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Agrément Certificate

96/3247

Product Sheet 4

ALSECCO EXTERNAL WALL INSULATION SYSTEMS

ALSECCO ECOMIN 400 EXTERNAL WALL INSULATION SYSTEM

This Agrément Certificate Product Sheet⁽¹⁾ relates to the Alsecco Ecomin 400 External Wall Insulation System, comprising mechanically fixed mineral wool fibre and mineral wool lamella insulation slabs, with supplementary adhesive, a reinforced basecoat and ceramic tiles or brick-slip finishes. The system is mechanically fixed through the reinforced basecoat (for ceramic tiles and clay brick-slips) or fixed through the insulation or through the reinforced basecoat (for acrylic brick-slips). It is suitable for use on the outside of external walls in new and existing domestic and non-domestic buildings.

(1) Hereinafter referred to as 'Certificate'.

CERTIFICATION INCLUDES:

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

KEY FACTORS ASSESSED

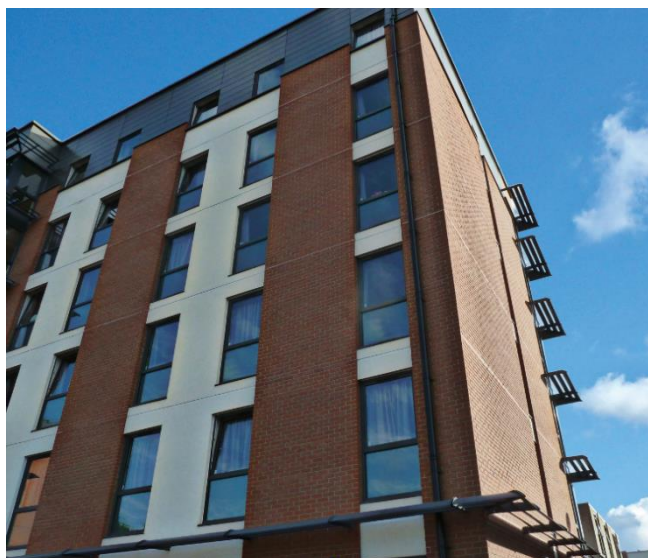
Thermal performance — the system can be used to improve the thermal performance of external walls and can contribute to satisfying the requirements of the national Building Regulations (see section 6).

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

Behaviour in relation to fire — the system has either an A2-s1, d0 or a B-s2, d0 reaction to fire classification in accordance with BS EN 13501-1 : 2007. The system may be restricted for use in buildings up to 18 metres in height, depending on the finish chosen (see section 8).

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

Durability — when installed and maintained in accordance with the Certificate holder's recommendations and the terms of this Certificate, 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

Date of Third issue: 31 October 2018

John Albon – Head of Approvals
Construction Products

Originally certificated on 24 March 2014

Claire Curtis-Thomas
Chief Executive

The BBA is a UKAS accredited certification body – Number 113.

The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at www.bbacerts.co.uk
Readers are advised to check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA direct.

Any photographs are for illustrative purposes only, do not constitute advice and should not be relied upon.

British Board of Agrément

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Regulations

In the opinion of the BBA, the Alsecco Ecomin 400 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 7.15 of this Certificate.
Requirement:	B4(1)	External fire spread
Comment:		The system can satisfy this Requirement. See sections 8.1 to 8.6 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 11.1, 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 sections 13.1 and 13.2 and the <i>Installation</i> part of this Certificate.
Regulation:	26	CO₂ emission rate for new buildings
Comment:		The system can contribute to satisfying this Regulation. See sections 6.2 and 6.3 of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)(2)	Durability, workmanship and fitness of materials
Comment:		The system can contribute to a construction satisfying this Regulation. See sections 12 and 13 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 sections 7.1 to 7.15 of this Certificate.
Standard:	2.6	Spread to neighbouring buildings
Comment:		The external surface of the system is classified as 'low risk', with reference to clauses 2.6.4 ⁽¹⁾⁽²⁾ , 2.6.5 ⁽¹⁾ and 2.6.6 ⁽²⁾ . See sections 8.1 to 8.5 and 8.7 to 8.9 of this Certificate.
Standard:	2.7	Spread on external walls
Comment:		The external surface of the system is classified as 'low risk', with reference to clauses 2.7.1 ⁽¹⁾⁽²⁾ and 2.7.2 ⁽¹⁾⁽²⁾ and Annex 2A ⁽¹⁾ . See sections 8.1 to 8.5 and 8.7 to 8.9 of this Certificate.

Standard: Comment:	3.10	Precipitation 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: Comment:	3.15	Condensation 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: Standard: Comment:	6.1(b) 6.2	Carbon dioxide emissions Buildings insulation envelope The system can contribute to satisfying these Standards, with reference to clauses 6.1.1 ⁽¹⁾⁽²⁾ , 6.1.2 ⁽¹⁾⁽²⁾ , 6.1.3 ⁽¹⁾ , 6.1.6 ⁽¹⁾ , 6.2.10 ⁽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: Comment:	7.1(a)(b)	Statement of sustainability 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 product can contribute to a construction meeting a higher level of sustainability as defined in this Standards, 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 6.2 of this Certificate.
Regulation: Comment:	12	Building standards applicable to conversions All comments given for the system under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to 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: Comment:	23	Fitness of materials and workmanship The system is acceptable. See section 13 and the <i>Installation</i> part of this Certificate.
Regulation: Comment:	28(b)	Resistance to moisture and weather The system provides a degree of protection against rain ingress. See section 10.1 of this Certificate.
Regulation: Comment:	29	Condensation The system can contribute to minimising the risk of interstitial condensation. See sections 11.2 and 11.4 of this Certificate.
Regulation: Comment:	30	Stability The system can sustain and transmit wind loads to the substrate wall. See sections 7.1 to 7.15 of this Certificate.
Regulation: Comment:	36(a)	External fire spread The system can satisfy this Regulation. See sections 8.1 to 8.6 of this Certificate.
Regulation: Comment:	39(a)(i)	Conservation measures The system can contribute to satisfying this Regulation. See sections 6.2 and 6.3 of this Certificate.
Regulation: Comment:	40	Target carbon dioxide emission rate The system can contribute to satisfying this Regulation. See sections 6.2 and 6.3 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 section: 3 *Delivery and site handling* (3.2) of this Certificate.

Additional Information

NHBC Standards 2018

In the opinion of the BBA, the Alsecco Ecomin 400 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 Alsecco Ecomin 400 External Wall Insulation Systems are mechanically fixed systems with supplementary adhesive (minimum 50% coverage), comprising mineral wool (MW) fibre and mineral wool (MW) lamella insulation slabs, with reinforced basecoat and brick-slip finishes. For the clay brick-slips and ceramic tiles (see Figure 1) the system is mechanically fixed through the mesh with supplementary adhesive, whereas for the acrylic brick-slips, the system can optionally be mechanically fixed through the insulation with supplementary adhesive. Supplementary adhesive coverage must be 100% when mechanical fixings are applied through the reinforced basecoat.

Table 1 Alsecco Ecomin 400 system summary

Component	Product	
	Option 1	Option 2
Adhesive	Thermastick MK Armatop A Armatop AKS Armatop L-Aero Armatop MP	
Insulation	Any mineral wool insulation	MW High Density MW Lamella
Basecoat	Armatop A Armatop AKS Armatop MP	Armatop A
Reinforcement	Alsecco Glassfibre Mesh 32 Alsecco Panzer Mesh	Alsecco Glassfibre Mesh K
Bedding Mortar	Bedding Mortar AF	Bedding Mortar A
Grouting joint mortar	N/A	Grouting Joint Mortar A Grouting Joint Mortar AS
Finishes	Acrylic brick-slips	Ceramic tiles Clay brick-slips

1.2 The system consists of the following components:

Supplementary adhesive

- Thermastick MK — a cementitious adhesive, comprising limestone sand conforming to BS EN 13139 : 2002, cement conforming to BS EN 197-1 : 2011, and additives. Supplied as a powder mixed with approximately 5 to 6 litres of clean water per bag and applied at a coverage of 3.5 to $6 \text{ kg}\cdot\text{m}^{-2}$
- Armatop A, L-Aero, MP and AKS — cementitious adhesives, each comprising limestone sand conforming to BS EN 13139 : 2002, cement conforming to BS EN 197-1 : 2011, and additives. Supplied as a powder mixed with approximately 5 to 6 litres of clean water per bag. Applied at a coverage of 3.5 to $4.5 \text{ kg}\cdot\text{m}^{-2}$ for Armatop L-Aero, 3.5 to $6 \text{ kg}\cdot\text{m}^{-2}$ for Armatop A and MP and 3 to $5 \text{ kg}\cdot\text{m}^{-2}$ for Armatop AKS

