I.V.A.S Industria Vernici S.p.A
Via Bellaria, 40
I-47030
San Mauro Pascoli (FC)
Italy
Tel: 01189 635 900 Fax: 01189 635 901
e-mail: enquiries@gruppoivas.co.uk
website: www.gruppoivas.com

BBA APPROVAL INSPECTION TESTING CERTIFICATION
TECHNICAL APPROVALS FOR CONSTRUCTION

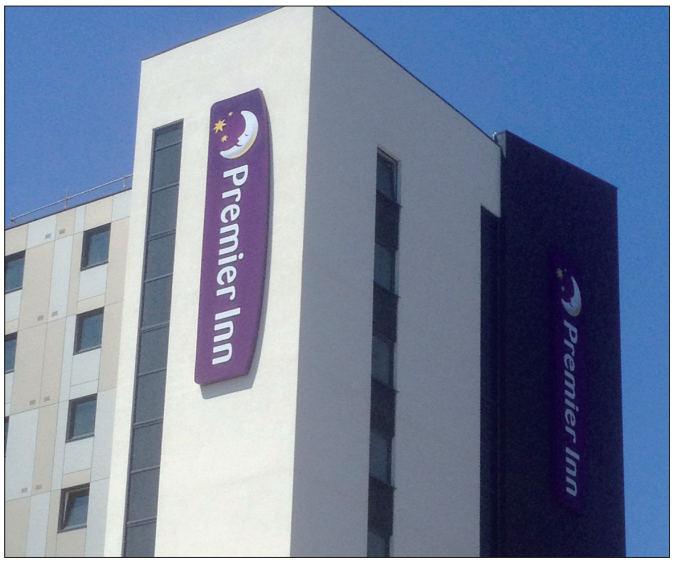
Agrément Certificate
11/4841
Product Sheet 7

TERMOK8 EXTERNAL WALL INSULATION SYSTEMS

TERMOK8 MECCANICO RAIL (M) EXTERNAL WALL INSULATION SYSTEM

This Agrément Certificate Product Sheet[1] relates to TermoK8 Meccanico Rail (M) External Wall Insulation System, comprising an aluminium or PVC rail system mechanically fixed to a masonry structure thus creating a cavity, with expanded polystyrene (EPS) insulation boards, glassfibre-reinforced basecoat 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 can contribute to satisfying the national Building Regulations (see section 6).

Strength and stability — correctly designed systems will have resistance to some wind loads and, in certain applications, impact damage (see section 7).

Behaviour in relation to fire — the system has a B-s2, d0 reaction to fire classification in accordance with BS EN 13501-1 : 2007 and has met the criteria set in BR 135 : 2013, Annex A (see section 8).

Risk of condensation — the system can contribute to limiting the risk of surface and interstitial 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 First issue: 28 November 2014

Brian Chamberlain
Head of Approvals — Engineering

Claire Curtis-Thomas
Chief Executive

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

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

British Board of Agrément
Bucknalls Lane
Watford
Herts WD25 9BA
tel: 01923 665300
fax: 01923 665301
e-mail: clientservices@bba.star.co.uk
website: www.bbacerts.co.uk
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Regulations

In the opinion of the BBA, TermoK8 Meccanico Rail (M) External Wall Insulation System, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements of the following Building Regulations (the presence of a UK map indicates that the subject is related to the Building Regulations in the region or regions of the UK depicted):

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

Requirement:	A1	Loading
Comment:		The system can sustain and transmit wind loads to the substrate wall. See section 7.4 of this Certificate.
Requirement:	B4(1)	External fire spread
Comment:		The system can satisfy or contribute to satisfying this Requirement. See sections 8.1 to 8.3 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 surface and interstitial 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 *Installation* part of this Certificate.
Regulation:	26	Minimum energy performance requirements for new buildings
Regulation:	26A	Fabric energy efficiency rates for new dwellings (applicable to England only)
Regulation:	26A	Primary energy consumption rates for new buildings (applicable to Wales only)
Regulation:	26B	Fabric performance values for new dwellings (applicable to Wales only)
Comment:		The system can contribute to satisfying these Regulations. See sections 6.2 and 6.3 of this Certificate.

