribute to a construction satisfying this Standard, with reference to clauses 3.10.1[(1)(2)] and 3.10.2[(1)(2)]. See section 10.1 of this Certificate.
Standard:	3.15	Condensation
Comment:		The system can contribute to satisfying this Standard, with reference to clauses 3.15.1[(1)(2)], 3.15.4[(1)(2)] and 3.15.5[(1)(2)]. See sections 11.3 and 11.4 of this Certificate.
Standard:	6.1(b)	Carbon dioxide emissions
Standard:	6.2	Building insulation envelope
Comment:		The system can contribute to satisfying these Standards, with reference to clauses (or parts of) 6.1.1[(1)], 6.1.2[(1)(2)], 6.1.3[(1)(2)], 6.1.6[(1)], 6.1.10[(2)], 6.2.1[(1)(2)], 6.2.3[(1)], 6.2.4[(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**
Comments:		All comments given for 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:		Walls insulated with the system can satisfy this Regulation. See section 10.1 of this Certificate.
Regulation:	**29**	**Condensation**
Comment:		Walls insulated with the system can satisfy the requirements of this Regulation. See section 11.4 of this Certificate.
Regulation:	**30**	**Stability**
Comment:		The system can sustain and transmit wind loads to the substrate wall. See sections 7.1 to 7.12 of this Certificate.
Regulation:	**36(a)**	**External fire spread**
Comment:		The system is unrestricted by this Regulation. See sections 8.1 to 8.4 of this Certificate.

Regulation:	**39(a)(i)**	**Conservation measures**
Regulation:	**40**	**Target carbon dioxide emission rate**
Comment:		The system can contribute to satisfying these Regulations. See sections 6.1 and 6.2 of this Certificate.

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

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

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

Additional Information

NHBC Standards 2022

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

Technical Specification

1 Description

1.1 The Jubizol MW External Wall Insulation System comprises mineral wool insulation slabs, mechanically fixed to the external masonry wall, with supplementary adhesive (100% coverage), reinforced basecoat, primer and various finish coats.

1.2 The system can be designed to achieve either a 30- or 60-year service life (see Figures 1a and 1b). Mechanical fixings are applied through the insulation slabs (30-year system) or through the reinforcement mesh and insulation slabs (60-year system). See sections 1.3 and 1.4 for additional information.

30-year durability (see Figure 1a)

1.3 After the slabs have been secured to the wall with insulation adhesive and mechanical fixings (approximately four per square metre), the basecoat (see section 1.6) is trowel-applied to the specified thickness, followed by the reinforcement mesh, which is fully embedded within the basecoat. A second layer of basecoat is applied and the system is left to cure before application of the primer, finish and decorative coats (described in sections 1.6 and 16).

60-year durability (see Figure 1b)

1.4 After the slabs have been secured to the wall with insulation adhesive and one mechanical fixing in the middle of each slab, the basecoat (see section 1.6) is trowel-applied to the specified thickness, followed by the reinforcement mesh, which is fully embedded within the basecoat. While the basecoat is still wet, additional mechanical fixings (see section 7.12) are applied through the mesh and insulation slabs into the substrate. Once the first layer of reinforced basecoat has cured, a second layer of mesh is applied, along with a second layer of basecoat. Finally, a third layer of basecoat is applied once the second layer has cured. The system is left to cure before application of the primer, finish and decorative coats (described in sections 1.6 and 16).

1.5 Additionally, for 60-year durability systems, the requirements of sections 1.6 (mechanical fixings) and 4.14 must be met.

1.6 The system comprises the following components:

Adhesive (supplementary)

- Jubizol Adhesive Mortar — a cementitious powder requiring 4 to 4.4 litres of clean water per bag, applied at a coverage rate of 3.5 to 5 kg·m^{-2}
- Jubizol Adhesive — a high-elasticity cementitious powder requiring 3.8 to 4.2 litres of clean water per bag, to give coverage rates of 3.5 to 5 kg.m^{-2}.

Insulation(1)

- MW Slab Plus 038 — rock mineral wool slabs, 1200 by 600 mm, in range of thicknesses between 60(2) and 200 mm in 10 mm increments, with a nominal density of 140 kg·m^{-3}, a minimum compressive strength of 40 kPa and a tensile resistance perpendicular to the faces of 15 kPa. Slabs are manufactured to comply with BS EN 13162 : 2012.

(1) For declared thermal conductivity values (λ_D), see section 6.1 of this Certificate.
(2) The minimum thickness is 100 mm when EJOT STR U mechanical fixings are specified (see Table 5, Design pull-through resistance). Thicknesses below 60 mm can only be specified for reveals.

Mechanical fixings

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

  — EJOT STR U / STR U 2G(3)(4) — high density polyethylene (HDPE) anchor sleeve with a stainless steel or electro-galvanized steel screw
  — EJOT SDM-T plus(4) — polyamide anchor sleeve with a stainless steel or electro-galvanized steel screw
  — EJOT NT U(4) — HDPE anchor sleeve with a stainless steel or electro-galvanized steel pin
  — EJOT SBL 140 Plus — polyamide, 140 mm diameter load-spreading disc washer to be used in conjunction with an EJOT fixing with standard 60 mm diameter plate.

  (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.
  (2) HDPE, polyamide or polypropylene anchor sleeves 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.
  (3) The minimum residual thickness of the insulation, excluding the depth of the fixing die, must be ≥ 60 mm when embedding the EJOT STR U fixing in the insulation.
  (4) These fixings when used with galvanized steel screw/pin can only be specified for 30-year durability applications.

Basecoat

- Jubizol Adhesive Mortar — a cementitious render, including aggregates and additives, requiring 4 to 4.4 litres of clean water per bag, and applied at a coverage rate of 5.6 to 8.4 kg·m^{-2}. The thickness of the basecoat is dependent upon the durability of the system (approximately 5 or 8 mm for a 30 or 60-year system respectively, as described in section 16).

Reinforcement mesh

- Jubizol Glassfibre Mesh — alkaline-resistant, vinyl-covered glass fibre mesh (grid size 3.5 by 4.7 mm) with nominal weight of 160 g·m^{-2}.

Primer

- Jubizol Unigrund — a water-based acrylic slurry primer for use with all finishing coats (except mineral-based finishing coats, mineral-trowelled render, mineral smooth render and Nivelin D)
- Akryl Emulsion — a water-based acrylic primer for use with the mineral-based finishing coats
- Silicate Primer — a water-based silicate primer for use with the silicate-based finishing coats
- Silicone Primer — a water-based silicone primer for use with the silicone-based finishing coats.

Finish coats

***Render finishes*[1]**

- Mineral Trowelled Render — a ready-mixed lime-cement-based mortar (particle sizes 2 and 2.5 mm) requiring 3.8 to 4.2 litres of clean water per bag, to give coverage rates of 2.6 to 3.1 $kg.m^{-2}$
- Mineral Smooth Render — a ready-mixed lime-cement-based mortar (particle sizes 1.5, 2 and 2.5 mm) requiring 3.8 to 4.2 litres of clean water per bag, to give coverage rates of 2.6 to 3.6 $kg.m^{-2}$
- Silicate Trowelled Render — a ready-to-use render paste (particle sizes 2 and 2.5 mm) to give coverage rates of 2.5 to 3.2 $kg.m^{-2}$
- Silicate Smooth Render — a ready-to-use render paste (particle sizes 1.5, 2 and 2.5 mm) to give coverage rates of 3 to 5.5 $kg.m^{-2}$
- Silicone Trowelled Render — a ready-to-use render paste (particle sizes 2 and 2.5 mm) to give coverage rates of 3.5 to 5 $kg.m^{-2}$
- Silicone Smooth Render — a ready-to-use render paste (particle sizes 1.5, 2 and 2.5 mm) to give coverage rates of 2.8 to 3.5 $kg.m^{-2}$
- Nivelin D[2] — a ready-mixed polymer-based render mortar requiring 0.25 to 0.27 litres of clean water per kg, applied to a thickness between 1.5 and 5 mm, to give coverage rate of approximately 4 $kg.m^{-2}$
- Unixil G — a siloxanised ready-to-use render paste (particle sizes 1.5, 2 and 2.5 mm), based on water-based acrylic binders, mineral fillers and special additives, to give coverage rates of 2.5 to 5 $kg.m^{-2}$
- Nanoxil G — a silicone ready-to-use render paste (particle sizes 1.5, 2 and 2.5 mm) to give coverage rates of 2.5 to 4.7 $kg.m^{-2}$.