Insulation⁽¹⁾⁽²⁾

- MW Dual Density 036 — dual density mineral wool slabs available in sizes up to 1200 by 600 mm and $80^{(2)}$ to 250 mm thicknesses, with nominal densities of $160/100 \text{ kg}\cdot\text{m}^{-3}$ (outer/inner layer), a minimum compressive strength of $10 \text{ kN}\cdot\text{m}^{-2}$ and a tensile resistance perpendicular to the faces of $10 \text{ kN}\cdot\text{m}^{-2}$. Slabs are manufactured to BS EN 13162 : 2012
- MW High Density 038/039 — high density mineral wool slabs available in sizes up to 1200 by 600 mm and in $60^{(2)}$ to 200 mm thicknesses, with a nominal density of $140 \text{ kg}\cdot\text{m}^{-3}$, a minimum compressive strength of $10 \text{ kN}\cdot\text{m}^{-2}$ and a tensile resistance perpendicular to the faces of $15 \text{ kN}\cdot\text{m}^{-2}$. Slabs are manufactured to BS EN 13162 : 2012
- MW Lamella 042 — mineral fibre slabs available in sizes up to 1000 by 200 mm and in $60^{(2)}$ to 300 mm thicknesses, with a nominal density of $95 \text{ kg}\cdot\text{m}^{-3}$, a minimum compressive strength of $50 \text{ kN}\cdot\text{m}^{-2}$ and a tensile resistance perpendicular to the faces of $80 \text{ kN}\cdot\text{m}^{-2}$. Slabs are manufactured to BS EN 13162 : 2012
- MW Slab 036 — rock mineral wool slabs available in sizes up to 1200 by 600 mm and in $100^{(2)}$ to 260 mm thicknesses, with a nominal density of $105 \text{ kg}\cdot\text{m}^{-3}$, a minimum compressive strength of 30 kPa and a tensile resistance perpendicular to the faces of $10 \text{ kN}\cdot\text{m}^{-2}$. Slabs are manufactured to BS EN 13162 : 2012
- MW Slab Plus 038 — high strength, rock mineral wool slabs with a water-repellent additive, available in sizes up to 1200 by 600 mm and in $100^{(2)}$ to 200 mm thicknesses, with a nominal density of $140 \text{ kg}\cdot\text{m}^{-3}$, a minimum compressive strength of $40 \text{ kN}\cdot\text{m}^{-2}$ and a tensile resistance perpendicular to the faces of $15 \text{ kN}\cdot\text{m}^{-2}$. Slabs are manufactured to BS EN 13162 : 2012.

(1) For declared thermal conductivity (λ_D) values, see Table 3.

(2) Insulation thicknesses <50 mm would generally be used in reveals.

Mechanical fixings

- mechanical fixings⁽¹⁾⁽²⁾ — anchors with adequate length to suit the substrate and the insulation thickness and selected from:

Ejot STR U and STR U 2G — polyethylene, PE-HD with stainless steel or electro-galvanized pins

Ejot NTK U — polyethylene, PE-HD with polyamide or PA pins

(1) Alternative fixings may be used provided they can be demonstrated to have equal or higher pull-out, plate stiffness and load resistance characteristics (see section 7 of this Certificate)

(2) The fixings must be surface mounted only, i.e. it must not be embedded into the insulation

Basecoat

- Armatop A — a cementitious basecoat comprising limestone sand conforming to BS EN 13139 : 2002, cement conforming to BS EN 197-1 : 2011, and additives. Supplied as a powder, and mixed with approximately 5 to 6 litres of clean water per bag, with a coverage rate of approximately $7 \text{ kg}\cdot\text{m}^{-2}$. Applied to a thickness of approximately 4 to 10 mm. For use with ceramic tiles, and brick-slips
- Armatop MP and AKS — cementitious basecoats comprising limestone sand conforming to BS EN 13139 : 2002, cement conforming to BS EN 197-1 : 2011, and additives. Supplied as a powder, and mixed with approximately 5 to 6 litres of clean water per bag, with a coverage rate of approximately 3.5 to $6 \text{ kg}\cdot\text{m}^{-2}$ for Armatop MP and 3.5 to $6 \text{ kg}\cdot\text{m}^{-2}$ for Armatop AKS. Applied to a thickness of approximately 4 mm. For use with acrylic brick-slips only

Reinforcement

- Alsecco Glassfibre Mesh K — a 1.10 m wide (4 by 4 mm) of multi-stranded alkali-resistant glassfibre, with a polymer coating and a nominal weight of $160 \text{ g}\cdot\text{m}^{-2}$
- Alsecco Panzer Mesh — a 1.0 m wide (6 by 6 mm) of multi-stranded alkali-resistant glassfibre, with a polymer coating and a nominal weight of $330 \text{ g}\cdot\text{m}^{-2}$
- Alsecco Glassfibre Mesh 32 — a 1.10 m wide mesh (4 by 4 mm) of multi-stranded alkali-resistant glassfibre, with a polymer coating and a nominal weight of $160 \text{ g}\cdot\text{m}^{-2}$

Bedding mortar

- Bedding Mortar A — a high-adhesive-strength cementitious mortar conforming to BS EN 12004 : 2007, cement conforming to BS EN 197-1 : 2011, and additives. Supplied as a grey powder to which clean water is added, with a coverage rate of approximately $3 \text{ kg}\cdot\text{m}^{-2}$ to $5 \text{ kg}\cdot\text{m}^{-2}$. Applied to a thickness of between 3 and 5 mm. For the application of the ceramic tiles and brick-slips
- Bonding Mortar AF — an organic-based, ready to use bonding and joint mortar. Supplied pre-coloured, with a coverage rate of approximately $3.5 \text{ kg}\cdot\text{m}^{-2}$. Applied to a thickness of between 1 and 4 mm. For the application of the acrylic brick-slips.

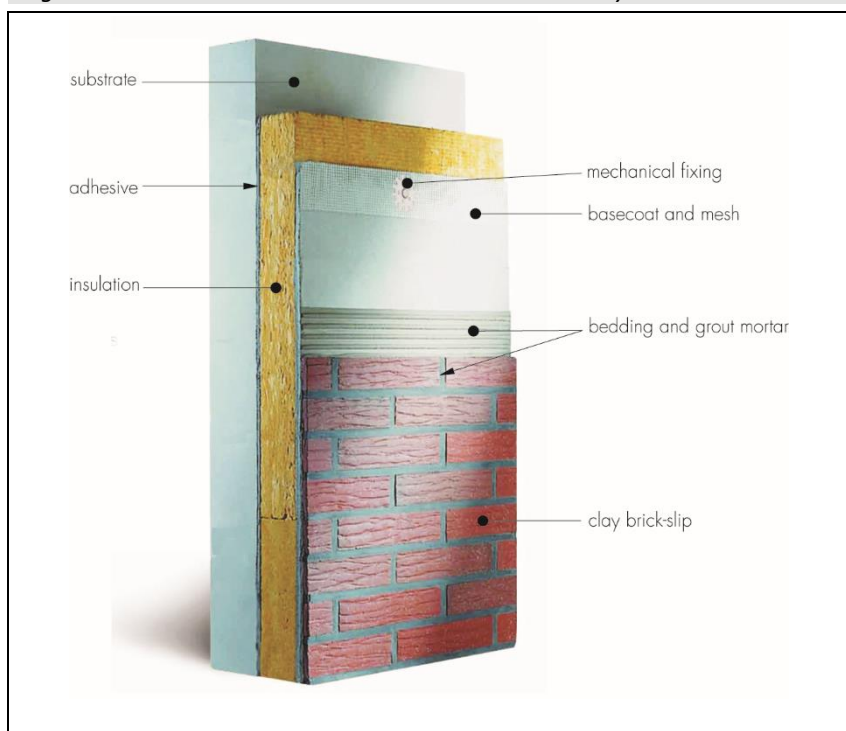
Decorative profiles

- Ceramic tiles — pre-coloured frost-resistant tiles, available in a range of sizes, from 6 to 15 mm thicknesses, in accordance with BS EN ISO 10545-12 : 1997 and manufactured to BS EN 14411 : 2012, with a coverage rate of approximately $13.6 \text{ kg}\cdot\text{m}^{-2}$ to $31.5 \text{ kg}\cdot\text{m}^{-2}$.
- Alsecco Acrylic Brick-slip Flex — pre-coloured brick slips, available in a range of sizes, from 4 to 6 mm thicknesses, with a coverage rate of approximately $3.5 \text{ kg}\cdot\text{m}^{-2}$ to $5.3 \text{ kg}\cdot\text{m}^{-2}$.
- Clay Brick-Slips — extruded or cut brick-slips, available in a range of sizes, from 6 to 15 mm thicknesses, manufactured to comply with the requirements of BS EN 771-1 : 2011, with a coverage rate of approximately $11 \text{ kg}\cdot\text{m}^{-2}$ to $28 \text{ kg}\cdot\text{m}^{-2}$.

