

Alumasc Exterior Building Products Limited

White House Works
Bold Road
Sutton
St Helens
Merseyside WA9 4JG

Tel: 01744 648400 Fax: 01744 648401
e-mail: info@alumasc-exteriors.co.uk
website: www.alumascfacades.co.uk



Agrément Certificate
93/2914
Product Sheet 1

SWISSLAB EXTERNAL WALL INSULATION SYSTEMS

SWISSLAB EPS/GREY EPS EXTERNAL WALL INSULATION SYSTEM

This Agrément Certificate Product Sheet⁽¹⁾ relates to the Swisslab EPS/Grey EPS External Wall Insulation System, comprising mechanically fixed expanded polystyrene (EPS) or Grey EPS insulation boards with optional supplementary adhesive, glassfibre reinforcing mesh and render finishes, and suitable for use on 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 contribute to satisfying 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 is classified Class 0 or 'low risk' surface spread of flame (see section 8).

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

Durability — with appropriate care, the system will remain effective for at least 30 years (see section 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

A handwritten signature in black ink, appearing to read 'John Albon'.

A handwritten signature in black ink, appearing to read 'Claire Curtis-Thomas'.

Date of Second issue: 8 October 2013

John Albon — Head of Approvals
Energy and Ventilation

Claire Curtis-Thomas
Chief Executive

Originally certificated 28 June 2010

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.

British Board of Agrément
Bucknalls Lane
Watford
Herts WD25 9BA

©2013

tel: 01923 665300
fax: 01923 665301
e-mail: mail@bba.star.co.uk
website: www.bbacerts.co.uk

Regulations

In the opinion of the BBA, the Swisslab EPS/Grey EPS External Wall Insulation System, if installed, used and maintained in accordance with this Certificate, will meet 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 or contribute to satisfying this Requirement. See sections 8.1 to 8.3 and 8.6 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 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 11.1, 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 6.2 and 6.3 of this Certificate.
Regulation: 7	Materials and workmanship
Comment:	The system is acceptable. See section 13.1 and the <i>Installation</i> part of this Certificate.
Regulation: 26	CO₂ emission rates for new buildings
Comment:	The system can enable, or contribute to enabling, a wall to meet the U value requirement. See sections 6.2 and 6.3 of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation: 8(1)(2)	Fitness and durability of materials and workmanship
Comment:	The system can contribute to a construction satisfying this Regulation. See sections 12.1, 13.1 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 system is regarded as 'low risk' and, therefore, can satisfy this Standard, with reference to clauses 2.6.4 ⁽¹⁾⁽²⁾ , 2.6.5 ⁽¹⁾ and 2.6.6 ⁽²⁾ . See sections 8.1, 8.2 and 8.4 to 8.6 of this Certificate.
Standard: 2.7	Spread on external walls
Comment:	The system can satisfy the requirements of this Standard, with reference to clauses 2.7.1 ⁽¹⁾⁽²⁾ and 2.7.2 ⁽²⁾ . See sections 8.1, 8.2 and 8.4 to 8.6 of this Certificate.
Standard: 3.10	Precipitation
Comment:	The system will contribute to a construction satisfying this Standard, with reference to clauses 3.10.1 ⁽¹⁾⁽²⁾ and 3.10.2 ⁽¹⁾⁽²⁾ . See sections 4.5 and 10.1 of this certificate.
Standard: 3.15	Condensation
Comment:	The system can satisfy the requirements of this Standard, with reference to clauses 3.15.1 ⁽¹⁾⁽²⁾ , 3.15.4 ⁽¹⁾⁽²⁾ and 3.15.5 ⁽¹⁾⁽²⁾ . See sections 11.3 and 11.4 of this Certificate.
Standard: 6.1(b)	Carbon dioxide emissions
Standard: 6.2	Buildings insulation envelope
Comment:	The system can contribute to satisfying these Standards, with reference to clauses (or parts of) 6.1.1 ⁽¹⁾ , 6.1.2 ⁽¹⁾⁽²⁾ , 6.1.3 ⁽¹⁾⁽²⁾ , 6.1.6 ⁽¹⁾ , 6.1.10 ⁽²⁾ , 6.2.1 ⁽¹⁾⁽²⁾ , 6.2.3 ⁽¹⁾ , 6.2.4 ⁽²⁾ , 6.2.5 ⁽²⁾ , 6.2.6 ⁽¹⁾ , 6.2.7 ⁽¹⁾ , 6.2.8 ⁽²⁾ , 6.2.9 ⁽¹⁾⁽²⁾ , 6.2.10 ⁽¹⁾ , 6.2.11 ⁽¹⁾ , 6.2.12 ⁽²⁾ and 6.2.13 ⁽¹⁾⁽²⁾ . See sections 6.2 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 clause 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
Comment:	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

Regulation:	23	Fitness of materials and workmanship
Comment:		The system is acceptable. See section 13.1 and the <i>Installation</i> part of this Certificate.
Regulation:	28(b)	Resistance to moisture and weather
Comment:		The system provides a degree of protection against rain ingress. See sections 4.5 and 10.1 of this Certificate.
Regulation:	29	Condensation
Comment:		The system can contribute to minimising the risk of interstitial and surface condensation. See sections 11.2 and 11.4 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 8.3 and 8.6 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 2007

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

Information in this Certificate may assist the client, 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 2013

NHBC accepts the use of the Swisslab EPS/Grey EPS 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 roofs), Chapter 6.9 Curtain walling and cladding.*

Technical Specification

1 Description

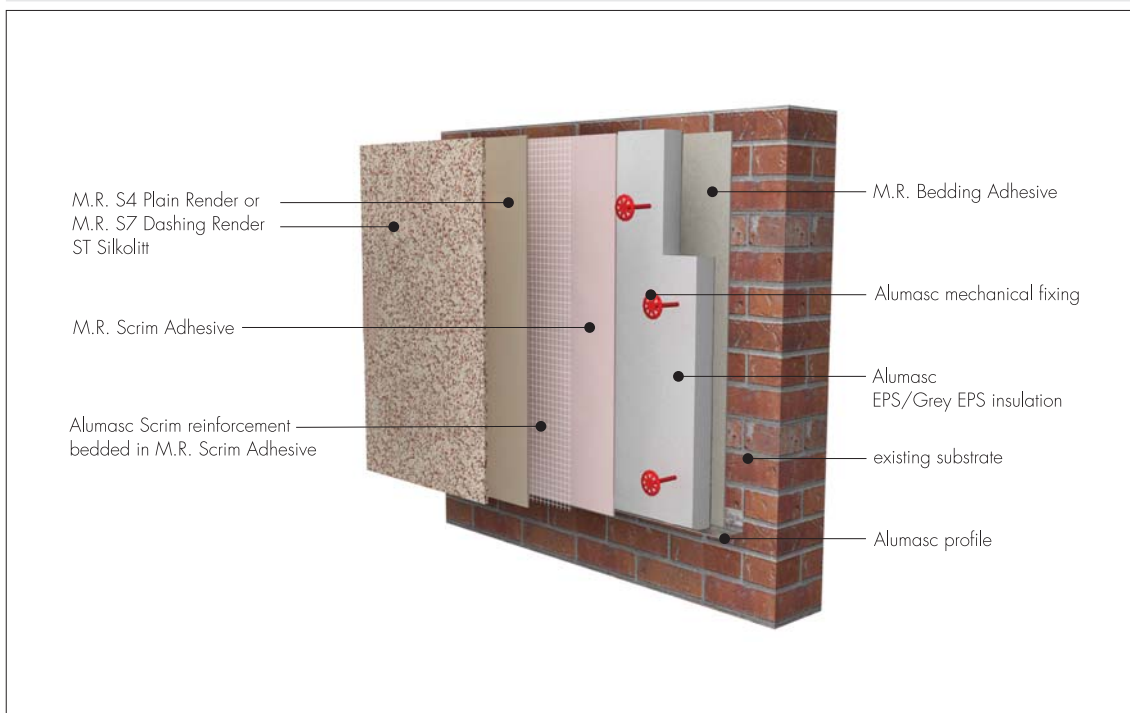
1.1 Swisslab EPS/Grey EPS External Wall Insulation System comprises standard white and grey expanded polystyrene insulation boards mechanically fixed to the substrate wall, optionally supplemented by adhesive, and glassfibre reinforcing mesh with render finishes.