The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)(2)	Durability, workmanship and fitness of materials
Comment:		The system can contribute to a construction satisfying this Regulation. See sections 12 and 13.1 and the *Installation* part of this Certificate.
Regulation:	9	Building standards applicable to construction
Standard:	1.1	Structure
Comment:		The system can sustain and transmit wind loads to the substrate wall. See section 7.4 of this Certificate.
Standard:	2.6	Spread to neighbouring buildings
Comment:		The system is regarded as 'low risk' and therefore can meet this Standard, with reference to clauses 2.6.4(1)(2), 2.6.5(2) and 2.6.6(2). See sections 8.1 to 8.3 of this Certificate.
Standard:	2.7	Spread on external walls
Comment:		The system can meet the requirements of this Standard, with reference to clauses 2.7.1(1)(2) and 2.7.2(2). See sections 8.1 to 8.3 of this Certificate
Standard:	3.10	Precipitation
Comment:		The system can satisfy this Standard, with reference to clauses 3.10.1(1)(2) and 3.10.6(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), 3.15.4(1) and 3.15.5(1). See sections 11.3 and 11.4 of this Certificate.
Standard:	6.1(b)	Carbon dioxide emissions
Standard:	6.2	Building insulation envelope
Comment:		The system can contribute to satisfying these Standards, with reference to clauses (or parts of) 6.1.1(1), 6.1.2(1)(2), 6.1.3(2), 6.1.5(2), 6.1.6(1), 6.2.1(1), 6.2.3(1), 6.2.4(1), 6.2.5(1)(2) and 6.2.10(2). See sections 6.2 to 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 a bronze level of sustainability as defined in this Standard. In addition, the system can contribute to a construction meeting a higher level of sustainability as defined in this Standard, with reference to clauses 7.1.4(1)(2) [Aspects 1(1)(2) and 2(1)], 7.1.6(1)(2) [Aspects 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 *Installation* part of this Certificate.
Regulation:	28	Resistance to moisture and weather
Comment:		The system provide 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 condensation. See section 11.4 of this Certificate.
Regulation:	30	Stability
Comment:		The system can sustain and transmit wind loads to the substrate wall. See section 7.4 of this Certificate.
Regulation:	36(a)	External fire spread
Comment:		The system has a low risk surface and can satisfy this Regulation. See sections 8.1 to 8.3 of this Certificate.
Regulation:	39	Conservation measures
Regulation:	40	Target carbon dioxide emission rate
Comment:		The system will contribute to a building satisfying its target emission rate. 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* (3.1) of this Certificate.

Additional Information

NHBC Standards 2014

NHBC accepts the use of the TermoK8 Meccanico Rail (M) Wall Insulation System, provided it is installed, used and maintained in accordance with this Certificate, in relation to *NHBC Standards*, Chapters 6.9 *Curtain walling and cladding*.

Technical Specification

1 Description

1.1 TermoK8 Meccanico Rail (M) External Wall Insulation System comprises grooved insulation boards which slot into aluminium or PVC intermediate horizontal rails that are mechanically fixed to a masonry substrate. The system has a reinforced render finish. The horizontal rail profiles are secured to the substrate wall through shims that create a minimum 20 mm wide cavity between the sheathing and the insulation. Basecoat render is trowel-applied to the board face in two layers; the first layer includes the embedded mesh, to an approximate thickness of 3 mm. A second layer is applied to a 3 mm thickness, to achieve an overall thickness of at least 6 mm. When dry, the decorative finish coat is applied to a required thickness.

1.2 The systems are made up of the following components:

Mechanical fixings

- Mechanical fixings[1] — a range of fixings, with an anchorage depth of a least 25 mm, approved and supplied by the Certificate holder and selected from (also see section 7):
- Ejot self-tapping screws — zinc coated high quality grade carbon steel fixing, with 6.30 mm fastener and 8 mm hex-drive system diameter, with 25 mm and 30 mm lengths. Used for fixing the starter track profiles to the masonry substrate
- Ejot SDK U hammer-in anchors — steel fixing, with 8 mm anchor and 16 mm collar diameters with 45 mm to 85 mm lengths. Used for fixing the starter track and intermediate rail profiles to the masonry substrate
- Ejot SDK U screw-in anchors — steel fixing, with 8 mm anchor and 16 mm collar diameters with 45 mm to 105 mm lengths. Used for fixing the starter track and intermediate rail profiles to the masonry substrate.