Grout joint mortar

- Grout Joint Mortar A and AS — pre-coloured water-repellent, frost-resistant, cementitious slurry grouting mortars, manufactured to comply with the requirements of BS EN 13888 : 2009, with a coverage rate of approximately $3 \text{ kg}\cdot\text{m}^{-2}$ to $8 \text{ kg}\cdot\text{m}^{-2}$. For ceramic tiles and brick-slips only.

Figure 1 Alsecco Ecomin 400 External Wall Insulation System



1.3 Ancillary materials used with the system:

- Alsecco profiles — range of aluminium, PVC-U or stainless steel profiles, comprising:
 - base profile
 - edge profile
 - corner profile with optional PVC-U nosing
 - render stop profile
 - base profile fixings (SDK U and NK U).

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

- movement joint
- expansion joint
- Alsecco profile connectors and fixings
- Alsecco sealing tape – pre-compressed expanding polyurethane foam tape
- Alsecco acrylic-based joint sealant.

2 Manufacture

2.1 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 Alsecco (UK) Ltd has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2015 by bsi (Certificate FS 620794).

3 Delivery and site handling

3.1 The insulation is delivered wrapped in polythene. Each pack carries the product identification and batch numbers.

3.2 The other components are delivered to site in the quantities and packaging listed in Table 2. Each package carries the product identification and manufacturer's batch number.

Table 2 Component supply details

Component	Quantity and packaging
Adhesives and basecoats	25 kg paper bags
Alsecco Glassfibre Mesh K and 32	1.10 m wide rolls, 50 m length
Alsecco Panzer Mesh	1.0 m wide rolls, 25 m length
Alsecco Bedding Mortar A	25 kg paper bags
Alsecco Bonding Mortar AF	25 kg polythene tubs
Ceramic tiles	boxed by manufacturer
Acrylic brick-slips	boxed by manufacturer
Clay brick-slips	boxed by manufacturer
Grout joint mortar	25 kg paper bags

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

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

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on the Alsecco Ecomin 400 External Wall Insulation System.

Design Considerations

4 General

4.1 The Alsecco Ecomin 400 External Wall Insulation System, when installed in accordance with this Certificate, is satisfactory for use in reducing the thermal transmittance (U value) of external masonry or concrete walls of new and existing buildings. It is essential that the detailing techniques specified in this Certificate are carried out to a high standard if the ingress of water into the insulation is to be avoided and the full thermal benefit obtained from treatment with the system (eg the insulation must be protected by an overhang, and window sills should be designed and installed so as to direct water away from the building).

4.2 For improved thermal/carbon-emissions performance of the structure, the designer should consider additional/alternative fabric and/or services measures.

4.3 The system is for application to the outside of external walls of masonry, normal weight concrete, lightweight concrete, autoclaved concrete and no-fines concrete construction, on new or existing domestic and non-domestic buildings (with or without existing render). Systems with ceramic tiles and clay brick-slip finishes are suitable for use on or at any distance from the boundary and without height restrictions. Systems with an acrylic brick-slip finish can be specified without height restrictions in England, Wales and Northern Ireland, but are restricted to 18 metres in height in Scotland. Prior to the installation of the system, wall surfaces should comply with section 14 of this Certificate.

4.4 New walls subject to the 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 of this Certificate.

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

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

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

5 Practicability of installation

The system should only be installed 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 443 : 2006, using the declared thermal conductivity of the insulation (λ_D value), given in Table 3.

Table 3 Thermal conductivity of the insulation (λ_D)

Insulation types	Thicknesses (mm)	Thermal conductivity ($W \cdot m^{-1} \cdot K^{-1}$)
MW Dual Density 036	80 to 250	0.036
MW High Density 038/039	30 and 40	0.038
	60 to 200	0.039
MW Lamella 042	60 to 300	0.042
MW Slab 036	100 to 260	0.036
MW Slab Plus 038	100 to 200	0.038



6.2 The U value of a completed wall will depend on the selected insulation type and thickness, the fixing method, the insulating value of the substrate masonry and its internal finish. Calculated U values for example constructions are given in Table 4.

Table 4 Insulation thickness required to achieve U value⁽¹⁾⁽²⁾⁽³⁾ using galvanized steel fixings (30-year durability)

U-value ⁽⁴⁾ (W·m ⁻² ·K ⁻¹)	Insulation thickness (mm)							
	215 mm brickwork, $\lambda = 0.56 \text{ W} \cdot \text{m}^{-1} \cdot \text{K}^{-1}$				200 mm dense blockwork, $\lambda = 1.75 \text{ W} \cdot \text{m}^{-1} \cdot \text{K}^{-1}$			
	MWDD Slab 036 + MW Slab 036	MWHD 039	MW Lamella 042	MW Slab Plus 038	MWDD Slab 036 + MW Slab 036	MWHD 039	MW Lamella 042	MW Slab Plus 038
0.18	210	.. ⁽⁵⁾	250	.. ⁽⁵⁾	220	.. ⁽⁵⁾	260	.. ⁽⁵⁾
0.19	200	.. ⁽⁵⁾	230	.. ⁽⁵⁾	210	.. ⁽⁵⁾	240	.. ⁽⁵⁾
0.25	140	150	170	150	150	160	180	160
0.26	140	150	160	140	150	160	170	150
0.28	120	130	140	130	130	140	150	140
0.30	110	120	130	120	120	130	140	130
0.35	90	110	110	100	100	110	120	110

- (1) Wall construction inclusive of 13 mm plaster ($\lambda = 0.57 \text{ W} \cdot \text{m}^{-1} \cdot \text{K}^{-1}$), 5.5 mm render ($\lambda = 1.0 \text{ W} \cdot \text{m}^{-1} \cdot \text{K}^{-1}$). Brickwork (protected) with 17.1% mortar or dense blockwork with 6.7% mortar ($\lambda = 0.88 \text{ W} \cdot \text{m}^{-1} \cdot \text{K}^{-1}$). Mineral wool insulation λ D as per Table 3. A 5 mm thick adhesive layer ($\lambda = 0.43 \text{ W} \cdot \text{m}^{-1} \cdot \text{K}^{-1}$) covering 100% of the area is also included, together with an external render thickness of 5.5 mm ($\lambda = 1 \text{ W} \cdot \text{m}^{-1} \cdot \text{K}^{-1}$).
- (2) Calculation based on a system that included seven galvanized steel fixings per m², with an 8 mm diameter and point thermal transmittance (Xp) of 0.004 W·K⁻¹ per pin. Use of other types of fixings should be calculated in accordance with BS EN ISO 6946 : 2007.
- (3) Based upon incremental insulation thickness of 10 mm.
- (4) When applying the maximum available insulation thickness, these walls can achieve U values from 0.16 to 0.21 W·m⁻²·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 system and it is the responsibility of the company installing the system to accurately follow the installation instructions. The Certificate holder must also verify that a suitably experienced and qualified individual (with adequate professional indemnity) establishes that:

- the wind loads on the different zones of the building's elevation for the specific geographical location have been calculated correctly (see section 7.3)
- the system can adequately resist and safely transfer the calculated loads, accounting for all possible failure modes, to the substrate wall and supporting structure (see sections 7.3 to 7.6).

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

7.3 The wind loads on the walls should be calculated, taking into account all relevant factors such as location and topography, in accordance with BS EN 1991-1-4 : 2005 and its UK National Annex. All of the factors affecting wind load on each elevation and specific zones of the building must be considered. In accordance with BS EN 1990 : 2002 and its UK National Annex, a partial factor of 1.5 must be applied to the calculated characteristic wind pressure values to establish the design wind load to be resisted by the system.

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

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

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

Primary resistance mechanisms of EWIS mechanically fixed through insulation, with supplementary adhesive⁽¹⁾⁽²⁾

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

(1) For mechanically fixed systems with supplementary adhesive fixed through insulation, the contribution of the adhesive is not considered when calculating resistance to wind load.

(2) Further guidance is available from BBA Guidance Note 1, available on the BBA website (www.bbacerts.co.uk).

7.7 The characteristic bond resistance between the insulation and render interface derived from test results was $10 \text{ kN}\cdot\text{m}^{-2}$ for MWDD, $15 \text{ kN}\cdot\text{m}^{-2}$ for MWHD and $80 \text{ kN}\cdot\text{m}^{-2}$ for MW Lamella. 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 5; the values are dependent on the fixing type and must be selected to suit the specific loads and substrate concerned. In situations where suitable data does not exist⁽¹⁾, the characteristic pull-out resistance must be established from site-specific pull-out tests conducted on the substrate of the building to ascertain the minimum resistance to pull-out failure of the fixings, and determined in accordance with the guidance given in EOTA TR051 (minimum test characteristic value = $0.6 \times$ mean of 5 lowest test results). To obtain the design pull-out resistance of the fixings (N_{RD2}), this characteristic pull-out resistance should then be divided by the partial factor given in Table 5.