1.2 The system (see Figure 1) comprises:

- M.R. Bedding Adhesive (optional supplementary adhesive) — polymer-modified, cement-based adhesive, supplied as powder to which water is added
- Alumasc EPS insulation — standard white expanded polystyrene board 1200 mm by 600 mm in a range of thicknesses, between 20 mm and 300 mm in increments of 10 mm, with a nominal density between $14 \text{ kg}\cdot\text{m}^{-3}$ and $16 \text{ kg}\cdot\text{m}^{-3}$, a minimum compressive strength of $70 \text{ kN}\cdot\text{m}^{-2}$ and a minimum tensile strength (perpendicular to the face) of $100 \text{ kN}\cdot\text{m}^{-2}$. Boards are manufactured to comply with the requirements for Grade SD (standard duty), type FRA (flame-retardant additive) material to BS EN 13163 : 2012
- Alumasc Grey EPS insulation — grey expanded polystyrene board 1200 mm by 600 mm in a range of thicknesses between 20 mm and 300 mm in 10 mm increments, with a nominal density between $15 \text{ kg}\cdot\text{m}^{-3}$ and $17 \text{ kg}\cdot\text{m}^{-3}$, a minimum compressive strength of $70 \text{ kN}\cdot\text{m}^{-2}$ and a minimum tensile strength (perpendicular to the face) of $100 \text{ kN}\cdot\text{m}^{-2}$. Boards are manufactured to comply with the requirements of EPS 70, Class E (flame retardant) material to BS EN 13163 : 2012
- Alumasc mechanical fixings — proprietary external wall insulation fixings of adequate length to suit the substrate and insulation thickness, with a minimum 60 mm washer diameter and minimum plate stiffness of $0.6 \text{ kN}\cdot\text{mm}^{-1}$, ETA approved and supplied by the Certificate holder. Examples include: Termoz 8NZ, Termofix CF8, Termoz 8U and DIPK fixings
- M.R. Scrim Adhesive — as M.R. Bedding Adhesive
- Alumasc scrim reinforcing mesh — a one-metre-wide mesh of multi-stranded alkali-resistant glassfibres, with a polymer coating and a nominal weight of either $150 \text{ g}\cdot\text{m}^{-2}$ or $200 \text{ g}\cdot\text{m}^{-2}$

- Painted finish:
 - M.R. S4 Plain Render — a polymer-modified fibre-reinforced cement-based mortar supplied as a powder to which water is added, and available coloured white, salmon, red, yellow, peach, grey, brown, russet, light cream, cream or pink. Other colours are available to order
 - M.R. S6 textured finish masonry paint — a synthetic resin emulsion applied by brush or roller and available in a range of colours to suit the M.R. S4 Plain Render
- Spar-dash finish:
 - M.R. S7 Dashing Render — a polymer-modified fibre-reinforced cement-based mortar supplied as a powder to which water is added, and available coloured white, salmon, terracotta red, red, burgundy, gold, yellow, peach, grey, brown, light cream, cream or pink. Other colours are available to order
 - M.R. Spar-Dash Aggregate — available in a range of colours to suit the M.R. S7 Dashing Render
- Silicone finish:
 - ST Primer — a bonding aid and pre-coat containing fine quartz grains
 - ST Silkoliitt — a bonded, textured render supplied as a paste in three grades of grain size, 1.5 mm, 2.5 mm and 3.5 mm.

Figure 1 Swisslab EPS/Grey EPS External Wall Insulation System

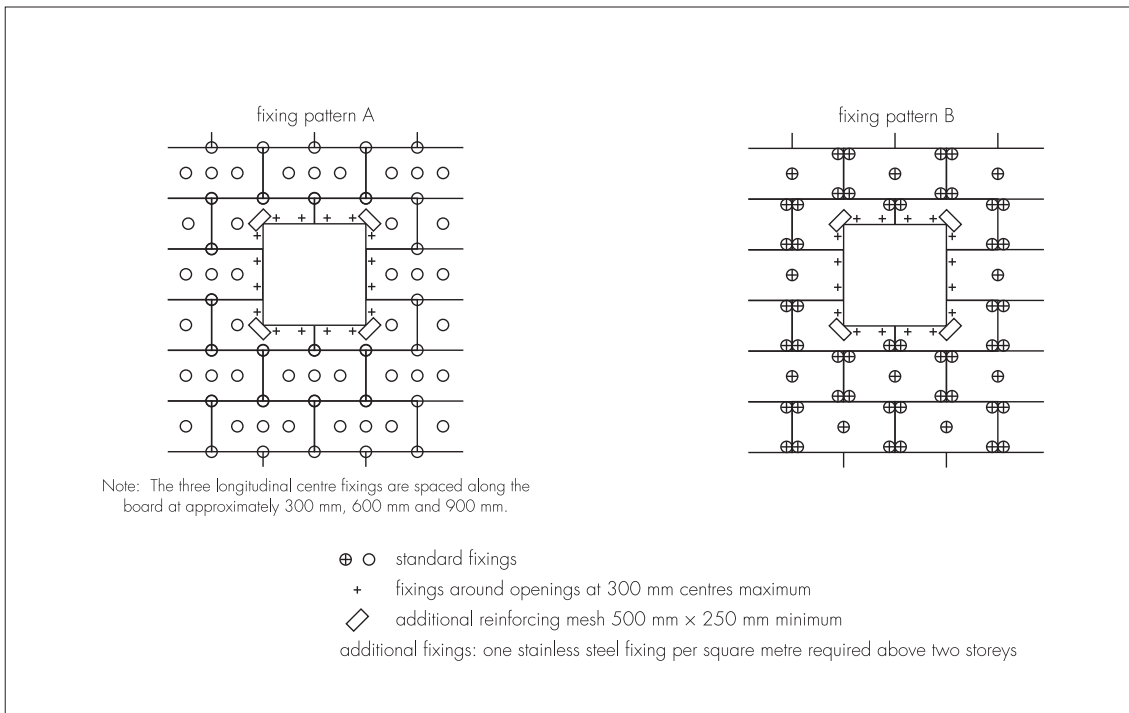


1.3 Ancillary materials, outside the scope of this Certificate, include:

- dubbing coat — a polymer-modified fibre-reinforced cement-based render, supplied as a powder to which water is added
- fungicidal wash
- stabilising solution
- a range of standard profiles for use at details such as end stop, corner mesh and expansion joint. Profiles are available in organic polyester-coated galvanized steel, stainless steel, aluminium or PVC and are provided to the specifier's requirements
- profile fixings — driven pins with plastic expansion sleeves
- Fir-Tree Fixings — plastic surface mounted bead fixing
- low-modulus silicone mastic provided to the specifier's requirements
- ground floor edge insulation system
- roof verge extenders
- under and over sills.