(1) The thickness of the applied finish is regulated by the particle size specified.
(2) Nivelin D is applied without primer.

Decorative coat

- Revitalcolor AG — a liquid exterior micro-reinforced acrylic waterborne paint, applied to an approximate thickness of 0.3 mm and only for use with Nivelin D, with a coverage of 0.5 $l.m^{-2}$

Figure 1a Jubizol MW External Wall Insulation System (30-year durability)

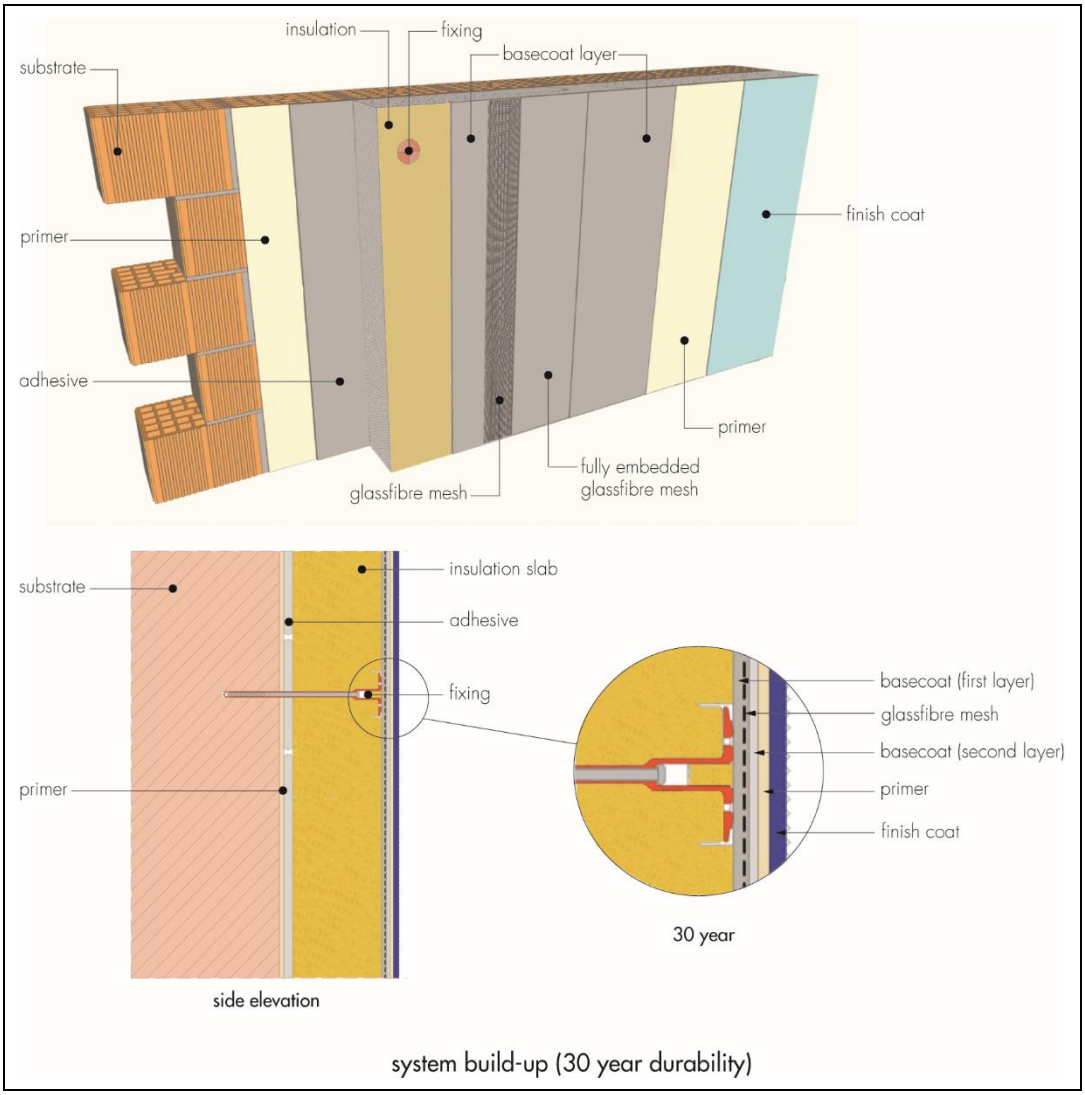
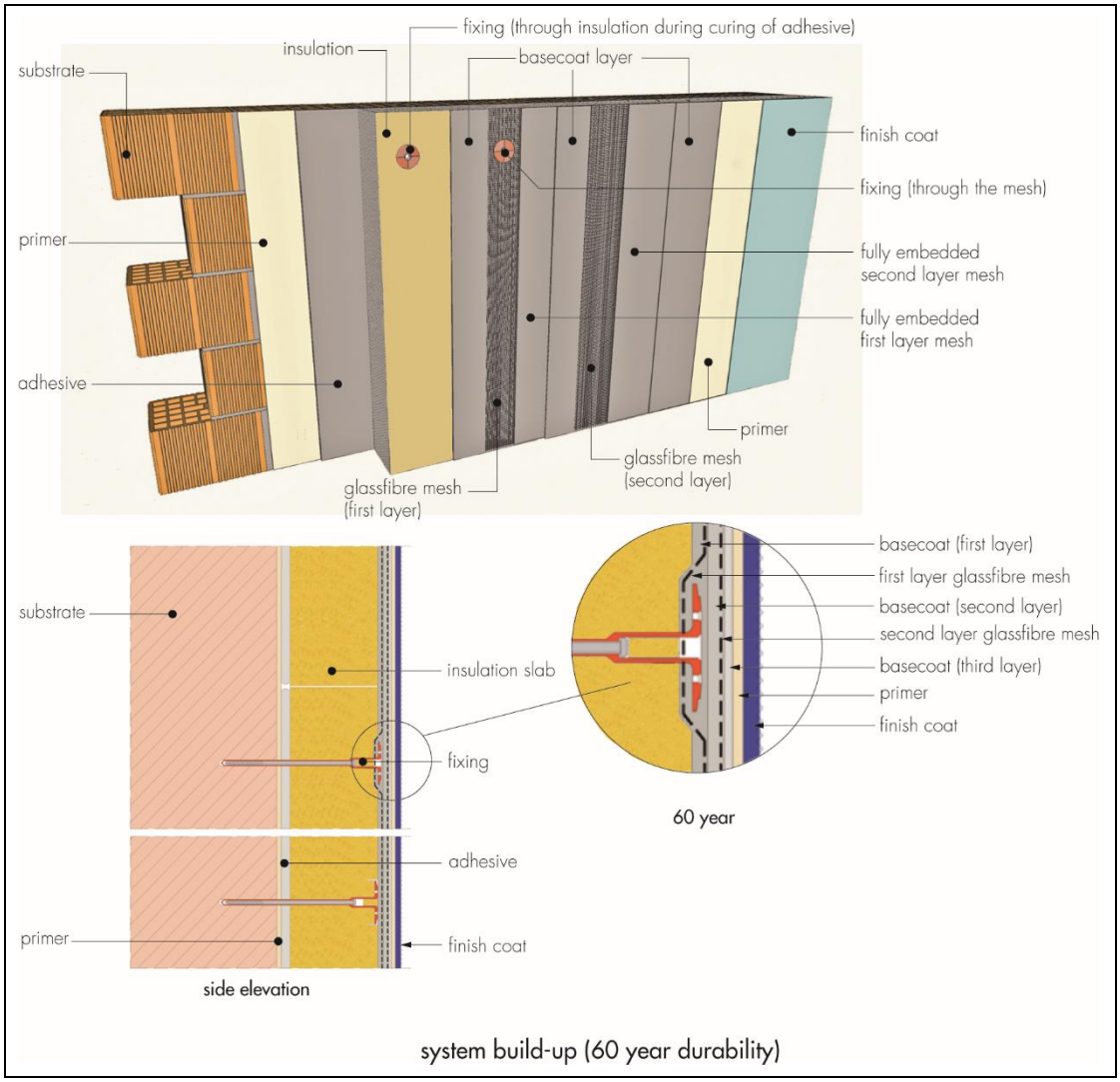


Figure 1b Jubizol MW External Wall Insulation System (60-year durability)



1.7 Ancillary materials used with the system:

- range of aluminium, PVC-U or stainless steel profiles(1), comprising:
  — base profile
  — edge profile
  — corner profile with optional PVC-U nosing
  — render stop profile

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

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

- a range of aluminium, PVC-U or stainless steel profiles(1), comprising:
  — movement joint
  — expansion joint
- profile connectors and fixings
- fungicidal wash
- silicone sealants
- expansion foam — polyurethane foam used for filling gaps between insulation slabs.