(1) Other fixings with similar or better characteristics (see Table 5) approved by the Certificate holder can be used.

Rail support system

- starter track rail profile — aluminium alloy, 2500 mm in length, with perforation holes for drainage, and to support the boards to the masonry structure. Fixed using self-tapping screws at 300 mm centres
- OR/LT intermediate horizontal rail profiles — aluminium alloy or PVC rails (2000 mm and 2500 mm in length respectively, by 2 mm thickness) for anchoring the boards to the masonry substrate. Fixed using self-tapping screws at 600 mm centres

- TK8 firebreak rails — stainless steel rails (2000 mm and 2500 mm in length, by 2 mm thickness) for anchoring the boards to the framework. Fixed to the sheathed steel frame using self-tapping screws at 600 mm centres
- VR/T vertical T spline profiles — aluminium alloy or PVC T sections (495 mm and 470 mm lengths respectively), by 2 mm thickness. Fitted into the grooves of insulation boards to support the edges
- Packing shims (cavity spacers) — PVC packers, from 15 to 20 mm thick, to maintain the 20 mm drainage cavity width.

Insulation

- grey/white expanded polystyrene (EPS 70E) insulation boards — 500 mm by 500 mm boards in a range of thicknesses from 60 mm to 200 mm. The boards have a nominal density of 15 $kg \cdot m^{-3}$, a minimum compressive strength of 70 $kN \cdot m^{-2}$ and a tensile strength perpendicular the faces of 100 kPa. Boards are manufactured to comply with the requirements of Class E material and BS EN 13163 : 2012. Each board has a 40 mm deep by 2 mm wide groove cut into all four edges which acts as a recess for the intermediate horizontal rail profiles. For the insulation thermal conductivity, see section 6.

Fire break

- mineral wool (MW) lamella — mineral fibre boards, in sizes of 500 mm by 600 mm and 600 mm by 600 mm and in thicknesses from 40 mm to 200 mm. The boards have a nominal density of 85 $kg \cdot m^{-3}$, a minimum compressive strength of 40 $kN \cdot m^{-2}$ and a tensile strength perpendicular to the faces of 80 $kN \cdot m^{-2}$. Boards are manufactured to comply with the requirements of BS EN 13162 : 2012. This insulation is only used as a fire break, and has a thermal conductivity of 0.042 ($W \cdot m^{-1} \cdot K^{-1}$).

Basecoat

- Klebocem and Klebocem Minerale basecoat — grey or white cement-based mortar render, supplied as a 25 kg bag and mixed with approximately 24% water by volume to form a paste. Available in 0.6 mm particle size and applied to a minimum thickness of 6 mm.

Reinforcement

- Armatex C1 — a 3 mm thick a woven alkali-resistant glassfibre reinforcement mesh, cell size approximately 3.0 mm by 3.5 mm, with a polymer coating and a nominal weight of 160 $g \cdot m^{-2}$.

Finish

- TermoK8 Rivatone Plus — acrylic resin-based granular paste, applied to a thickness of 1.5 mm to 3 mm, and available in different colours
- TermoK8 Rivatone Idrosiliconico Plus — silicone resin-based paste, applied to a thickness of 1.2 mm to 3 mm, and available in different colours.

1.3 Ancillary items supplied with the system but outside the scope of this Certificate:

- drainage and ventilated starter track profiles to suit each insulation thickness
- stop beads and expansion joints
- water drainage deflection channels (for deflecting water around openings)
- insect mesh
- Thermo–expanding gasket fire strip
- cavity fire stops – intumescent strips
- sealant.