1.4 The EPS or Grey EPS insulation boards are primarily fixed with mechanical fixings and optionally bonded using supplementary adhesive to the external surface of walls on new or existing buildings of masonry or concrete. The selected primary mechanical fixings should be a minimum of five fixings per full board (see Figure 2).

Figure 2 Insulation boards fixing patterns



2 Manufacture

2.1 As part of the assessment and ongoing surveillance of the quality of the system components, the BBA has:

- agreed with the manufacturer the quality control procedures and product testing regime to be undertaken
- assessed and agreed the quality control operated over batches of incoming material
- 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 Alumasc Exterior Building Products Limited has been assessed and registered as satisfying the requirements of BS EN ISO 9001 : 2008 by Centre For Assessment Ltd (Certificate 02/1832).

3 Delivery and site handling

3.1 The insulation boards are delivered to site shrink-wrapped in polythene packs. Each pack carries the product identification 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 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 package
M.R. Bedding and M.R. Scrim Adhesive	25 kg
M.R. S Renders and Dubbing	25 kg
M.R. Spar-Dash Aggregate	25 kg
ST Primer	23 kg
ST Silkolit	25 kg
Alumasc mechanical fixings	boxed by manufacturer
M.R. stabilising solution	5 litre drum
M.R. fungicidal wash	5 litre drum
M.R. Fir-Tree Fixing	boxed by manufacturer
Alumasc reinforcing mesh	50 m roll, 1 m wide

3.3 The insulation boards should be stored on a firm, clean, level base, off the ground and 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 decorative M.R. Spar-Dash Aggregate should be stored off the ground and protected with opaque polythene sheeting.

3.6 The M.R. polymer cement adhesives are cementitious materials and must be stored in dry conditions, off the ground, and protected from frost at all times.

3.7 The M.R. S6 smooth finish masonry paint, ST Primer and ST Silkolitt should be stored in a safe area under cover, off the ground and protected from excessive heat and frost all the times.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on the Swisslab EPS/Grey EPS External Wall Insulation System.

Design Considerations


4 General

4.1 The Swisslab EPS/Grey EPS External Wall Insulation System, when installed in accordance with this Certificate, is effective in reducing the thermal transmittance (U value) of walls of new and existing buildings. It is essential that the detailing techniques specified in this Certificate are carried out to a high standard if the ingress of water into the insulation is to be avoided and the full thermal benefit obtained from the system. Only details specified by the Certificate holder should be used.

4.2 The system is applied to the outside of external walls of masonry and dense or no-fines concrete construction and is suitable for use on new or existing domestic or non-domestic buildings up to 18 m in height. Application and maintenance must be carried out strictly in accordance with this Certificate and the Certificate holder's instructions, by installers trained and approved by the Certificate holder.

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

4.4 Existing buildings, subject to national Building Regulations, should have wall surfaces in accordance with section 14 of this Certificate.

 4.5 New buildings 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 BS EN 1996-2 : 2006 and its UK National Annex.

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 It is recommended that external plumbing be removed before installation and alterations made to underground drainage, where appropriate, to accommodate repositioning of the plumbing on 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.

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 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 : 2007 and *BRE Report BR 443 : 2006*, using the insulation manufacturer's declared thermal conductivity (λ_D value) in Table 2.

Table 2 Thermal conductivity values

Insulation	λ_D value ($W \cdot m^{-1} \cdot K^{-1}$)
EPS	0.038
Grey EPS	0.030

6.2 The U value of a completed wall will depend on the selected insulation thickness and fixing method, the insulation value of the substrate masonry and its internal finish. Figures for typical design U values, calculated in accordance with section 6.1, are given in Table 3.

Table 3 Insulation thickness required to achieve some typical design values⁽¹⁾⁽²⁾

U value ($W \cdot m^{-2} \cdot K^{-1}$)	Insulation thickness requirement (mm)			
	215 mm Brickwork ($\lambda = 0.56 W \cdot m^{-1} \cdot K^{-1}$)		200 mm Dense blockwork ($\lambda = 1.75 W \cdot m^{-1} \cdot K^{-1}$)	
	EPS	Grey EPS	EPS	Grey EPS
0.19	200	160	—	180
0.26	140	110	150	120
0.28	120	100	130	110
0.30	110	90	120	100
0.35	90	80	100	85

(1) The following values for other elements of the construction were used:

- external boundary resistance (R_{se}) — $0.04 m^2 \cdot K \cdot W^{-1}$
- 14 mm render $\lambda = 1.0 W \cdot m^{-1} \cdot K^{-1}$, dash $\mu = 19$, thickness = 12 mm
- white EPS $\lambda = 0.038 W \cdot m^{-1} \cdot K^{-1}$, $\mu = 60$
- grey EPS $\lambda = 0.030 W \cdot m^{-1} \cdot K^{-1}$, $\mu = 60$
- 215 mm brickwork (protected) — $\lambda = 0.56 W \cdot m^{-1} \cdot K^{-1}$ ($\mu = 10$) [or 200 mm blockwork, $\lambda = 1.75 W \cdot m^{-1} \cdot K^{-1}$ ($\mu = 100$ and 6.7%)]
- mortar — $\lambda = 0.88 W \cdot m^{-1} \cdot K^{-1}$
- plaster (13 mm) — $\lambda = 0.57 W \cdot m^{-1} \cdot K^{-1}$, $\mu = 10$
- internal boundary resistance (R_{si}) — $0.13 m^2 \cdot K \cdot W^{-1}$.

(2) Fixing regime 6.944 fixings per m^2 (5 fixings per board) with a point thermal transmittance, $\chi = 0.002 W \cdot K^{-1}$.