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

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 JUB kemična industrija d.o.o. has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2015, BS EN ISO 14001 : 2015, ISO 50001 : 2018 and ISO 45001 : 2018 by IQNet (Certificates SI-Q-159, SI-E-034, SI-En-024 and SI-H-022 respectively).

3 Delivery and site handling

3.1 The insulation slabs are delivered in sealed packs and each pack carries the product identification and manufacturer's batch numbers.

3.2 The other components are delivered in the quantities and packaging listed in Table 1.

Table 1 Component supply details

Component	Quantity and package
Jubizol Adhesive Mortar and Jubizol Adhesive (Adhesive/basecoat)	25 kg bags
Jubizol Glassfibre Mesh	50 m roll, 1 m wide
Jubizol Unigrund primer	18 kg plastic containers
Akryl Emulsion primer	1 kg, 5 kg and 18 kg containers
Silicate Primer and Silicone Primer	5 litre containers
Mineral renders (Trowelled and Smooth)	20 kg bags
Silicate renders (Trowelled and Smooth)	25 kg containers
Silicone renders (Trowelled and Smooth)	25 kg containers
Nivelin D	5 kg and 20 kg bags
Unixil G	25 kg containers
Nanoxil G	25 kg plastic containers
Mechanical fixings	boxed by manufacturers
Revitalcolor AG paint	5 litre and 16 litre containers

3.3 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.

3.4 The insulation must be protected from prolonged exposure to sunlight, either by storing opened packs under cover or re-covering with opaque polythene sheeting.

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

3.6 The other components of the systems should be stored in a safe area, under cover and protected from excessive heat and frost at all times.

Assessment and Technical Investigations

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

Design Considerations

4 General

4.1 The Jubizol MW External Wall Insulation System, when installed in accordance with this Certificate, is satisfactory for use in reducing the thermal transmittance (U value) of external masonry or concrete walls of new or 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) without height restriction. Prior to installation of the system, wall surfaces should comply with section 14 of this Certificate.

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

- BS EN 1992-1-1 : 2004 and its UK National Annex
- BS EN 1996-1-1 : 2005 and its UK National Annex
- BS EN 1996-2 : 2006 and its UK National Annex
- BS 8000-0 : 2014
- BS 8000-2.2 : 1990
- BS 8000-3 : 2001.

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

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

4.7 The system will improve the weather resistance of a wall and provide a decorative finish. However, for existing buildings, it should only be installed where there are no signs of dampness on the inner surface of the wall other than those caused solely by condensation.

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

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

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

4.11 The designer should select a construction appropriate to the local wind-driven rain index, paying due regard to the design detailing, workmanship and materials to be used.

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

4.13 The Jubizol MW External Wall Insulation System can be adapted to achieve an extended service life of 60 years instead of the standard 30. The difference between 30- and 60-year durability systems is covered in sections 1.2 to 1.8, with the detailed installation procedure covered in section 16.

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

- base profile and render stop end including the fixings. In addition, any other profile component which would remain exposed after the application of the finish coat
- pin 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 (see section 15 of this Certificate).

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

6 Thermal performance

6.1 Calculations of thermal transmittance (U value) should be carried out in accordance with BS EN ISO 6946 : 2017 and BRE Report BR 443 : 2006, using the declared thermal conductivity (λ_D) value of 0.038 $W \cdot m^{-1} \cdot K^{-1}$

6.2 The U value of a completed wall will depend on the selected insulation thickness, 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 construction in accordance with the national Building Regulations are given in Tables 2 and 3, and are based on the thermal conductivity specified in section 6.1.

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

U value(4) ($W \cdot m^{-2} \cdot K^{-1}$)	Insulation thickness(3) requirement (mm)	
	215 mm brickwork, $\lambda = 0.56\ W \cdot m^{-1} \cdot K^{-1}$	200 mm dense blockwork, $\lambda = 1.75\ W \cdot m^{-1} \cdot K^{-1}$
	MW Slab Plus 038	MW Slab Plus 038
0.18	—(5)	—(5)
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 ($\lambda = 0.57\ W \cdot m^{-1} \cdot K^{-1}$), brickwork (protected) with 17.1% mortar or dense blockwork with 6.7% mortar ($\lambda = 0.88\ W \cdot m^{-1} \cdot K^{-1}$). Declared thermal conductivity (λ_D) of the insulation as specified in section 6.1. A 5 mm thick layer of adhesive with $\lambda = 0.43\ W \cdot m^{-1} \cdot K^{-1}$ covering 100% of the area is also included, and a slab emissivity of 0.9, together with an external render thickness of 5 mm with $\lambda = 1.0\ W \cdot m^{-1} \cdot K^{-1}$.

(2) Calculations based on a mechanically fixed system that included 4 galvanized steel fixings per m^2, with 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. A gap correction ($\Delta U''$) of zero is assumed.

(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 0.19 $W \cdot m^{-2} \cdot K^{-1}$.

(5) See section 4.2.

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

U value[4] ($W \cdot m^{-2} \cdot K^{-1}$)	Insulation thickness[3] requirement (mm)	
	215 mm brickwork, $\lambda = 0.56\ W \cdot m^{-1} \cdot K^{-1}$	200 mm dense blockwork, $\lambda = 1.75\ W \cdot m^{-1} \cdot K^{-1}$
	MW Slab Plus 038	MW Slab Plus 038
0.18	200	—[5]
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 ($\lambda = 0.57\ W \cdot m^{-1} \cdot K^{-1}$), brickwork (protected) with 17.1% mortar or dense blockwork with 6.7% mortar ($\lambda = 0.88\ W \cdot m^{-1} \cdot K^{-1}$). Declared thermal conductivity (λ_D) of the insulation as specified in section 6.1. A 5 mm thick adhesive layer with $\lambda = 0.43\ W \cdot m^{-1} \cdot K^{-1}$ covering 100% of the area is also included, and a slab emissivity of 0.9, together with an external render thickness of 8 mm with $\lambda = 1\ W \cdot m^{-1} \cdot K^{-1}$.

(2) Calculations based on a mechanically fixed system that included 6 stainless steel fixings per m^2, with 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. A gap correction ($\Delta U''$) of zero is assumed.

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

(4) When applying the maximum available insulation thickness, these walls can achieve U values from 0.18 $W \cdot m^{-2} \cdot K^{-1}$ to 0.19 $W \cdot m^{-2} \cdot K^{-1}$ depending on insulation type and wall type.

(5) See section 4.2.

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 systems and it is the responsibility of the company installing the systems 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 7.6).

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

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

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

7.6 Negative wind load is transferred to the substrate wall via(1)(2):

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

(1) The contribution of the adhesive is not considered when calculating resistance to wind load.
(2) Further guidance is available from BBA Guidance Note 1, available on the BBA website (www.bbacerts.co.uk).

7.7 The characteristic bond resistance between the insulation and render interface derived from test results was 15 $kN \cdot m^{-2}$. The design resistance of the bond between the insulation and render (N_{RD1}) should be taken as the characteristic bond resistance divided by a partial factor of 9.