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

Table 5 Fixings — typical characteristic pull-out resistances

Fixing type ⁽¹⁾	ETA number	Substrate	Drill diameter (mm)	Effective anchorage depth (mm)	Characteristic pull-out resistance (kN) ⁽²⁾	Partial factor
Ejot STR U	04/0023	Concrete C12/15 Clay brickwork	8	25	1.5	2
Ejot STR U 2G	04/0023	Concrete C12/15 Clay brickwork	8	25	1.5	2
Ejot NTK U	07/0026	Concrete C12/15 Clay brickwork	8	40	0.6 0.9	2

(1) For the EJOT NTK U fixing, the minimum value for plate stiffness of fixings is $0.5 \text{ kN}\cdot\text{mm}^{-2}$ and the load resistance is 1.44 kN. For the Ejot STR U/2G fixings, the minimum value for plate stiffness of fixings is $0.6 \text{ kN}\cdot\text{mm}^{-2}$ 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 mm fixing plate or a 60 mm fixing plate with a 90 or 140 mm extended washer diameter, and minimum insulation thickness of 60, 80 or 100 mm. The design resistance per fixing (N_{RD3}) is obtained by applying an appropriate partial factor as shown in Tables 6a and 6b.

Table 6a Design pull-through resistances

Factor (unit)	MW Dual Density 036		MW High Density 039		MW Slab 036		MW Slab Plus 038	
	pull through							
Tensile resistance of the insulation (kN·m ⁻²)	10		15		10		15	
Fixing type ⁽¹⁾	Ejot NTK U Ejot STR U/2G		Ejot NTK U Ejot STR U/2G		Ejot STR U/2G		Ejot STR U/2G	
Fixing plate diameter (mm)	60 + 90 washer		60		60		60	
Insulation thickness (mm)	80		60		100		100	
Characteristic pull- through resistance ⁽²⁾ per fixing kN	Panel joints	-	Panel joints	-	Panel joints	0.212	Panel joints	0.333
	At panel	0.353	At panel	0.299	At panel	0.221	At panel	0.747
Partial factor ⁽³⁾	2.5		2.5		2.5		2.5	
Design pull-through resistance per fixing (N _{RD3}) kN	Panel joints	-	Panel joints	-	Panel joints	0.085	Panel joints	0.133
	At panel	0.141	At panel	0.120	At panel	0.089	At panel	0.299
Design pull-through resistance per slab kN (based on the minimum number of fixings) ⁽⁴⁾	0.564		0.48		0.437		1.163	
Design pull-through resistance per slab kN (based on maximum number of fixings) ⁽⁵⁾	0.705		0.96		0.7		2.06	

Table 6b Design pull-through resistances

Factor (unit)	MWDD 036 (1200 x 600 mm)		MWHD 039 (1200 x 600 mm)		MW Lamella 042 (1000 x 200 mm)	
	Static Foam Block (SFB)		Static Foam Block (SFB)		Pull through	
Tensile resistance of the insulation (kN·m ⁻²)	10		15		≥ 80	
Fixing type ⁽¹⁾	EJOT STR-U/2G		EJOT STR-U/2G		EJOT NTK U or STR-U/2G	
Fixing plate diameter (mm)	60 + 90 washer		60 + 90 washer		60 + 140 washer	
Insulation thickness (mm)	≥ 100		≥ 100		≥ 60	
Characteristic pull-through resistance ⁽²⁾ per fixing kN (Pull through data) or per unit area kN·m ⁻² (DWU)	At panel	0.428	At panel	0.655	Panel joints	
					At panel	0.437
Partial factor ⁽³⁾	2.5		2.5		2.5	
Design pull-through resistance per fixing (N _{RD3}) kN (Pull through data) or per unit area kN·m ⁻² (DWU)	At panel	0.171	At panel	0.262	Panel joints	
					At panel	0.175
Design pull-through resistance per slab kN (based on the minimum number of fixings) ⁽⁴⁾	0.68		1.048		0.35	
Design pull-through resistance per slab kN (based on maximum number of fixings) ⁽⁵⁾	0.85		1.31		0.35	

(1) See Table 5 for typical characteristic pull-out resistance of the fixings.

(2) Characteristic pull-through resistance of insulation over the head of the fixing, in accordance with BS EN 1990 : 2002, Annex D7.2 and its UK National Annex.

(3) The partial factor is based on the assumption that all insulation slabs are quality controlled and tested to establish tensile strength perpendicular to the face of the slab.

(4) The minimum design pull through resistance per slab is based on a minimum of 5 fixings per slab when the system is fixed through panel joints and also through the panel which equates to approximately 7 fixings per m^2 ; a minimum of 4 fixings per slab *when the system is fixed through the panel only* which equates to approximately 5.5 fixings per m^2 ; and a minimum of 2 fixings per lamella slab *when the system is fixed through the panel only* which equates to approximately 10 fixings per m^2 . The design resistance for the minimum number of fixings is based on the fixing pattern shown in Figures 6a to 6c and minimum insulation thickness specified in Tables 6a and 6b. 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 5 fixings per slab for fixings with a 90 mm fixing plate diameter, which equates to approximately 7 fixings per m^2 ; a maximum of 8 fixings per slab for fixings with a 60 mm fixing plate diameter, which equates to approximately 11 fixings per m^2 ; and 2 fixings per lamella slab, which equates to approximately 10 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 Tables 6a and 6b. The fixing pattern, insulation thickness and interaction of the fixings should be considered when calculating the design resistance per slab.

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:

$$R_d \geq W_e$$

$$R_{d,b,ins/rend} = A_r * N_{RD1}$$

$$R_{d,pull-out} = n * N_{RD2}$$

$$R_{d,pull-through} = (N_{RD3,panel} * n_{panel}) + (N_{RD3,joint} * n_{joint}) / A_{slab}$$

Where:

R_d is the design ultimate resistance ($\text{kN}\cdot\text{m}^{-2}$) taken as the minimum of $R_{d,b,ins/rend}$, $R_{d,pull-out}$ and $R_{d,pull-through}$

W_e is the maximum design wind load ($\text{kN}\cdot\text{m}^{-2}$)

$R_{d,b,ins/rend}$ is the design bond resistance between the insulation and render ($\text{kN}\cdot\text{m}^{-2}$)

$R_{d\text{pull-out}}$ is the design pull-out resistance of the insulation fixings per metre square ($\text{kN}\cdot\text{m}^{-2}$)
 $R_{d\text{pull-through}}$ is the design pull-through resistance of the insulation fixings per metre square ($\text{kN}\cdot\text{m}^{-2}$)
 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 ($\text{kN}\cdot\text{m}^{-2}$)
 n is the number of anchor fixings per m^2
 N_{RD2} is the design pull-out resistance per fixing based on test (kN)
 $N_{RD3\text{panel}}$ is the design pull-through resistance per anchor not placed at the panel joint, based on test (kN)
 $N_{RD3\text{joint}}$ 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 insulation system is mechanically fixed to the substrate wall with a minimum of 5 fixings per slab when the system is fixed through panel joints and also through the panel which equates to approximately 7 fixings per m^2 ; a minimum of 4 fixings per slab when the system is fixed through the panel only which equates to approximately 5.5 fixings per m^2 ; and a minimum of 2 fixings per lamella slab when the system is fixed through the panel only which equates to approximately 10 fixings per m^2 , as per the fixing pattern shown in Figures 6a to 6c, and in conjunction with a minimum 50% 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.

Primary resistance mechanisms of EWIS mechanically fixed with supplementary adhesive through mesh/insulation via⁽¹⁾⁽²⁾

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

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

7.13 The DWU test was carried out on Alsecco Ecomin 400 External Wall Insulation System, mechanically fixed onto a masonry substrate. Mineral wool insulation slabs of 60 mm thickness were initially fixed with the insulation adhesive (100% coverage), followed by 8.3 fixings per m^2 (EJOT STR-U 2G⁽⁵⁾ fixings with a 60 mm fixing plate diameter) applied through the reinforced basecoat/insulation before the render finish was applied. The maximum characteristic negative wind load resistance that can be sustained by the Alsecco Ecomin 400 system as determined from the DWU test is $4.95 \text{ kN}\cdot\text{m}^{-2}$. The maximum design wind load resistance ($R_{d\text{Test}}$) is derived by dividing the maximum characteristic wind load resistance by a partial safety factor of 1.5, which equals $3.3 \text{ kN}\cdot\text{m}^{-2(1)(2)(3)(4)}$.