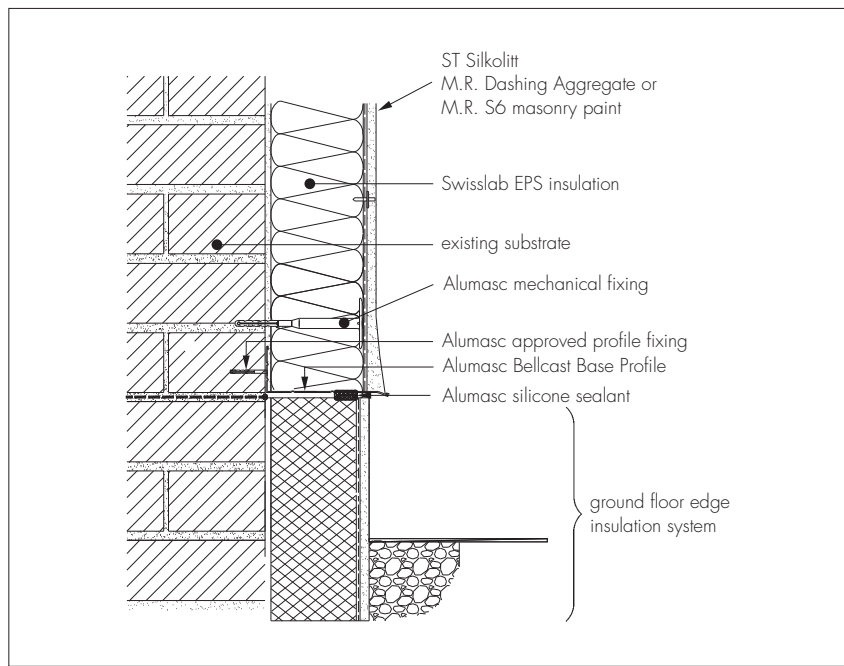
6.3 The system can contribute to maintaining continuity of thermal insulation at junctions between elements and openings. For Accredited Construction Details the corresponding ψ -values (ψ) in BRE Information Paper IP 1/06, Table 3, may be used in carbon emission calculations in Scotland and Northern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

England and Wales — Approved Documents to Part L and, for new thermal elements to existing buildings, Accredited Construction Details (version 1.0) F. Also see SAP 2009, Appendix K, and the *iSBEM User Manual* for new build

Scotland — Accredited Construction Details (Scotland)

Northern Ireland — Accredited Construction Details (version 1.0).

Figure 3 Typical section at base level




7 Strength and stability

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

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

7.3 Negative wind 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 wall should be calculated in accordance with BS EN 1991-1-4 : 2005 and its UK National Annex. 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 and its UK National Annex, 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 buildings must 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 contribution that may occur from the system
- the proposed system and associated fixing layout provides adequate resistance to negative wind loads based on the results of the site investigation and test results
- 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 : 2002, Annex D.

7.6 The number and centres of fixings should be determined by the system designer. Provided the substrate wall is suitable and an appropriate fixing is selected, the mechanical 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 Approval (ETA) are given in Table 4; however, these values are dependent on the substrate and the fixing must be selected to suit the loads and substrate concerned.

Table 4 Fixings — typical characteristic pull-out strengths

Fixing type	ETA No.	Substrate	Typical pull-out strength ⁽¹⁾ (N)
Termoz 8U	02/0019	Concrete C12/15/clay bricks	1500
Termofix CF8	07/0287	Concrete C12/15/clay bricks	600/900
Termoz 8NZ	03/0019	Concrete C12/15/clay bricks	1500

(1) Values are determined in accordance with ETAG 014 : 2002 and are dependent on the substrate.

7.8 The pull-through resistances determined by the BBA from tests on anchors are given in Table 5.

Table 5 Pull-through resistances

Factor (unit)	Expanded polystyrene insulation	Grey expanded polystyrene insulation
Insulation thickness (mm)	100	80
Plate diameter of anchor (mm)	60	60
Characteristic pull-through resistance ⁽¹⁾ (per anchor) (N)	1965	2075
Factor of safety	2.5	2.5
Design pull-through resistance ⁽²⁾ (N)	786	830

(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 boards 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 in all categories⁽¹⁾.

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

- Use 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
- 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
- Use 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 surface spread of flame classification for the system is Class 0 or 'low risk' as defined in the national Building Regulations.

8.2 The standard white EPS and Grey EPS insulation materials are not classified as non-combustible.



8.3 The system is considered suitable for use on or at any distance from the boundary and restricted for use in buildings less than 18 m in height.



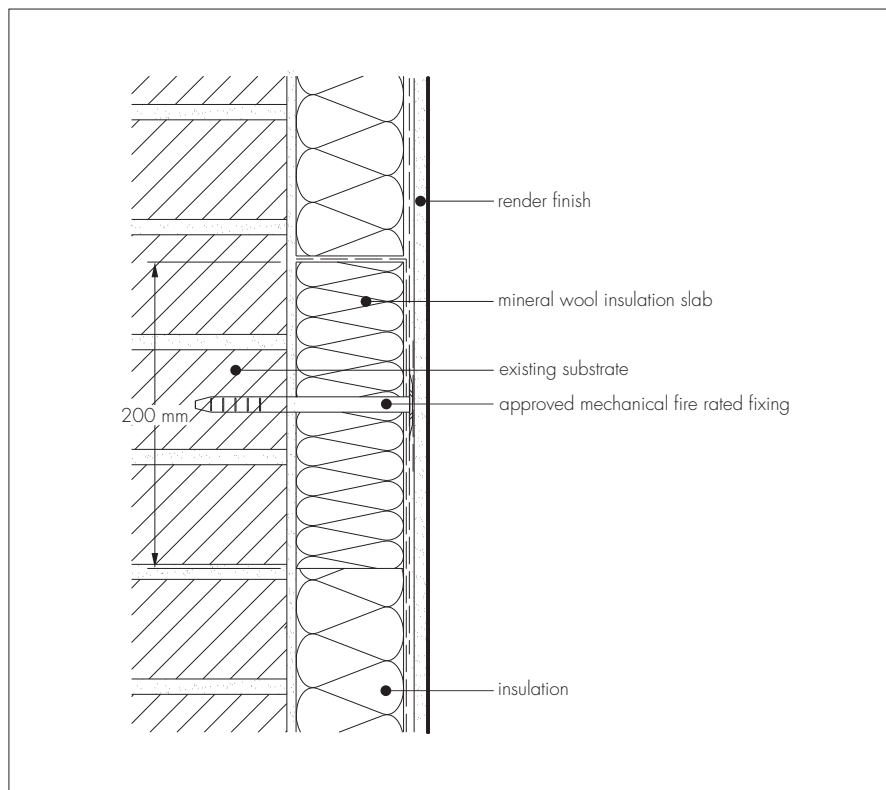
8.4 The system is classified as 'low risk' combustible materials and must not be used within 1 m of the boundary and is restricted for use in buildings less than 18 m in height.

8.5 The system is not classified as 'non-combustible'; therefore, calculations for unprotected areas apply, with some minor exceptions.



8.6 Application to second storey walls and above should include at least one stainless steel mechanical fixing per square metre and fire barriers in line with compartment walls and floors (see Figure 4). For installation of fire barriers and steel fixings refer to the guidance in *BRE Report BR 135 : 2013*.

Figure 4 Fire barrier



9 Proximity of flues

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

England and Wales — Approved Document J

Scotland — Mandatory Standard 3.19, clause 3.19.4⁽¹⁾⁽²⁾

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

Northern Ireland — Technical Booklet L.

10 Water Resistance



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

10.2 Designers and installers should take particular care in detailing around openings, penetrations and movement joints to minimise the risk of rain ingress. Only details approved by the Certificate holder should be used.