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

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

Table 4 Fixings — typical characteristic pull-out resistances

Fixing type(1)	ETA number	Substrate	Drill diameter (mm)	Effective anchorage depth (mm)	Characteristic pull-out resistance (kN)(2)	Partial factor
EJOT STR U/STR U 2G	04/0023	Concrete C12/15 Clay brickwork	8	25	1.5	2
EJOT SDM-T plus	04/0064	Concrete C12/15 Clay brickwork	8	50	1.5	2
EJOT NT U	05/0009	Concrete C12/15 Clay brickwork	8	25	1.2 1.5	2

(1) The minimum value for plate stiffness of fixings is 0.6 $kN \cdot mm^{-1}$ and the load resistance is 2.08 kN.
(2) Values are determined in accordance with EAD 330196-00-0604 : 2016 and are dependent on the substrate. The use categories are defined in the corresponding ETA.

7.9 The characteristic pull-through resistance of the fixings was determined from tests using either a 60 or 140 mm diameter fixing plate and the minimum insulation thickness of either 50 or 80 mm. The design resistance per fixing (N_{RD3}) is obtained by applying an appropriate partial factor as shown in Table 5.

Table 5 Design pull-through resistances

Factor (unit)	**Mineral wool insulation 1200 x 600 mm**					
	Pull through data for 30- and 60-year durability systems					
Tensile resistance of the insulation (kN·m^{-2})	≥ 15					
Fixing type[1]	EJOT STR U/STR U 2G		EJOT STR U/STR U 2G		EJOT SDM-T plus EJOT NT U EJOT NK U	
Fixing plate diameter (mm)	≥ 60		≥ 140		≥ 60	
Insulation thickness (mm)	≥ 80		≥ 80		≥ 50	
Characteristic pull-through resistance[2] per fixing kN	Panel joints	0.161	Panel joints	0.261	Panel joints	—
	At panel	0.309	At panel	0.623	At panel	0.240
Partial factor[3]	2.5					
Design pull-through resistance per fixing (N_{RD3}) kN	Panel joints	0.064	Panel joints	0.104	Panel joints	—
	At panel	0.126	At panel	0.249	At panel	0.096
Design pull-through resistance per slab kN (based on the minimum number of fixings)[4]	0.254		0.457		—[6]	
Design pull-through resistance per slab kN (based on maximum number of fixings)[5]	1.262		2.449		—[6]	

(1) See Table 4 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 3 fixings per slab (1200 x 600 mm), which equates to approximately 4 fixings per m^2. The design resistance for the minimum number of fixings is based on the fixing pattern provided in Figure 4 of this Certificate and minimum insulation thickness specified in 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 11 fixings per slab (1200 x 600 mm), which equates to approximately 15 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, and by using the specific fixing type specified. The fixing pattern, insulation thickness and interaction of the fixings should be considered when calculating the design resistance per slab. When using a 140 mm washer, the maximum number of fixings per slab should be less than 11 due to interaction of the fixings and therefore the design pull-though resistance per slab should be recalculated.
(6) The design pull-through resistance for the minimum and maximum number of fixings per slab can be determined for the system application where fixings are purely applied within the insulation slab (that is, not at slab joints) by using the 'design pull-through resistance per fixing' data (in the Table above).

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

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

For safe design:

$Rd \geq W_e$

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

Where:
Rd is the design ultimate resistance (kN·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·m^{-2})
$Rd_{b.ins/rend}$ is the design bond resistance between the insulation and render (kN·m^{-2})
$Rd_{pull\text{-}out}$ is the design pull-out resistance of the insulation fixings per metre square (kN·m^{-2})
$Rd_{pull\text{-}through}$ is the design pull-through resistance of the insulation fixings per metre square (kN·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_{slab}	is the area of the slab (m^2)

7.12 The system is mechanically fixed to the substrate wall with a minimum of three fixings per slab (approximately four fixings per metre square) as per the fixing pattern shown in Figure 4 for 30 year system, and with a minimum of five fixings per slab (equal to seven fixings per metre square) as per fixing pattern shown in Figure 5 for 60 year system, and in conjunction with 100% coverage of supplementary adhesive (see section 16 of this Certificate). Additional fixings may be required, depending on the results of the calculations detailed above for the specific site.

Impact resistance

7.13 Hard body impact tests were carried out in accordance with ETAG 004 : 2013. The system is suitable for use in the Categories up to and including those specified in Table 6 of this Certificate.

Table 6 System impact resistance

Render systems: Basecoat (Jubizol Adhesive Mortar) + primer + finishing coats (all particle sizes) indicated below:	**Category(1)**	
	Single layer mesh	**Double layer mesh**
Mineral Trowelled Render Mineral Smooth Render	Category II	Category I
Nivelin D + Revitalcolor AG		
Silicate Trowelled Render Silicate Smooth Render	Category I	Category I
Silicone Trowelled Render Silicone Smooth Render		
Nanoxil G	Category I	Category I
Unixil G		

(1) The use Categories are defined in ETAG 004 : 2013 as:

- Category I — a zone readily accessible at ground level to the public and vulnerable to hard body impacts but not subjected to abnormally rough use
- Category II — a zone liable to impacts from thrown or kicked objects, but in public locations where the height of the system will limit the size of the impact; or at lower levels where access to the building is primarily to those with some incentive to exercise care
- Category III — a zone not likely to be damaged by normal impacts caused by people or by thrown or kicked objects.

8 Behaviour in relation to fire

8.1 The system has a reaction to fire classification(1) of A2-s1, d0 in accordance with BS EN 13501-1 : 2007.

(1) Test report Issuer: ZAG LJUBLJANA. Report number P0351125306. Report Date: 13th September 2011.

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

8.3 The mineral wool (MW) insulation material in isolation is classified A1 to BS EN 13501-1 : 2007.

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

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

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

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

9 Proximity of flues and appliances

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

10 Water resistance

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

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

10.3 The guidance given in BRE Report BR 262 : 2002 should be followed in connection with the watertightness of solid wall constructions. The designer should select a construction appropriate to the local wind-driven rain index, paying due regard to the design detailing, workmanship and materials to be used.

10.4 At the top of walls, the system should be protected by a coping, adequate overhang or other detail designed for use with this type of system (see section 16).

11 Condensation

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

Surface condensation

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

11.3 Walls will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed 1.2 $W \cdot m^{-2} \cdot K^{-1}$ at any point. Guidance may be obtained from BS 5250 : 2011, section 4, and Annexes D and 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 factor (μ) and equivalent air layer thicknesses (S_d) are shown in Table 7.

Table 7 Water vapour resistance factor (μ) and equivalent air layer thickness (S_d)

Components	Thickness (mm)	μ	s_d (m)
Mineral wool insulation	60 to 200	1(1)	—
Rendering system: Jubizol Adhesive Mortar basecoat(2) plus, as appropriate, primer + finish coat (specific particle size) as indicated below:			
Mineral Trowelled Render or Mineral Smooth Render (1.5 mm)	4.5 to 8.5	—	0.1
Silicate Trowelled Render or Silicate Smooth Render (2 mm)	4.5 to 8.5	—	0.1
Silicone Trowelled Render or Silicone Smooth Render (2 mm)	4.5 to 8.5	—	0.2
Nivelin D + Revitalcolor AG	4.5 to 11	—	0.1
Unixil G (2 mm)	4.5 to 8.5	—	0.4
Nanoxil G (2 mm)	4.5 to 8.5	—	0.3

(1) The value is taken from BS EN ISO 10456 : 2007, Table 4.
(2) Jubizol Adhesive Mortar basecoat applied to a thickness between 3 and 6 mm.

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 any sealant joints at window and door frames replaced at regular intervals
- maintenance schedules, which should include the replacement and resealing of joints (for example, between the insulation systems and window and door frames).

12.2 For a 60-year durability, a detailed maintenance plan must be prepared and provided to the building manager/owner on completion. As a minimum, this should include an inspection for evidence of defects 12 months after the application and subsequently every five years. This plan should include full details of the required inspection regime 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 stainless steel base and corner profiles, stainless steel fixings or centre pin Grade 1.4301 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. Additionally, the fixings must be applied through the mesh.

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

13.5 To maintain a high quality aesthetic appearance, it may be necessary to periodically overcoat the building using system-compatible coatings recommended by the Certificate holder and in accordance with BS EN 1062-1 : 2004. Care should be taken not to adversely affect the water vapour transmission or fire characteristics of the system. The advice of the Certificate holder should be sought as to the suitability of a particular product.