2 Manufacture

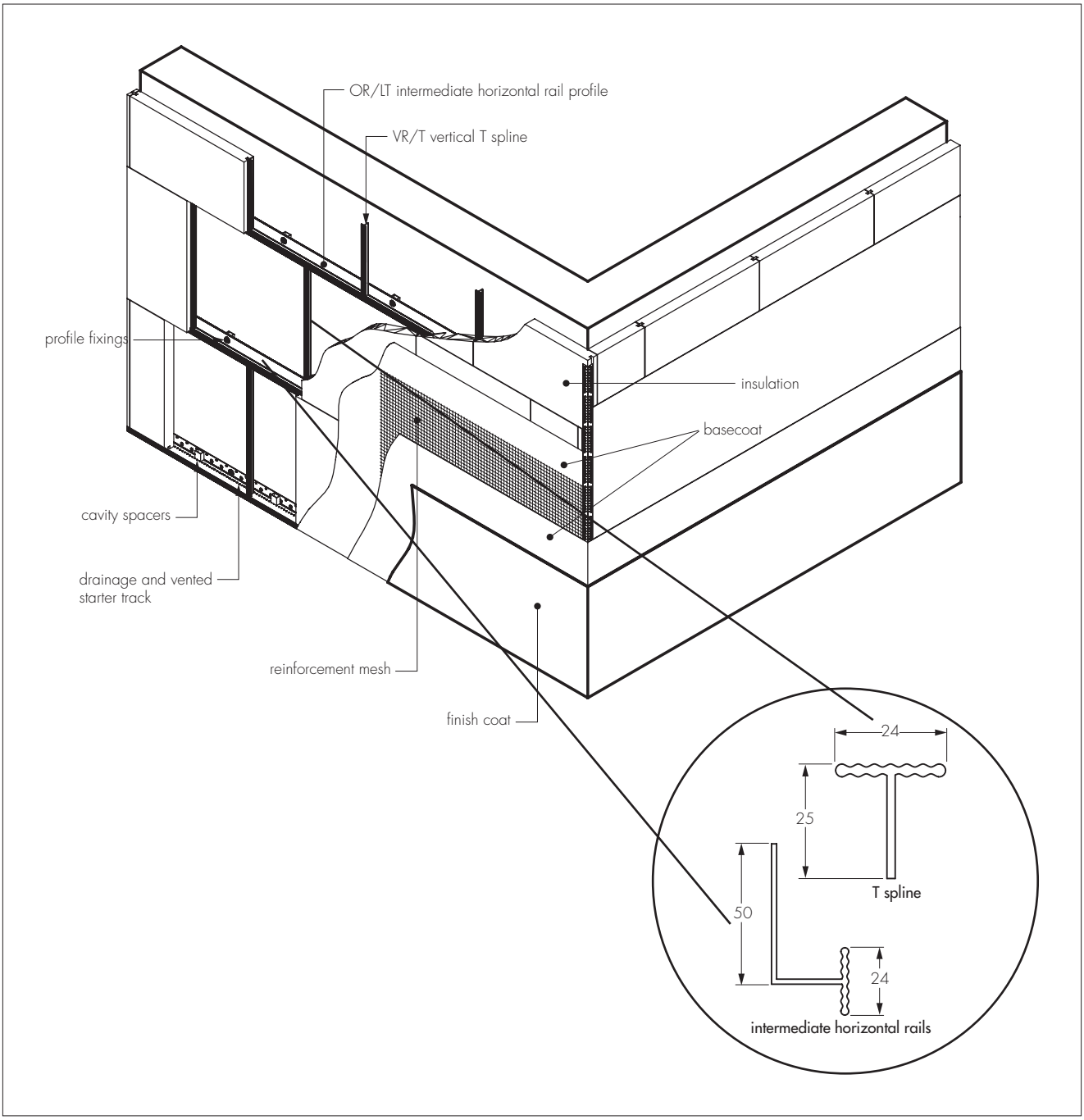
2.1 As part of the assessment and ongoing surveillance of product quality, the BBA has:

- agreed with the manufacturer the quality control procedures and product testing to be undertaken
- assessed and agreed the quality control operated over batches of incoming materials
- monitored the production process and verified that it is in accordance with the documented process
- evaluated the process for management of nonconformities
- checked that equipment has been properly tested and calibrated
- undertaken to carry out the above measures on a regular basis through a surveillance process, to verify that the specifications and quality control operated by the manufacturer are being maintained.