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

10.4 At the tops of walls, the system should be protected by an adequate overhang or other detail designed for use with these types of system (see section 16.30).

11 Risk of condensation



11.1 Designers must ensure that an appropriate condensation risk analysis has been carried out for all parts of construction, including openings and penetrations at junctions between the insulation system, to minimise the risk of condensation. The recommendations of 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 $0.7 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$ at any point and the junctions with other elements and openings comply with section 6.3.



11.3 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



11.4 Walls incorporating the system will adequately limit the risk of interstitial condensation when they are designed and constructed in accordance with this Certificate.

11.5 The render systems used with the system have an equivalent air layer of thickness ($S_{a,i}$) of $\leq 2.0 \text{ m}$. This corresponds to a water vapour resistance factor (μ) which is dependent on the particular basecoat and finish configuration.

11.6 The water vapour resistance factors (μ) for both EPS and Grey EPS is 60, as taken from BS EN ISO 10456 : 2007, Table 4.

12 Maintenance and repair



12.1 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.

12.2 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.

13 Durability



13.1 The system should remain effective for at least 30 years, provided any damage to the surface finish is repaired immediately, and regular maintenance is undertaken. This includes checks on joints in the system and external plumbing fittings to prevent leakage of rainwater into the system, enabling steps to be taken to correct the defects.

13.2 Any render containing Portland 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 is less noticeable on lighter colours.

13.3 The decorative finishes may become discoloured with time, the rate depending on the initial colour, the degree of exposure, atmospheric pollution and the nature of the natural aggregate, as well as the design and detailing of the wall. In common with traditional renders, discoloration by algae and lichens may occur in particularly wet areas. The appearance of M.R. S7 can be restored by using traditional cleaning methods suitable for sand/cement renders (such as by brushing and washing). The appearance of M.R. S4 can be restored by a further application of finish.

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 Swisslab EPS/Grey EPS External Wall Insulation 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 beads
- where required, additional corner mesh and reinforcement
- areas where flexible sealants must be used
- any alterations to external plumbing
- where required, the positions of fire barriers.

14.2 The survey should include tests conducted on the walls of the building by the Certificate holder or their approved applicators (see section 15) to determine the pull-out resistance of the proposed mechanical fixings. An assessment and recommendation is made on the type and number of fixings required to withstand the building's expected wind loading based on calculations using the test data, the relevant wind speed data for the site and, in the absence of a formal requirement, a safety factor of 2.

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

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

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

14.7 All modifications, such as provision for fire stopping (see section 8) and necessary repairs to the building, are completed before installation commences.

15 Approved Installers

Application of the system, within the context of this Certificate, is 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 requirements 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 Application is carried out in accordance with the Certificate holder's current installation instructions.

16.2 M.R. Bedding Adhesive, Scrim Adhesive, Dubbing and render coats must not be applied in rain or mist, at temperatures below 5°C or above 30°C, if exposure to frost is likely to occur during drying, or if the boards or background are already wet or frostbound.

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

16.4 M.R. adhesives and renders are mixed using a paddle mixer. Conventional concrete mixers are unsuitable.

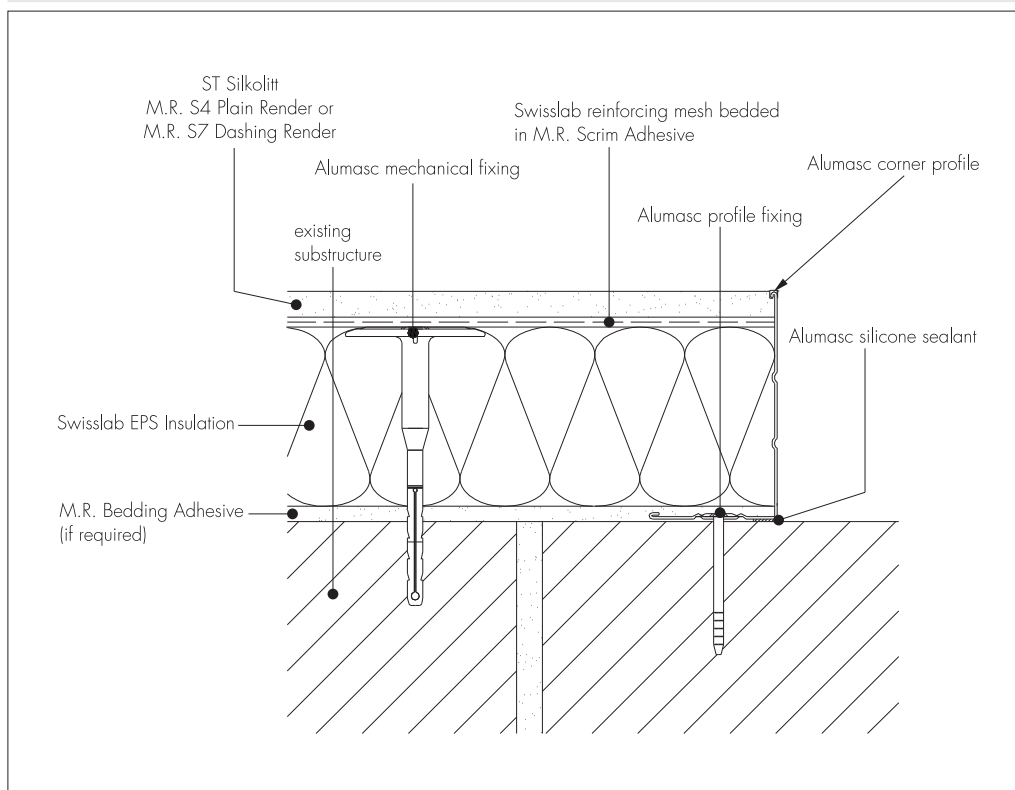
16.5 One coat of fungicidal wash is applied by brush, roller or knapsack spray. If adhesively fixing the insulation boards or for areas to receive a dubbing coat, once the fungicidal wash has dried, apply one coat of stabilising solution by brush, roller or knapsack spray.

Positioning and securing insulation boards

16.6 The Alumasc base profile is secured to the external wall, line and level, above the dpc using the approved profile fixings at 300 mm centres minimum. Additional packers may be required (see Figure 3).

16.7 Stop beads are positioned vertically or 'wrap back' technique, eg at party wall positions where the adjoining house does not require treatment (see Figure 5).

Figure 5 Typical end stop detail



16.8 To compensate for minor variations in the backing wall flatness, M.R. Bedding Adhesive (wet-fix system) can be used if required, and is prepared for use by mixing the contents of each 25 kg bag with 6.0 – 6.5 litres of cold, clean water. An electrically driven paddle mixer is used for a minimum of five minutes until a smooth, workable consistency is achieved. The adhesive mix is left to stand for at least five minutes and again mixed for a further two minutes. The bed coat of M.R. Bedding Adhesive can be applied in one of two ways; either:

- the supplementary adhesive can be applied by trowel to the full area of the back of the insulation board and notched with a 10 mm notch trowel and the board placed firmly against the substrate, or the
- supplementary adhesive can be applied directly to the substrate and notched.