Installation

14 Site survey and preliminary work

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

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

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. In general, 100% coverage of insulation adhesive is required. However, an assessment and recommendation is made on the percentage of adhesive coverage per slab 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 section 7). The advice of the Certificate holder should be sought to ensure the proposed bonding pattern is sufficient.

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

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

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

14.6 On existing buildings, purpose-made window sills must be fitted to extend beyond the finished face of the system. New buildings should incorporate suitably deep sills (see Figure 9).

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

15 Approved installers

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

- employing operatives who have been trained and approved by the Certificate holder to install the system

- which has undertaken to comply with the Certificate holder's application procedure, containing the requirement for each application team to include at least one member-operative trained by the Certificate holder
- subject to at least one inspection per annum by the Certificate holder to ensure suitable site practices are being employed. This may include unannounced site inspections.

16 Procedure

General

16.1 Installation of the system must be carried out in accordance with this Certificate and the Certificate holder's current installation instructions.

16.2 Weather conditions should be monitored to ensure correct application and curing conditions. Application of render 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 renders must not be applied if the temperature is likely to fall below 0°C within 72 hours of completion.

16.3 Where required, a fungicidal wash is applied to the entire surface of the external wall by brush, roller or spray.

16.4 The primer should be applied as required and appropriately selected for the chosen finish coat (see section 1.6).

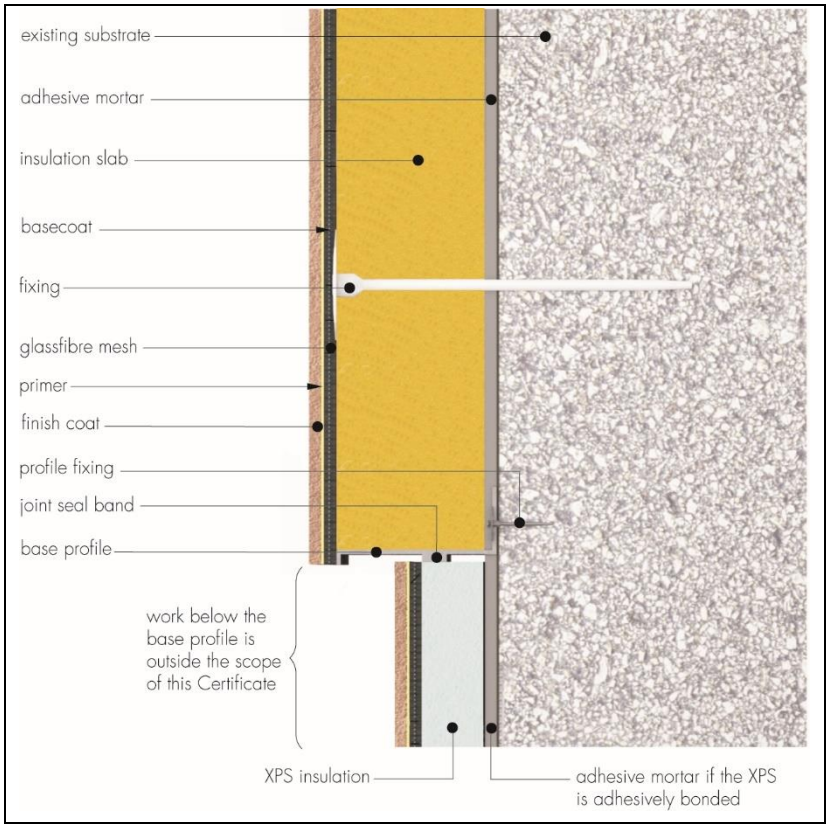
16.5 All rendering should be in accordance with the relevant recommendations of BS EN 13914-1 : 2016. The render must be protected from rapid drying and should not be applied on elevations in direct sunlight or where the substrate is hot.

16.6 The difference between 30- and 60-year durability systems is described in section 1. The initial installation procedure that follows (sections 16.7 to 16.22) is common to both types of systems, with the exception in the selection of the material specification of system components (see sections 4.14 and 13.2).

Positioning and securing insulation slabs

16.7 The base profile (see section 4.14) is secured to the external wall above the dpc using the approved profile fixings at approximately 300 mm centres (see Figure 2). Base profile connectors are inserted at all rail joints. Extension profiles are fixed to the front lip of the base profile or stop end channel where appropriate.

Figure 2 Typical section of base profile



16.8 The adhesive is prepared by mixing each bag with the required amount of clean water in a suitable container using a paddle drill mixer to create a paste-like mortar in accordance with the Certificate holder's instructions (see section 1.6).

16.9 For even and smooth substrates, the entire surface of the slab is coated with adhesive using a notched trowel, to produce a coat 2 to 5 mm in thickness. The slab should be immediately placed on the substrate and pressed into place. For uneven substrates (due to existing render), the adhesive is applied in a continuous line around the perimeter of the insulation slab (at least 30 mm wide) with at least six additional dabs of adhesive (approximately 80 to 120 mm in diameter) distributed uniformly over the remaining surface in order to achieve maximum coverage after the slab has been pressed against the wall.

16.10 The first run of insulation slabs positioned on the base profile with adhesive applied, and pressed firmly against the wall (so the adhesive is evenly distributed). Care should be taken to ensure that all slab edges are butted tightly together; alignment must be checked as work proceeds, to achieve a flush finish.

16.11 Subsequent rows of slabs are positioned so that the vertical joints are staggered and overlapped at the building corners and so that slab joints do not occur within 200 mm of the corners of openings (see Figure 4). The alignment should be constantly checked as work proceeds. Joints between the slabs up to 10 mm can be filled with expansion foam approved by the Certificate holder. Gaps greater than this should be closed by repositioning or, where appropriate, by cutting slivers of insulation slab to fit.

16.12 Where existing render is on the wall or dubbing out render has been used, care should be taken when aligning the slabs as the effective embedment will be reduced.

16.13 To fit around details such as doors and windows, the slabs may be cut with a sharp knife or a fine-tooth saw. Purpose-made powder-coated aluminium window sills, which are designed to prevent water ingress and incorporating drips to shed water clear of the system, are fitted (see Figure 8). However, their performance is outside the scope of this Certificate.

16.14 The surface of the slabs should be smooth without high spots or irregularities. At all locations where there is a risk of insulant exposure (eg window reveals or eaves), the system must be protected (eg by an adequate overhang or by purpose-made sub-sills, seals or flashing).

16.15 Building corners, door and window heads and jambs are formed using corner profiles, in accordance with the Certificate holder's instructions. Corner profiles are fixed to all building corners. For a 60-year durability, any portion of the corner profile that would remain exposed after the application of the finish coat must be constructed from stainless steel.

16.16 If required, mechanical fixings can be applied through each slab (one fixing in the centre) to secure them until the adhesive has stabilised. However, for the application of 60-year systems, one fixing in the centre of the insulation slab is a requirement (see Figure 5). Holes are drilled through the slabs into the substrate wall, and mechanical fixings are inserted and tapped or screwed firmly into place.

16.17 Installation continues until the whole wall is completely covered including, where appropriate, the building soffits. Window and door reveals should be insulated to minimise the effects of cold bridging. Where clearance is limited, strips of insulation should be installed to suit available margins and details (see Figure 8).