- (1) The maximum design wind load that can be resisted by the system corresponds to the maximum allowed spacing, centres and layout of fixings. This fixing configuration with the appropriate fixings will also adequately transfer the systems self-weight, wind and impact loads to a suitable substrate wall.
- (2) Coverage area of supplementary adhesive is 100%
- (3) The partial factor for DWU is based on the mode of failure obtained in the test.
- (4) The design resistance is determined by dividing the characteristic resistance value obtained from a DWU test by a partial safety factor of 1.5. The characteristic resistance value obtained from a DWU test was $4.95 \text{ kN}\cdot\text{m}^{-2}$.
- (5) Alternative fixings may be used provided they can be demonstrated to have equal or higher fixing plate diameter, plate stiffness and load resistance characteristics than the tested EJOT STR-U 2G fixing.

7.14 The data derived from sections 7.8 and 7.13 must be assessed against the design wind load, and the following expressions must be satisfied:

For safe design:

$$R_{d\text{Test}} \geq W_e \text{ and } n_{RD2} \geq W_e$$

where

$R_{d\text{Test}}$ is the design negative wind load resistance of the system based on test ($\text{kN}\cdot\text{m}^{-2}$)
 W_e is the maximum applied design wind load ($\text{kN}\cdot\text{m}^{-2}$)
 n_{RD2} is the design pull-out resistance of the system is based on characteristic values from site tests and the number of fixings per unit area must be $\geq$ as tested in DWU test ($\text{kN}\cdot\text{m}^{-2}$)

7.15 The insulation system is mechanically fixed through mesh/insulation to the substrate wall with a minimum of 8.3 fixings per square metre, as per the fixing pattern shown in Figure 7, and in conjunction with 100% coverage of supplementary adhesive (see section 16 of this Certificate). The design wind load resistance is only applicable to the system tested and as described in 7.13. No enhancement to the wind load resistance may be gained by the addition of fixings; however, additional fixings may be required depending on the design and installation conditions.

Impact resistance

7.16 Hard body impact tests were carried out in accordance with ETAG 004 : 2013. The system is suitable for Use Categories I to III⁽¹⁾.

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

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

8 Behaviour in relation to fire



8.1 The reaction to fire classifications for the system in accordance with BS EN 13501-1 : 2007 are shown in Table 7 below.

8.2 These classifications apply to the full range of insulation thicknesses and finishes covered by this Certificate.

8.3 The mineral wool insulation materials in isolation are classified as non-combustible.

Table 7 Reaction to fire classification

Systems: Basecoat + finishing indicated	Classification
Ceramic tiles and clay brick-slip finish system	A2-s1, d0
Acrylic brick-slip finish system	B-s2, d0

System with a A2-s1, d0 reaction to fire classification



8.4 The system is considered suitable for use on or at any distance from the boundary and there is no height restriction on its use.

System with a B-s2, d0 reaction to fire classification



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



8.6 The system is considered suitable for use in buildings without height restriction.



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

8.8 For domestic buildings in Scotland, the use of the system is restricted to buildings up to 18 metres in height.

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

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

9 Proximity of flues and appliances

Where a 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. Care should be taken to ensure that walls are adequately weathertight prior to application of the system. The insulation system must only be installed where there are no signs of dampness on the inner surface of the substrate other than those caused solely by condensation.

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

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

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

11 Risk of condensation



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

Surface condensation



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



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 4, and BRE Report 262 : 2002.

Interstitial condensation



11.4 Walls incorporating the system will adequately limit the risk of interstitial condensation when they are designed and constructed in accordance with BS 5250 : 2011, section 4 and Annexes D and G.

11.5 The water vapour resistance (μ) factor (for the insulation slabs) and equivalent air layer thickness (s_d) (for the render systems) is shown in Table 8 of this Certificate.

Table 8 Water vapour resistance factor and equivalent air layer thickness

Layer	Thickness (mm)	Water vapour resistance (μ)	Equivalent air layer thickness s_d (m)
MWDD, MWHD and MW Lamella	60 to 300	1 ⁽¹⁾	—
Basecoats as indicated below:			
Armatop A	>4	10	—
Armatop MP	>4	75	—
Armatop AKS	>4	7.5	—
Finishing coats (values quoted are for individual components, with exception of Acrylic Brick Slip Flex):			
Acrylic Brick Slip Flex (value quoted is for the composite system)	4 ⁽²⁾	—	0.45 ⁽²⁾
Bedding mortar A ⁽³⁾	4	7	—
Brick Slips	—	5 to 20	—
Ceramic Tiles	6 to 15	— ⁽⁴⁾	— ⁽⁴⁾
Joint Mortar A	—	35	—

(1) This value is taken from BS EN ISO 10456 : 2006.

(2) Brick Slip Flex in Bonding Mortar AF.

(3) For brick slips and ceramic tiles.

(4) To be determined for each case.

11.6 The area of the individual ceramic tiles or brick-slips must not exceed 0.09 m² and the lengths of the sides must not exceed 0.30 m, with a minimum and maximum thickness of 6 mm and 15 mm.

11.7 If the joints make up $\leq 6\%$ of the area as a whole, evidence must be provided of long-term freedom from condensation with the aid of a calculation method that records transient heat and moisture transfer in accordance with BS EN ISO 13788 : 2012. The water absorption of the ceramic tiles and brick-slips must not exceed 3.0% in accordance with BS EN ISO 10545-3 : 1997.

12 Maintenance and repair



12.1 An initial inspection should be made within 12 months and regularly thereafter to include:

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



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 of this Certificate.

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 any repairs necessary to the building structure before application of a 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.

14.2 The survey should include tests conducted on the walls of the building by the Certificate holder or their approved installers 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 and pull-out resistance (see section 7).

14.3 All necessary repairs to the building structure must be completed before installation of the system commences.

14.4 Surfaces should be sound, clean and free from loose material. The flatness of surfaces must be checked; this may be achieved using a straight-edge spanning the storey height. Any excessive irregularities, ie greater than 20 mm, 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 sills must be fitted to extend beyond the finished face of the system. New buildings should incorporate suitably deep sills.

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

15 Approved installers

Application of the system, within the context of this Certificate, must be carried out by installers approved by the Certificate holder. A Certificate holder approved installer is a company:

- employing operatives who have been trained and approved by the Certificate holder to install the system and has operatives who, upon completion of their training, have been issued with an appropriate identification card by the Certificate holder
- 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 Application is carried out in accordance with the Certificate holder's current installation instructions and this Certificate.

16.2 Weather conditions should be monitored to ensure correct application and curing conditions. Application of coating materials must not be carried out at temperatures below 5°C or above 30°C, or if exposure to frost is likely, and the coating must be protected from rapid drying.

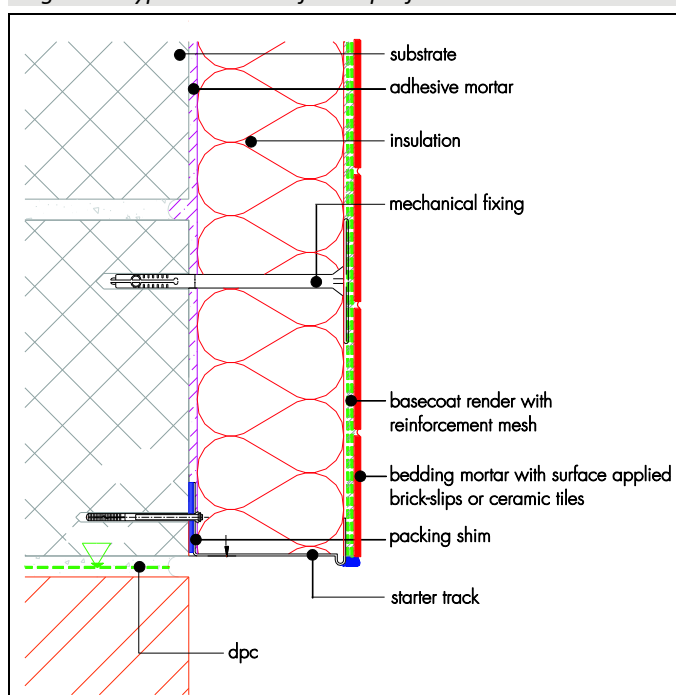
16.3 All rendering should be in accordance with the relevant recommendations of BS EN 13914-1 : 2005.

16.4 The initial installation procedure is common to both systems (see section 1.1).

Positioning and securing insulation slabs

16.5 The base profile is secured to the external wall above the dpc using the approved profile fixings at approximately 500 mm centres (see Figure 2). Base rail connectors are inserted at all rail joints. Extension profiles are fixed to the front lip of the base rail or stop end channel where appropriate.