16.9 The first run of insulation boards is positioned on the base profile. Using the wet-fix system, boards are pressed firmly into the adhesive. Subsequent rows of boards are positioned so that the board joints are staggered by at least 200 mm and overlapped at the building corners and in such a manner that board joints do not occur within 200 mm of the corners of openings. L-shaped boards must be installed around all opening corners. If required, the boards may be arranged with the longer edge positioned vertically. Mechanical fixings for insulation boards are installed as specified in the project specific design (see Figure 2).

16.10 The insulation boards are mechanically fastened to the wall using either fixing pattern A or B (see Figure 2). Mechanical fixings are positioned 300 mm apart around door and window details and at 300 mm vertical centres at building corners. At corners, fixings should be positioned inwards by 75 mm (see Figure 8) plus the thickness of the insulation. Holes are drilled into the substrate to a minimum depth specified by the fixing supplier and the mechanical fixings are inserted and tapped firmly into place, securing the insulation board to the substrate.

16.11 Above two storeys, horizontal fire barriers are installed in accordance with the requirements of section 8.6 of this Certificate.

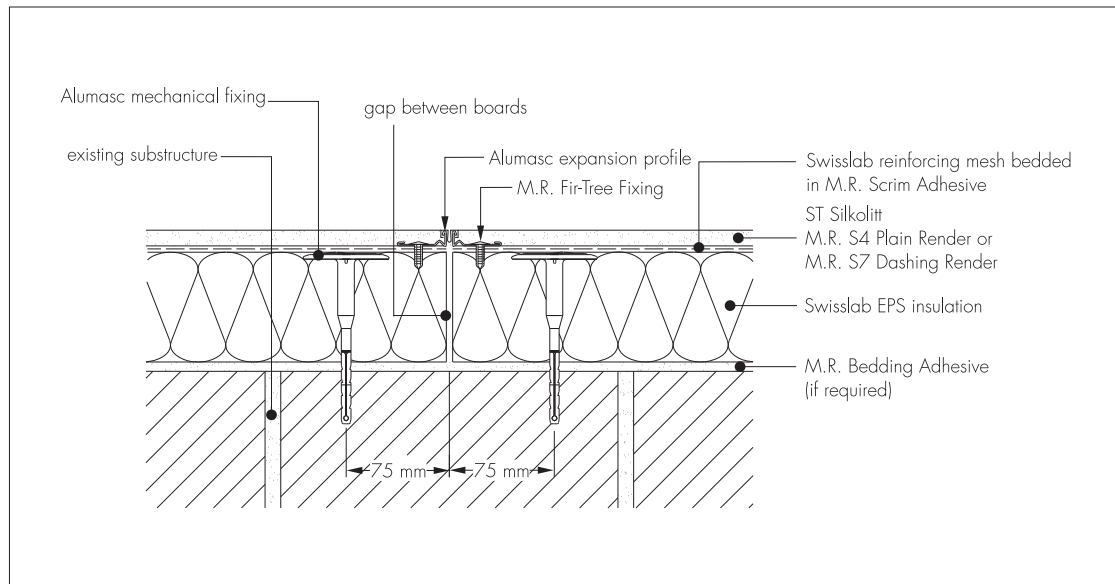
16.12 Care must be taken to ensure that all board edges are butted tightly together, and alignment should be checked as work proceeds. Any high spots or irregularities should be removed by lightly planing with a rasp.

16.13 To fit around details such as doors and windows, insulation boards may be cut with a sharp knife, fine-tooth saw or hot wire cutting machine. If required, purpose-made window sills are fitted (see Figure 10). They are designed to prevent water ingress and incorporate drips to shed water clear of the system.

Movement joints and profiles

16.14 Movement joints in the substrate must be continued through the system. The joint detail using purpose-made metal trims is illustrated in Figure 6.

Figure 6 Vertical movement joint detail



16.15 Expansion bead locations are marked vertically at agreed positions. These beads are positioned at approximately 7 m centres along a building depending on the individual requirements of each job.

Reinforcing

16.16 The M.R. Scrim Adhesive is prepared as described in section 16.8 and a bed coat is trowel-applied to the surface of dry insulation boards to a minimum thickness of 3 mm.

16.17 M.R. Scrim Reinforcement is bedded into the adhesive with 75 mm minimum laps at joints. Extra mesh (500 mm by 250 mm) is used around openings (see Figure 2).

16.18 For installations above two storeys, additional holes are drilled at one-metre centres through the M.R. Scrim Adhesive and Alumasc stainless steel fixings are inserted through the mesh and tapped firmly home. The fixings are covered with M.R. Scrim Adhesive and square pieces of M.R. Reinforcing Mesh measuring not less than 150 mm by 150 mm.

Rendering and finishing

16.19 Expansion beads are fixed at agreed positions. Angle beads are fixed to all building corners and to door and window heads and jambs. The beads are fixed using Fir-Tree Fixings at maximum 300 mm centres, after the M.R. Scrim Adhesive has cured.

16.20 Prior to the render coat, a bead of low modulus silicone sealant is gun-applied at window and door frames, overhanging eaves, gas and electric meter boxes, wall vents or where the render abuts any other building material or surface.

16.21 The drying period of any render will depend on weather conditions. However, each coat must be left to harden for as long as possible in good drying conditions but before application of the subsequent coat. The scrim adhesive must be allowed to harden and dry for between 1 and 3 days depending on the environment.

16.22 To prevent the renders from drying too rapidly they should not be applied in direct sunlight. Continuous surfaces must be completed without a break.

16.23 After application, care must be taken to protect the renders from direct sunlight, drying winds, rain, mist and cold (less than 5°C on a falling thermometer) to prevent the drying time from being too rapid or excessively prolonged.

16.24 The scrim adhesive must be allowed to harden and dry for between 1 and 3 days depending on the environment before application of the M.R. S7 Dashing Render or M.R. S4 Plain Render.

16.25 M.R. S7 Dashing Render or M.R. S4 Plain Render is prepared using the same procedures as for the M.R. Bedding Adhesive (see section 16.8) by mixing the contents of each 25 kg bag with approximately 5 to 5.6 litres and 4 to 4.5 litres of water respectively. Care must be taken to ensure an even dispersion of the resin and fibre reinforcement.

16.26 One coat of M.R. S7 Dashing Render or M.R. S4 Plain Render is trowel-applied to a minimum thickness of 8 mm. For the M.R. S7 Dashing Render, a minimum of three bags of suitable spar-aggregate should be emptied into a clean wheelbarrow or tub and any excess water allowed to drain before being mixed thoroughly. While the M.R. S7 Dashing Render is still soft, the 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. With M.R. S4 Plain Render, it is finished smooth with a stainless steel trowel, sponged up and allowed to dry. Any contaminants, such as grease, dirt, chalking, must be removed prior to the application of further top coats or paints.

16.27 M.R. S6 smooth finish masonry paint is applied in two coats by brush or roller, allowing sufficient drying time between each coat. Drying times depend on weather conditions.