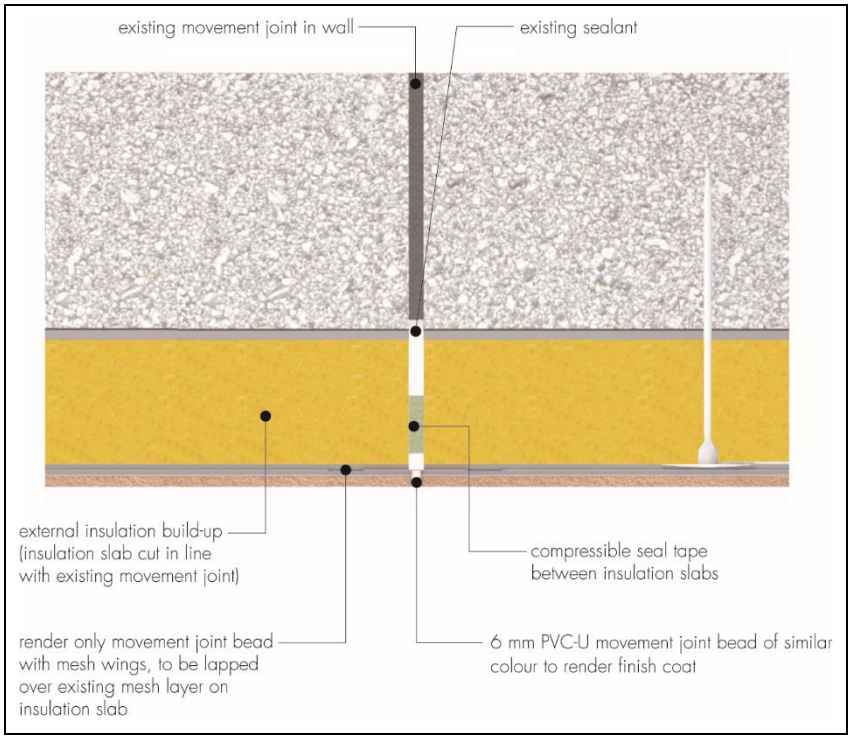
16.18 After sufficient stabilisation of the installed insulation system (normally 48 hours, during which time the insulation should be protected from exposure to extreme weather conditions to prevent degradation), the system is ready for the application of the basecoat, including reinforcement mesh.

16.19 Prior to the application of the basecoat and reinforcement, a bead of silicone sealant is applied at window and door frames, overhanging eaves, gas and electric meter boxes, and wall vents, or where the render abuts any other building material or surface. Alternatively, an appropriate sealing tape may be used between the insulation and the object to provide a weathertight seal.

Movement joints

16.20 Generally, movement joints are not required in the system but, if an expansion joint is incorporated in the substrate, then movement joints must be carried through the insulation system (see Figure 3).

Figure 3 Movement joint details



Application of basecoat and reinforcement

16.21 The basecoat is prepared by thoroughly mixing each bag with the required amount of clean water in a suitable container for at least five minutes using a paddle mixer, to create a paste-like mortar in accordance with the Certificate holder's instructions (see section 1.6).

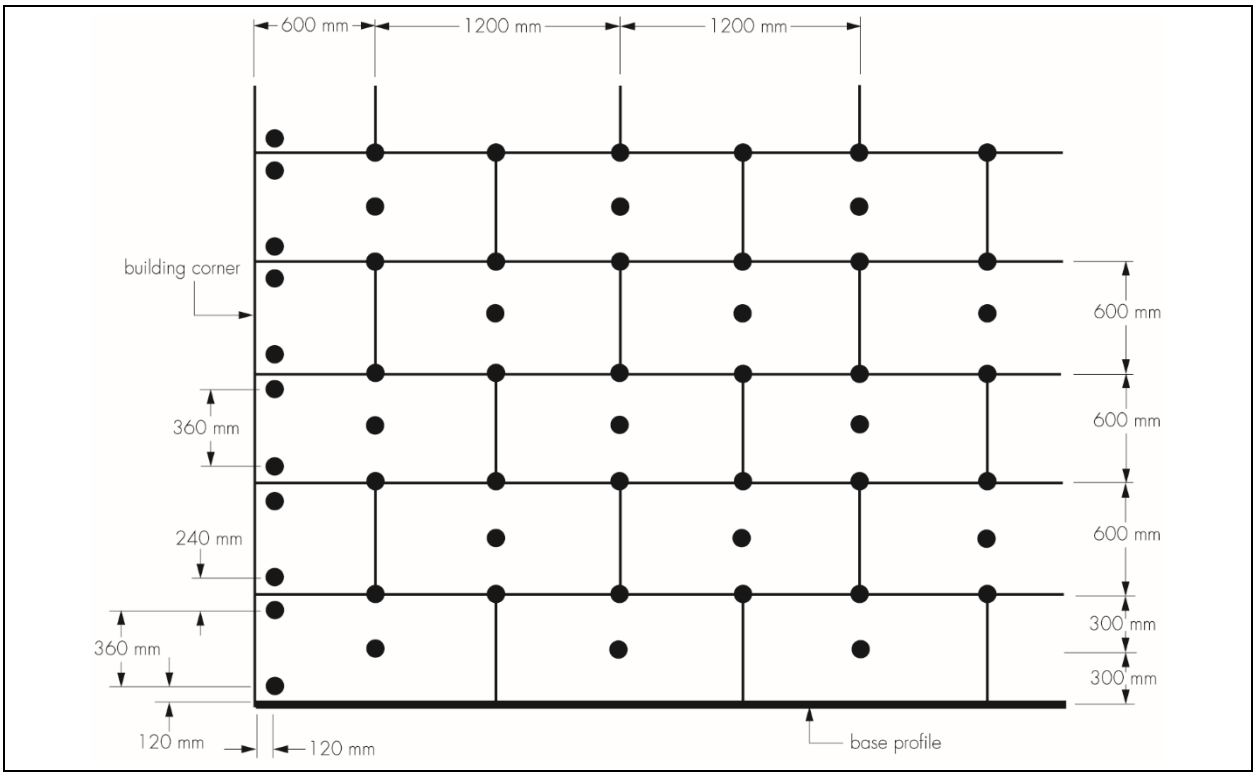
16.22 Before the full application of basecoat (and mesh) over the insulation slabs (see section 16.25), reinforcement is provided at the corners of openings. To provide the necessary reinforcement, stress patches of reinforcing mesh (approximately 200 by 200 mm) are applied with basecoat (see Figure 6).

16.23 Further installation procedures specific to 30- and 60-year durability systems are described in sections 16.24 to 16.28 and 16.29 to 16.36 respectively.

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

16.24 After the insulation adhesive has set, holes are drilled through the insulation slab into the substrate wall to a required depth and mechanical fixings (three fixings per slab, which is equivalent to 4.2 fixings per metre square) are inserted and tapped or screwed firmly into place, following the fixing pattern shown in Figure 4. Additional fixings are applied at building corners as shown, in accordance with design requirements.

Figure 4 Typical arrangement of insulation slabs and fixing pattern for 30-year durability – 3 fixings per slab



16.25 The first layer of the basecoat is applied over the insulation slabs using a stainless steel trowel, and floated with a Darby float to an approximate thickness of 3 mm. Reinforcing mesh (with its concave surface to the wall) is applied and immediately embedded into the basecoat by trowelling from the centre to the edge, and an additional light coat of basecoat is applied (whilst the initial coat is still wet) to ensure the mesh is free of wrinkles.

16.26 The mesh should be overlapped at joints by at least 100 mm. Further basecoat (approximately 1 mm) is then applied as required, to ensure the mesh is completely covered and that it is placed in the top one third of basecoat.

16.27 A second layer of basecoat is applied to an approximate thickness of 1 mm after the first coat of basecoat has been allowed to dry for approximately 48 hours, resulting in a minimum basecoat thickness of 5 mm.

16.28 The basecoat is left to dry for a further 24 hours before the primer is applied, where required. The primer must be suitable for the required finish coat (see section 1.6) and left to dry for 12 hours (before the application of the finish coat — see sections 16.37 to 16.41).

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

16.29 After the insulation adhesive has set, the system is ready for the application of basecoat (see section 16.21) and reinforcing mesh.