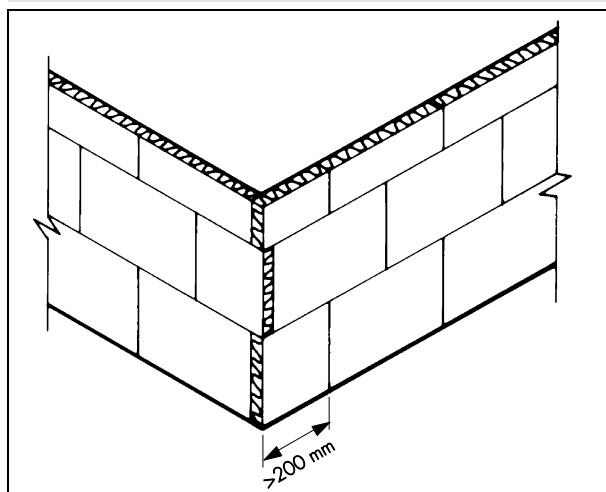
Figure 2 Typical section of base profile



16.6 The supplementary adhesive is prepared by mixing each bag or tub with 4.5 or 5.5 litres of water (see section 1.3). The adhesive is applied in a continuous line around the perimeter of the slab with six additional dabs of adhesive distributed uniformly over the remaining surface — at least 50% of the slab should be covered. Alternatively, the adhesive can be applied over the entire face of the insulation slab using a notched trowel. Supplementary adhesive coverage must be 100% when mechanical fixings are applied through the reinforced basecoat and the insulation slab.

16.7 The first run of insulation slabs is positioned on the base profile with the adhesive applied. The slabs must be pressed firmly against the wall and butted tightly together with the vertical joints staggered by at least 200 mm (see Figure 3). Joints between slabs greater than 2 mm should be filled with slivers of insulation slab or expanding polyurethane foam. Gaps greater than 10 mm should be closed by repositioning or, where appropriate, by cutting slabs to fit. Alignment should be checked as work proceeds.

Figure 3 Typical arrangement of insulation slabs



16.8 When required, at least one fixing per slab should be installed to maintain the insulation slab's position while the adhesive sets.

16.9 To fit around details such as doors and windows, insulation slabs may be cut with a sharp knife or a fine-toothed saw. If required, purpose-made window sills, designed to prevent water ingress and incorporating drips to shed water clear of the system, are fitted at this stage.

16.10 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.

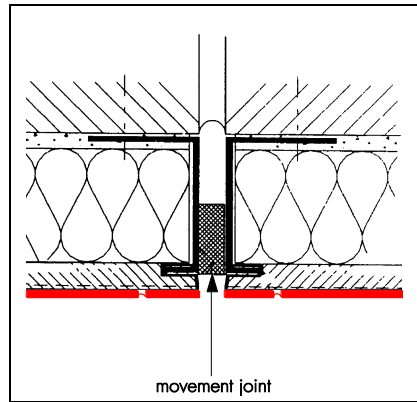
16.11 Installation continues until the whole wall is completely covered including, where appropriate, the building soffits.

16.12 Window and door reveals should be insulated to minimise the effects of cold bridging. Where clearance is limited, strips of approved insulation should be installed to suit available margins and details.

Movement joints

16.13 Generally, movement joints are not required in the systems but, if such a joint is already incorporated in the substrate, a movement joint must be included with the system (see Figure 4).

Figure 4 Vertical movement joint

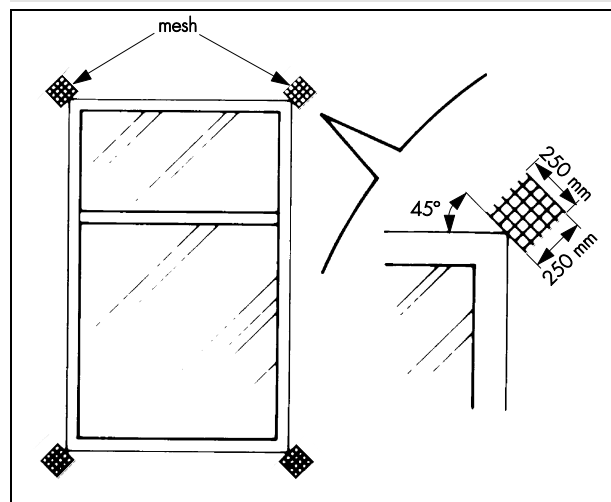


16.14 For the ceramic and brick-slip systems, any large continuous areas should be divided by means of vertical joints.

16.15 Prior to the application of the basecoat render, a bead of joint sealant is gun-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, gun-applied joint sealants or the use of proprietary sealing beads can be used in accordance with the Certificate holder's instructions.

16.16 Pieces of reinforcing mesh (approximate size 250 by 250 mm) should be used diagonally at the corners of windows and doors and other building openings so that they extend equally either side of the corner (see Figure 5).

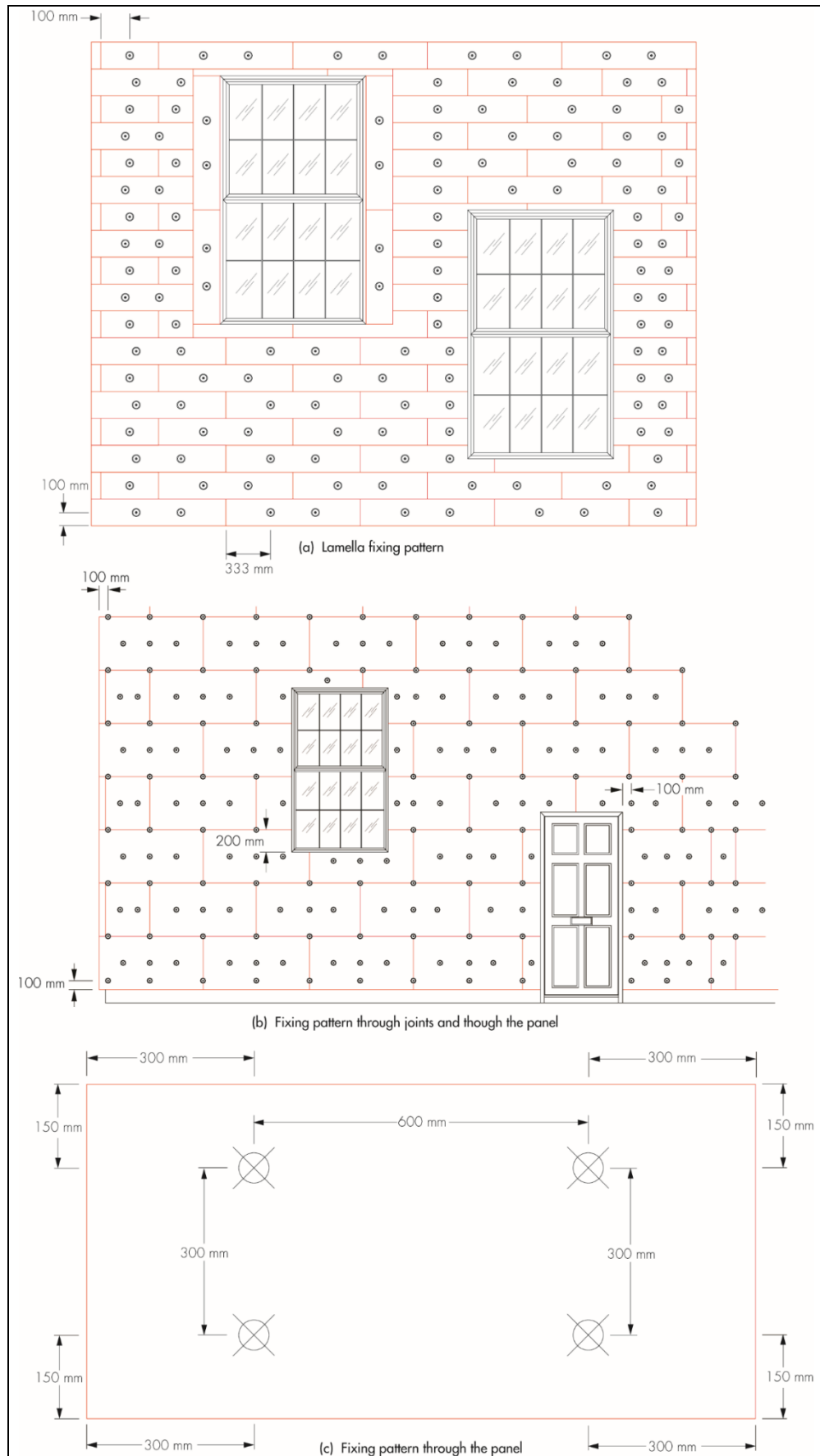
Figure 5 Additional reinforcement at openings



Mechanical fixings through the insulation slabs (for acrylic brick slip system)

16.17 After the slabs are adhesively fixed to the substrate, holes are drilled into the substrate through the insulation slabs to a specified minimum depth. Mechanical fixings are applied through each slab to equate to a minimum 10, 7 and 5.5 fixings per m² (see Figures 6a to 6c respectively). Additional fixings are applied at the corners of the building.