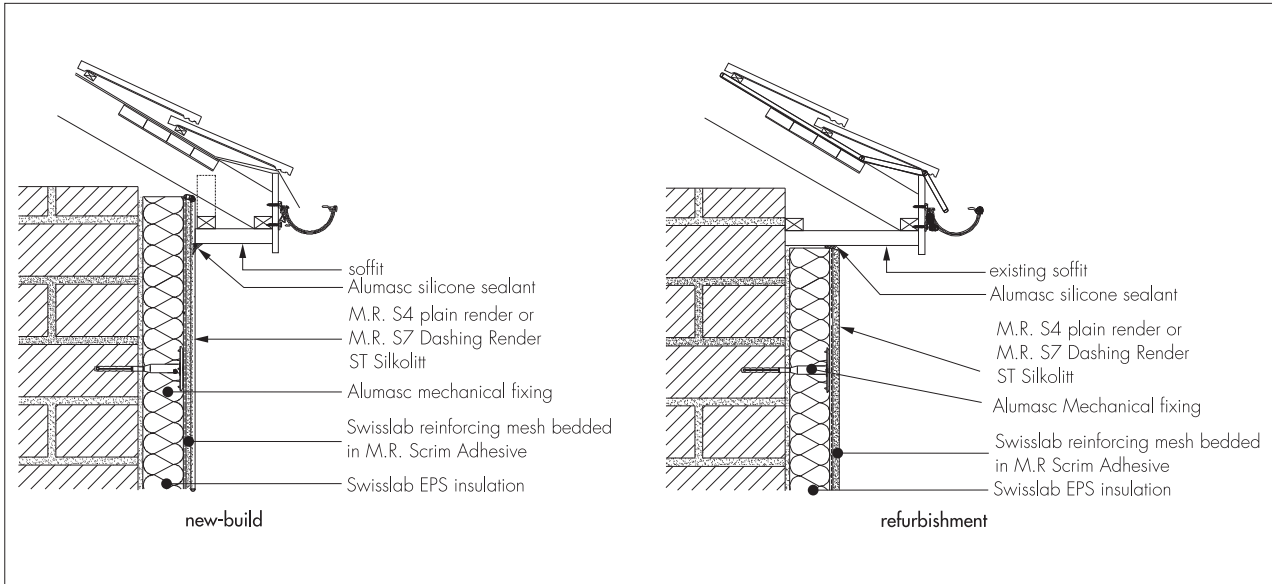
16.28 ST Primer is applied by roller or brush and allowed to dry before application of ST Silkolitt. The Silkolitt paste⁽¹⁾ is applied by stainless steel trowel to a thickness of 1.5 mm, 2.5 mm or 3.5 mm depending on the grain size selected, and is textured with a plastic trowel in a circular motion.

(1) The paste can be diluted with a maximum of 2% clean water in the tub, if required.

16.29 The decorative finish should not be applied in wet weather, at temperatures below 5°C, or when frost is expected. Freshly coated work should be protected from rain.