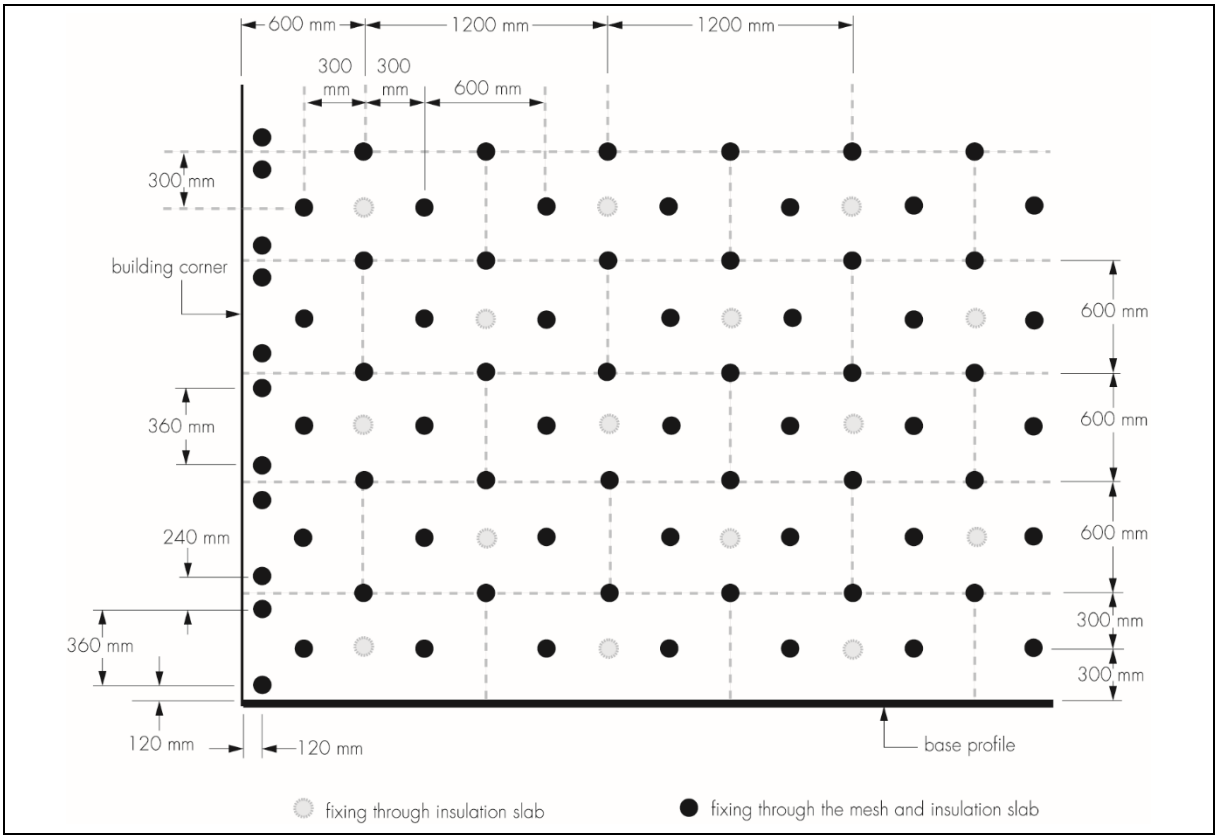
16.30 The first layer of the basecoat is progressively applied over the insulation slabs to an approximate thickness of 3 mm, working in 1-metre sections in a vertical or horizontal direction using a stainless steel trowel, and floated with a Darby float.

16.31 The reinforcing mesh (with its concave surface to the wall) is applied and immediately embedded into the basecoat by trowelling from the centre to the edge; an additional light coat of basecoat is applied to ensure the mesh is free of wrinkles.

16.32 The reinforcing mesh should be overlapped at joints by at least 100 mm. Further basecoat (approximately 1 mm) is then applied as required, to ensure the mesh is completely covered and that it is placed in the top one third of basecoat.

16.33 While the basecoat is still wet, holes are drilled through the mesh and insulation slabs into the substrate wall to a required depth and mechanical fixings (additional to those initially applied to secure the slabs) are inserted and tapped or screwed firmly into place, using the fixing pattern shown in Figure 5. This grid pattern represents approximately 7 fixings per square metre (the initial 1 fixing through the centre of slabs, plus an additional 4 fixings per slab through the mesh – based on slab size 1200 by 600 mm). The fixing plate is deliberately over-driven into the insulation to reduce the protrusion of the plate from the surface of the insulation slab.

Figure 5 Typical arrangement of the fixing pattern through the mesh for 60-year durability – 7 fixings per m²

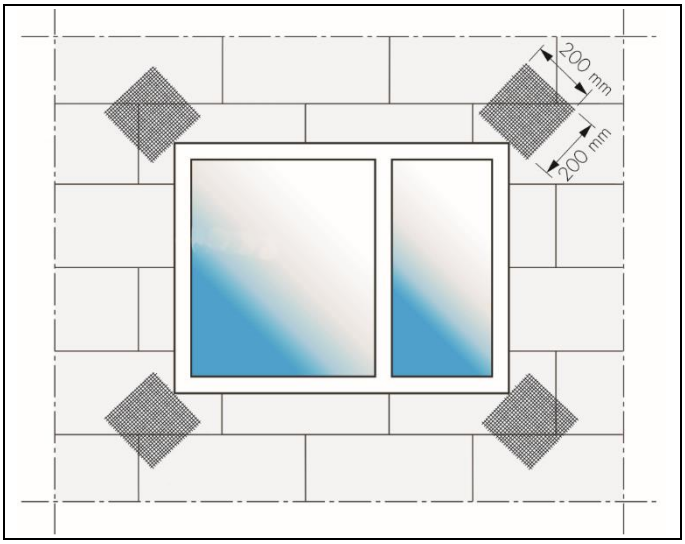


16.34 After the first layer of the reinforced basecoat has been allowed to dry for approximately 60 hours and the fixings have been secured, a second layer of basecoat (to an approximate thickness of 3 mm) is applied, together with a second layer of mesh, with its concave surface to the wall. The mesh is immediately embedded into the basecoat by trowelling from the centre to the edge; an additional light coat of basecoat is applied to ensure the mesh is free of wrinkles.

16.35 The second layer of reinforced basecoat is left to dry for an additional 60 hours. Finally, a third layer of basecoat (approximately 1 mm thickness) is applied. This would result in a minimum basecoat thickness of 8 mm.

16.36 The basecoat is left to dry for a further 24 hours before the primer is applied, where required. The primer must be suitable for the required finish coat for the system (see section 1.6) and left to dry for 12 hours before the application of the finishing coat (see sections 16.37 to 16.41).

Figure 6 Additional reinforcement of openings



Finish coats

Render finishes

16.37 The basecoat and primer must be allowed to fully cure for the stated period at each stage of installation covered in this Certificate. Prior to the application of the finishing coat, sealant should be applied as required, as defined in the project-specific specification.

16.38 Finishing coats are applied in accordance with the Certificate holder's instructions (see section 1.6) and by following the design guidelines given in section 4.14 of this Certificate.

General guidelines

16.39 Continuous surfaces must be completed without a break, so the coatings are always applied to a wet edge. Care should be taken to prevent the finish coats from either drying too rapidly or freezing.

16.40 Care should be taken in the detailing of the system around openings and projections and at eaves (see Figures 7 and 8) 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.