Figure 6 *Insulation slab fixing pattern through the insulation*



16.18 The basecoat is prepared with the required amount of clean water (see section 1.2), then applied over the insulation slabs using a stainless steel trowel, and floated with a Darby float to a thickness of between 3 and 10 mm. The reinforcement mesh is immediately applied and embedded into the basecoat by trowelling from the centre to the edge, overlapping at all mesh joints by at least 100 mm. An additional coat of basecoat is applied (while the first coat is still wet) to ensure the mesh is free of wrinkles and to achieve an approximate overall thickness of 4 mm for Armatop MP and AKS, and 4 to 10 mm for Armatop A. The basecoat is applied progressively, working in one-metre sections in a vertical or horizontal direction. It must be allowed to cure for 48 hours before applying the Bonding Mortar AF.

Mechanical fixings through the mesh slabs (for any system type)

16.19 After the insulation adhesive has set (100% adhesive coverage), the system is ready for the application of basecoat and reinforcing mesh.

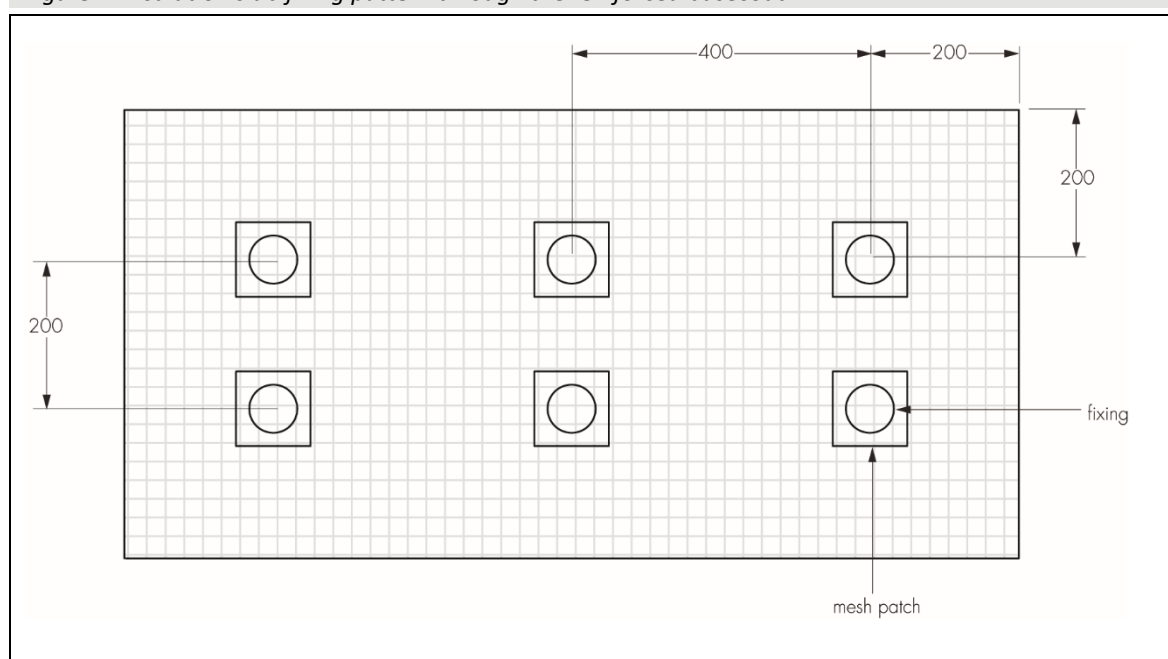
16.20 The basecoat is trowel applied to the surface of the insulation to a thickness of approximately 5 mm.

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

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

16.23 While the basecoat is still wet, holes are drilled through the reinforcement mesh and insulation slabs into the substrate wall to the required depth at the specified frequency and pattern, but not less than 8.3 fixings per square metre. Around openings, additional fixings should be used at 300 mm centres. The mechanical fixings are tapped or screwed firmly into place, securing the mesh and insulation slabs to the substrate wall. See Figure 7.

Figure 7 Insulation slab fixing pattern through the reinforced basecoat



16.24 The fixings are slightly overdriven into the substrate in order to allow the fixing plate to partially penetrate through the basecoat.

16.25 While the basecoat is still wet, 100 by 100 mm stress patches of reinforcing mesh are applied over the head of the fixings and fully embedded with the basecoat. Further basecoat is then applied to maintain a minimum of approximately 3 to 4 mm thickness when measured from the top of the fixing head.

16.26 The basecoat is applied progressively, working in one-metre sections in a vertical or horizontal direction.

16.27 Stop beads are positioned vertically, eg at party wall positions where the adjoining house does not require treatment. Where required, angle beads are fixed to all building corners and to door and window heads and jambs.

16.28 Once the application of the basecoat is completed, the basecoat (with the embedded mesh) is left to dry. The drying time will depend upon the weather conditions, but a minimum of 48 hours should elapse before the finishes are applied.

Finish coats

16.29 The ceramic tiles or brick-slips must be attached to the hardened reinforced layer of basecoat using the Bedding Mortar A, which is applied with a trowel and combed through in a horizontal direction to create a rigid bed.

16.30 The tiles or brick-slips are then installed using the buttering-floating method, which involves applying the bedding mortar to the tiles and substrate, then gently sliding the tile or brick-slip into position, leaving a joint width in between (as required), before being firmly pressed into position.

16.31 For application of the acrylic brick-slips, a trowel should be used to apply the Bonding Mortar AF to the Basecoat, and a notched trowel (4 by 6 mm or 5 by 5 mm) used to comb through the adhesive to create a ridged bed. The Brick-slip Flex should be placed on top of the open adhesive, leaving a joint width in between and pressed into position. A damp brush can be used to smooth the adhesive over the area of the joint before the adhesive has set.

16.32 The drying time is dependent on conditions, but will typically be four days. Once dry, the ceramic tiles and brick-slips are grouted using Joint Mortar AS and Joint Mortar A, in accordance with the Certificate holder's instructions.

16.33 At the tops of walls, the system should be protected by an adequate overhang (see Figure 8) or by an adequately sealed purpose-made flashing. Care should be taken in the detailing of the system around openings and projections (see Figures 9 and 11).