16.30 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 Typical eaves detail



16.31 Care must be taken in the detailing of the system around openings and projections (see Figures 8, 9 and 10).

Figure 8 External corner or reveal detail

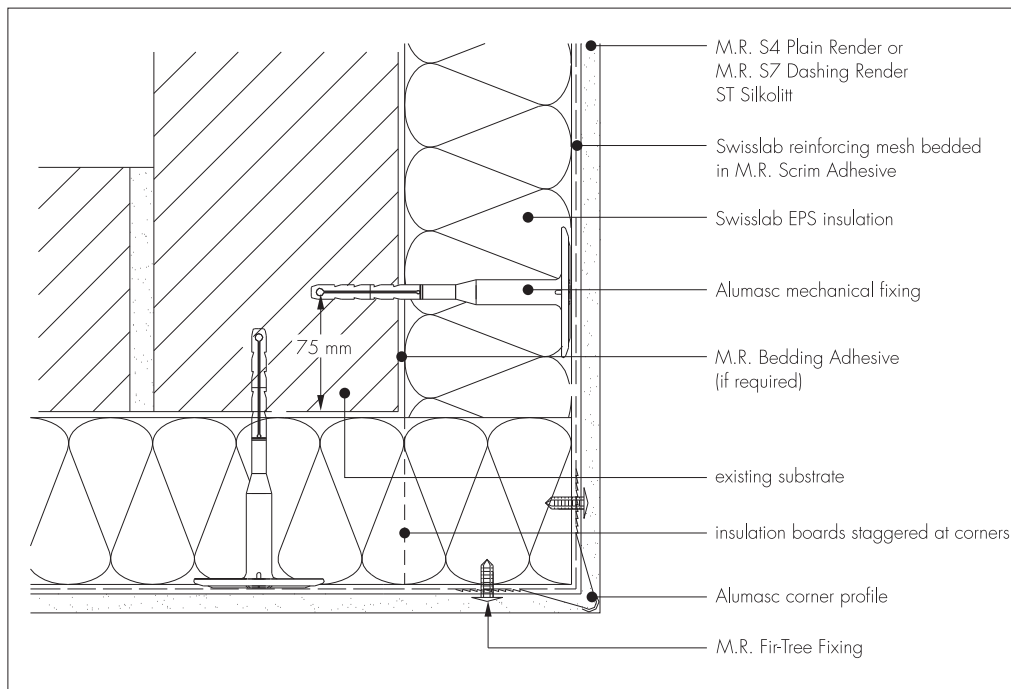


Figure 9 Insulated window or door reveal

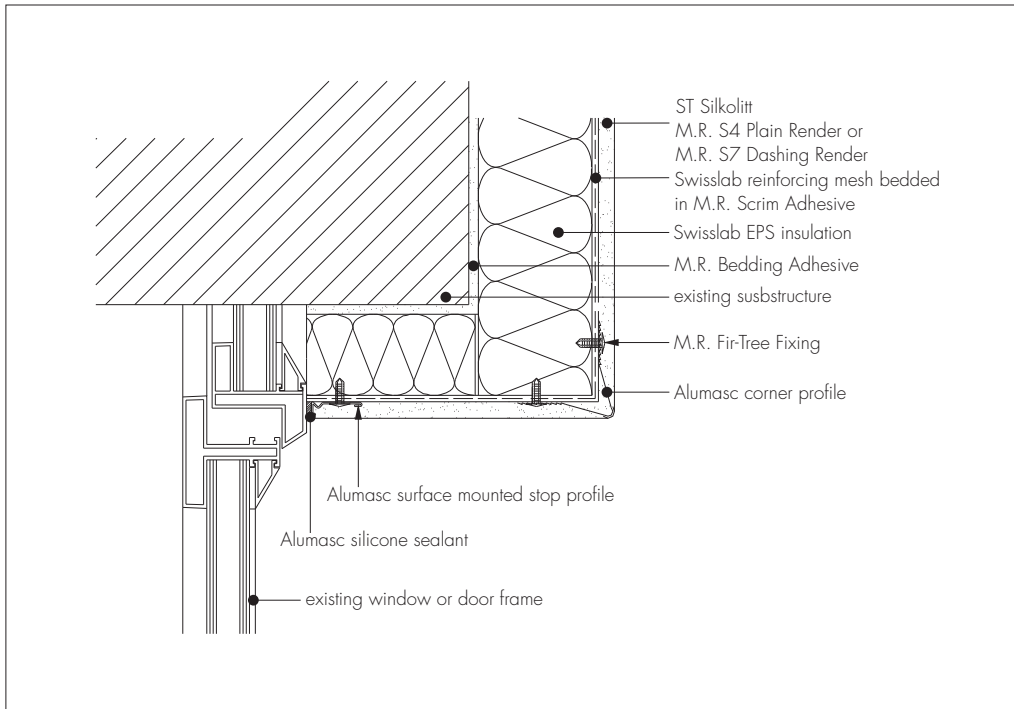
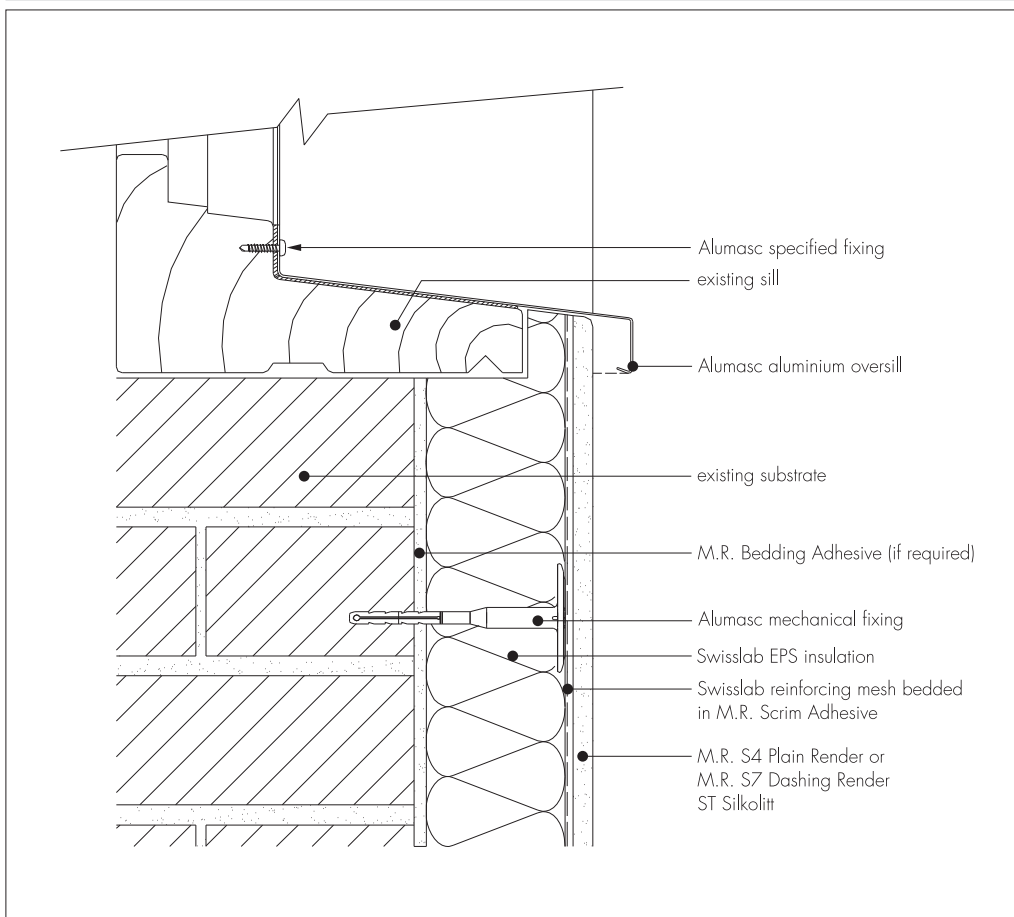


Figure 10 Typical sill detail



16.32 On completion of the installation, external fittings, eg rainwater goods, are re-fixed through the system into the substrate.

16.33 For all rendering and application of finishing coats, continuous surfaces should be completed without a break.

17 Tests

17.1 Tests were carried out on Swisslab EPS (white) EWIS in accordance with MOAT No 22 : 1988 to determine:

- component characterisation
- resistance to freeze/thaw
- heat/spray cycling
- impact resistance
- water absorption of render
- water permeability
- water vapour permeability.

17.2 Tests were carried out Swisslab Grey EPS EWIS in accordance with ETAG 004 : 2011 to determine:

- resistance to freeze/thaw
- heat/spray cycling
- bond strength of M.R. S7 Dashing Render or M.R. S4 Plain Render
- tensile strength (perpendicular to faces) of Grey EPS insulation
- impact resistance.

17.3 An examination was made of data relating to:

- resistance of dynamic wind uplift⁽¹⁾
- flexural and compressive strength of renders
- fire propagation tests to BS 476-6 : 1989
- surface spread of flame tests to BS 476-7 : 1997
- pull-out strength of fixings
- durability of finish
- thermal conductivity to BS EN ISO 6946 : 2007
- bond strength of M.R. S7 and M.R. S4.

(1) Tests were conducted by the BBA generally in accordance with European Organisation for Technical Approvals' draft ETAG Guidelines for External Thermal Insulation Composite Systems with rendering.

18 Investigations

18.1 An examination was made of the manufacturing process, the methods adopted for quality control of manufactured and bought-in components, and details of the quality and composition of the materials used.

18.2 A computer simulation of the risk of interstitial condensation was undertaken.

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

Bibliography

- BS 476-6 : 1989 *Fire tests on building materials and structures — Method of test for fire propagation for products*
- BS 476-7 : 1997 *Fire tests on building materials and structures — Method of test to determine the classification of the surface spread of flame of products*
- BS 5250 : 2011 *Code of practice for control of condensation in buildings*
- BS 8000-3 : 2001 *Workmanship on building sites — Code of practice for masonry*
- BS EN 1990 : 2002 *Eurocode — Basis of structural design*
- NA to BS EN 1990 : 2002 *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 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 13163 : 2012 *Thermal insulation products for buildings - Factory made expanded polystyrene (EPS) products - Specification*
- BS EN 13914-1 : 2005 *Design, preparation and application of external rendering and internal plastering — External rendering*
- BS EN ISO 6946 : 2007 *Building components and building elements — Thermal resistance and thermal transmittance — Calculation method*

BS EN ISO 9001 : 2008 *Quality management systems — Requirements*

MOAT No 22 : 1988 *UEAtc Directives for the Assessment of External Insulation Systems for Walls (Expanded Polystyrene Insulation Faced with a Thin Rendering)*

BRE Information Paper IP 1/06 *Assessing the effects of thermal bridging at junctions and around openings*

BRE Report (BR 135 : 2013) *Fire Performance of External Insulation For Walls of Multistorey Buildings*

BRE Report (BR 262 : 2002) *Thermal insulation: avoiding risks*

BRE Report (BR 443 : 2006) *Conventions for U-value calculations*

ETAG 004 : 2011 *Guideline for European Technical Approval of External Thermal Insulation Composite Systems with Rendering*

ETAG 014 : 2002 *Guideline for European Technical Approval of Plastic Anchors for fixing of External Thermal Insulation Composite Systems with Rendering*

Conditions of Certification

19 Conditions

19.1 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.

19.2 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.

19.3 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.

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

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

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

19.6 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.