16.41 The finish coat should be allowed to dry thoroughly before painting any of the surrounding features.

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

Figure 7 Roof eaves detail

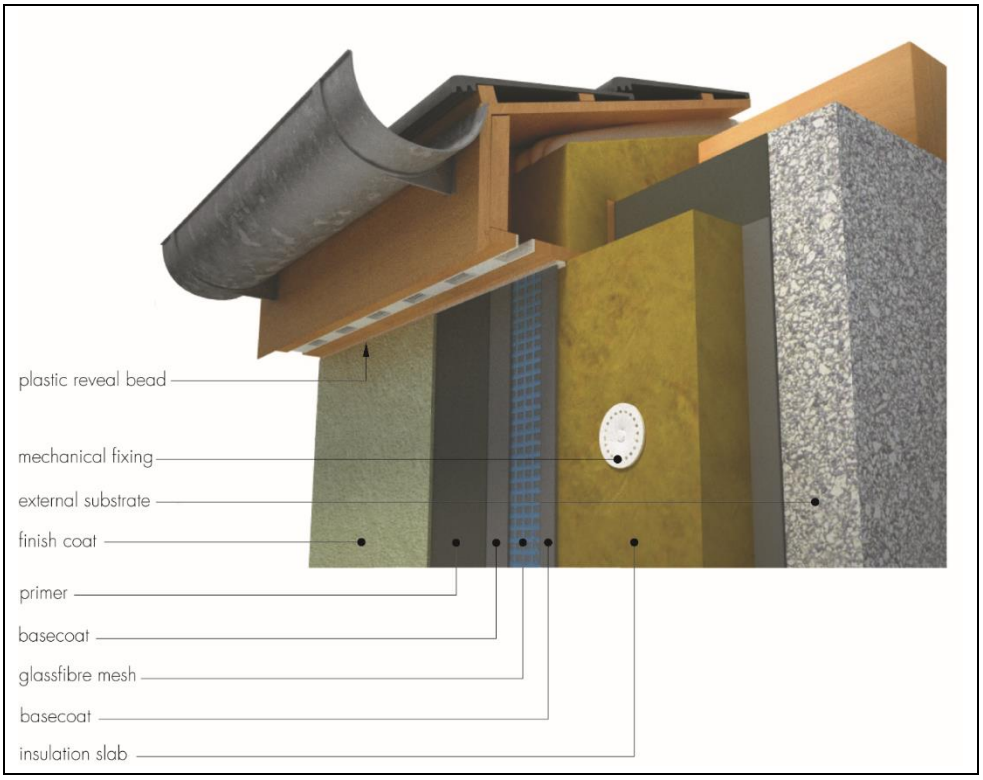
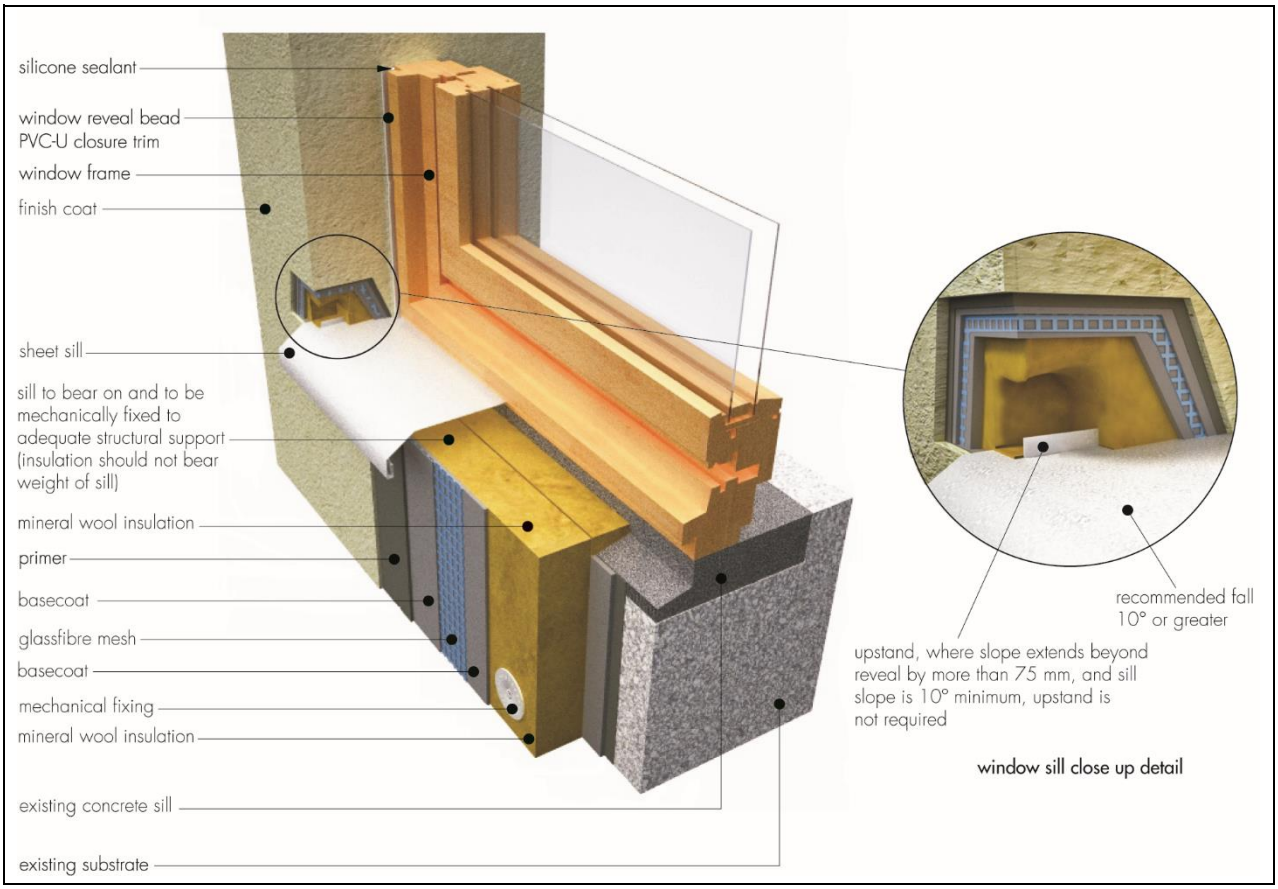


Figure 8 Window sill and reveal detail



17 Investigations

17.1 The system was examined to determine:

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

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

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

Bibliography

BRE Report (BR 135 : 2003) *Fire Performance of External Insulation For Walls of Multi-Storey Buildings*
BRE Report (BR 262 : 2002) *Thermal insulation: avoiding risks*
BRE Report (BR 443 : 2006) *Conventions for U-value calculations*

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

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

BS EN 1062-1 : 2004 *Paints and Varnishes — Coating Materials and Coating Systems for Exterior Masonry and Concrete — Classification*

BS EN 1990 : 2002 *Eurocode — Basis of structural design*
NA to BS EN 1990 : 2002 + A1 : 2005 UK National Annex for *Eurocode — Basis of structural design*
BS EN 1991-1-4 : 2005 *Eurocode 1 : Actions on structures — General actions — Wind actions*
NA to BS EN 1991-1-4 : 2005 UK National Annex to *Eurocode 1 : Actions on structures — General actions — Wind actions*
BS EN 1992-1-1 : 2004 + A1 : 2014 *Eurocode 2 — Design of concrete structures — General rules and rules for buildings*
NA to BS EN 1992-1-1 : 2004 + A1 : 2014 UK National Annex to *Eurocode 2 — Design of concrete structures — General rules and rules for buildings*
BS EN 1996-1-1 : 2005 *Eurocode 6 — Design of masonry structures — General rules for reinforced and unreinforced masonry structures*
NA to BS EN 1996-1-1 : 2005 UK National Annex to *Eurocode 6 — Design of masonry structures — General rules for reinforced and unreinforced masonry structures*
BS EN 1996-2 : 2006 *Eurocode 6 : Design of masonry structures — Design considerations, selection of materials and execution of masonry*
NA to BS EN 1996-2 : 2006 UK National Annex to *Eurocode 6 — Design of masonry structures — Design considerations, selection of materials and execution of masonry*

BS EN 10088-2 : 2014 *Stainless steels — Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes*

BS EN 13162 : 2012 *Thermal insulation products for buildings — Factory made mineral wool (MW) products — Specification*

BS EN 13501-1 : 2007 *Fire classification of construction products and building elements — Classification using test data from reaction to fire tests*

BS EN 13914-1 : 2016 *Design, preparation and application of external rendering and internal plastering — External rendering*

BS EN ISO 6946 : 2017 *Building components and building elements — Thermal resistance and thermal transmittance — Calculation method*

BS EN ISO 9001 : 2015 *Quality management systems — Requirements*

BS EN ISO 10456 : 2007 *Building materials and products — Hygrothermal properties — Tabulated design values and procedures for determining declared and design thermal values*

BS EN ISO 14001 : 2015 *Environmental management systems — Requirements with guidance for use*

EAD 330196-00-0604 : 2016 *Plastic anchor for fixing of External Thermal Insulation Composite Systems with renderings*

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

ETAG 004 : 2013 *Guideline for European Technical Approval of External Thermal Insulation Composite Systems (ETICS) with Rendering*

Conditions

1. This Certificate:

- relates only to the product 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.

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.

3 This Certificate will be displayed on the BBA website, and the Certificate Holder is entitled to use the Certificate and Certificate logo, provided that the product 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.

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

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

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product or any other product
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product
- actual installations of the product, including their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the product is installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the product, including its manufacture, supply, installation, use, maintenance and removal
- any claims by the manufacturer relating to UKCA, UKNI or CE marking.

6. Any information relating to the manufacture, supply, installation, use, maintenance and removal of this product which is contained or referred to in this Certificate is the minimum required to be met when the product 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.

British Board of Agrément
1st Floor, Building 3, Hatters Lane
Croxley Park, Watford
Herts WD18 8YG
tel: 01923 665300
clientservices@bbacerts.co.uk
www.bbacerts.co.uk