Figure 8 Roof eaves details

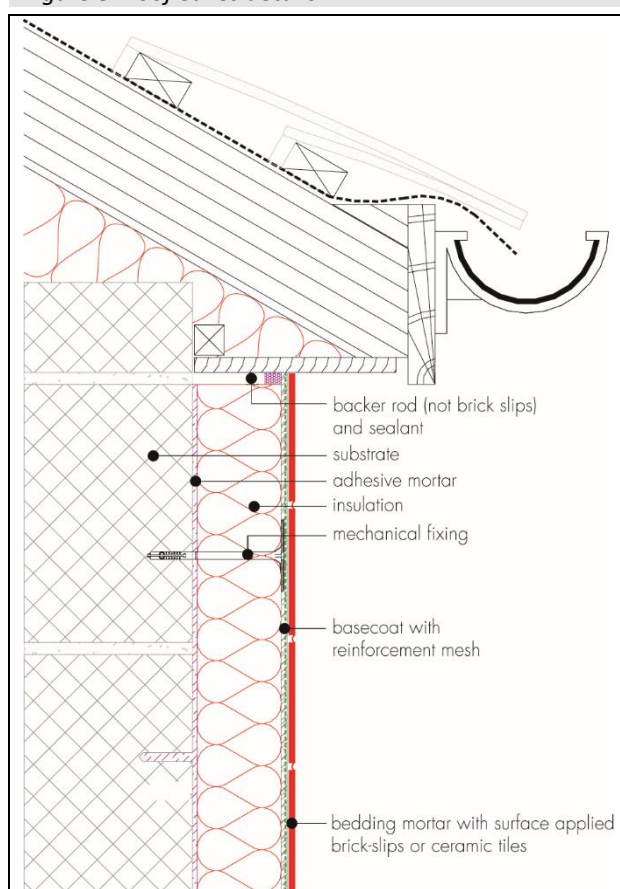


Figure 9 Insulated window detail

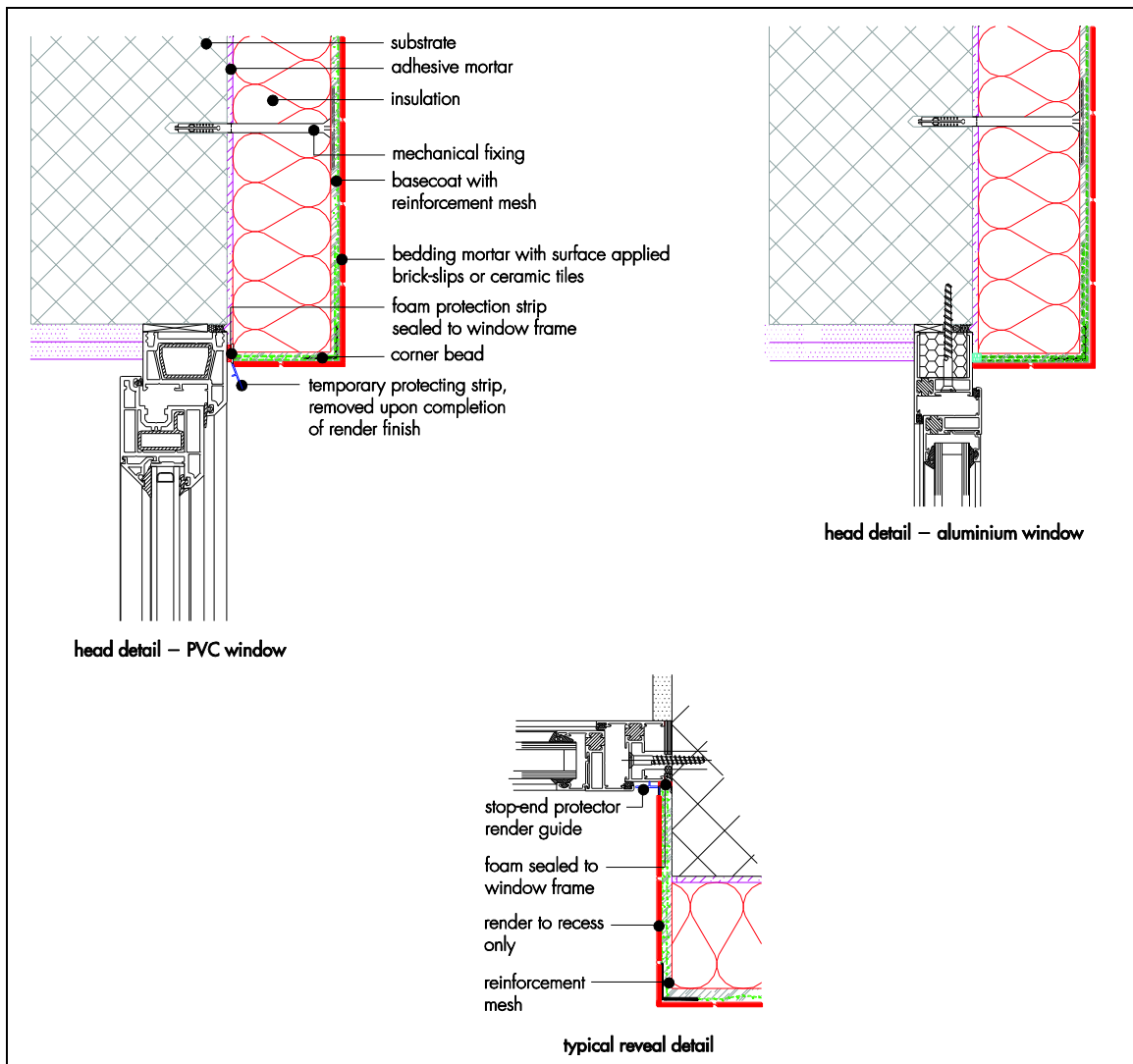


Figure 10 External corner detail

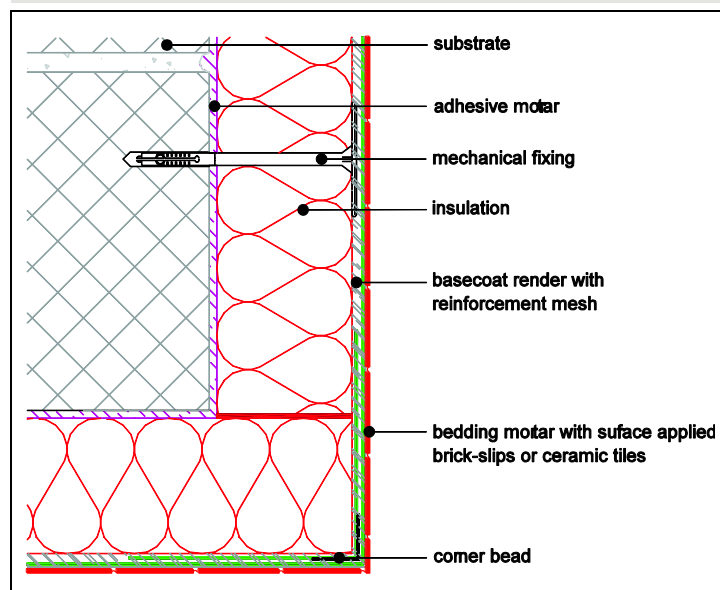
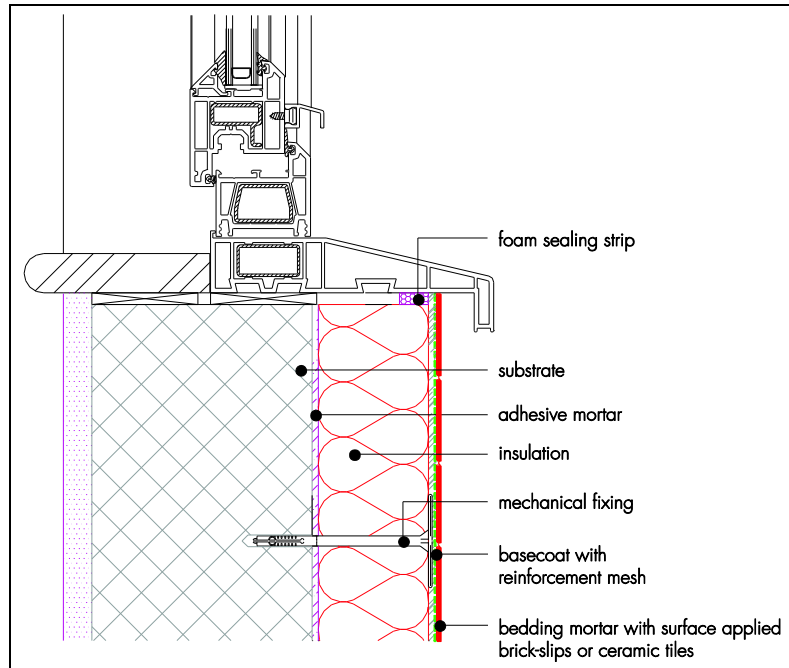


Figure 11 Window sill detail



Technical Investigations

17 Test

17.1 Results of tests were assessed to determine:

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

17.2 An examination was made of data relating to:

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

18 Investigations

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

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

- BS 5250 : 2011 + A1 : 2016 *Code of practice for control of condensation in buildings*
- BS 8000-0 : 2014 *Workmanship on construction sites – Introduction and general principles*
- BS 8000-2 : 1990 *Workmanship on building sites – Codes 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 197-1 : 2011 *Cement — Composition, specifications and conformity criteria for common cements*
- BS EN 1990 : 2002 + A1 : 2005 *Eurocode — Basis of structural design*
- BS EN 1991-1-4 : 2005 + A1 : 2010 *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*
- BS EN 1996-1-1 : 2005 + A1 : 2012 *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*
- BS EN 12004 : 2007 + A1 : 2012 *Adhesives for tiles – Requirements, evaluation of conformity, classification and designation*
- BS EN 13139 : 2002 *Aggregates for mortar*
- BS EN 13162 : 2001 *Thermal insulation products for buildings – Factory made mineral wool (MW) products - Specification*
- BS EN 13501-1 : 2007 + A1 : 2009 *Fire classification of construction products and building elements — Classification using test data from reaction to fire tests*
- BS EN 13888 : 2009 *Grout for tiles – Requirements, evaluation of conformity, classification and designation*
- 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*
- BS EN ISO 10456 : 2007 *Building materials and product — Hygrothermal properties — Tabulated design values and procedures for determining declared and design thermal values*
- BS EN ISO 10545-3 : 1997 *Ceramic tiles – Determination of water absorption, apparent porosity, apparent relative density and bulk density*
- BS EN ISO 13788 : 2012 *Hygrothermal performance of building components and building elements – Internal surface temperature to avoid critical surface humidity and interstitial condensation – Calculation methods*
- ETAG 004 : 2013 *Guideline for European Technical Approval of External Thermal Insulation Composite Systems with Rendering*
- BRE Report 135 (BR 135 : 2013) *Fire performance of external thermal insulation for walls of multistorey buildings*
- BRE Report 262 (BR 262 : 2002) *Thermal insulation: avoiding risks*
- BRE Report 443 (BR 443 : 2006) *Conventions for U-value calculations*

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.