2.2 The management system of I.V.A.S. Industria Vernici S.p.A has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 (No. 08595-2001-AQ-BOL-SINCERT) by SINCERT Det Norske Veritas Italia S.r.l.

2.3 The system is marketed in the UK by Aliva UK, 1210 Parkview, Arlington Business Park, Theale, Berkshire RG7 4TY. Tel: 01189 635 900, e-mail: enquiries@gruppoivas.co.uk.

Figure 1 Termok8 Meccanico Rail (M) External Wall Insulation System — components



3 Delivery and site handling

3.1 Components are delivered to site in the quantities and packages as listed in Table 1. Each package carries the product's identification marks and manufacturer's batch number.

Table 1 Component supply details

Components	Quantity and packaging
Insulation	polythene-wrapped
Mechanical fixings	boxed by manufacturer
Starter track rail profile	box of 25
OR/LT intermediate horizontal rail profiles	box of 25
VR/T vertical T splines profiles	box of 100
TK8 firebreak rails	box of 25
Glassfibre reinforced mesh	1 m wide roll, 50 m length
Klebocem and Klebocem Minerale basecoat	25 kg bag
TermoK8 Rivatone Plus finish coat	25 kg tub
TermoK8 Rivatone Idrosiliconico Plus finish coat	25 kg tub
Packing shims (cavity spacers)	box of 100

3.2 The insulation must be kept dry, and stored on a firm, clean, level base off the ground and protected from weather/frost and under cover until required for use. Care must be taken during handling to avoid damage.

3.3 The insulation should be protected from prolonged exposure to sunlight and contact with solvent and bitumen. The boards must not be exposed to open flame or other ignition sources.

3.4 The basecoat must be stored in dry conditions within 5° and 30° degrees, off the ground and protected from moisture. Contaminated material must be discarded.

3.5 The render finishes should be stored in dry conditions, off the ground and protected from frost at all times. Damaged, wet or contaminated products should not be used and must be discarded.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on the TermoK8 Meccanico Rail (M) External Wall Insulation System.

Design Considerations

4 General

4.1 The TermoK8 Meccanico Rail (M) External Wall Insulation System, when installed in accordance with this Certificate, can contribute to reducing the thermal transmittance (U value) of the 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. Only details specified by the Certificate holder should be used.

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

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

4.4 The system is applied to the outside of the external walls of masonry, dense or no-fines concrete construction and are suitable for use on new or existing domestic and non-domestic buildings with no height restriction. Prior to installation of the system, the wall surfaces should comply with section 14 of this Certificate.

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

- BS EN 1992-2 : 2006 — the designer should select a construction appropriate to the local wind-driven rain index, paying attention to the design detailing, workmanship and materials to be used
- BS 8000-3 : 2001.

4.6 Other new buildings not subject to regulatory requirements should also be built in accordance with the standards identified in section 4.5.

4.7 Drainage deflection beads are incorporated into the system to deflect water present in the drainage cavity around openings, other penetrations or items that block the drainage cavity.

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

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

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

4.11 It is essential that the appropriate movement joints and expansion joints are incorporated into the construction to accommodate the differential movement (for example, expansion and contraction of movement joints) and the variation of temperature and moisture levels between different substrates. This is to ensure substrate movement does not damage the insulation system.

4.12 It is essential that this system is installed and maintained in accordance 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 thermal conductivity (λ_D value) of the insulation given in Table 2.

Table 2 Thermal conductivity of the insulation (λ_D value)

Insulation types	Thickness (mm)	Thermal conductivity ($W \cdot m^{-1} \cdot K^{-1}$)
TermoK8 EPS70E (white)	60 to 200	0.038
TermoK8 EPS70E (grey)		0.032
MW lamella	40 to 200	0.042

6.2 The U value of a wall construction will depend on the selected insulation thickness, the type and number of rails profiles, the degree of ventilation to the cavity, the fixing method and the insulating value of the substrate and its internal finish. Example U values for sample constructions with an unventilated cavity are given in Table 3 and 4, and are based on the thermal conductivities given in Table 2.

6.3 The system can maintain, or contribute to maintaining, continuity of thermal insulation at junctions between walls and other elements. Details shown in section 15 will allow use of the default ψ-values (Psi) for Accredited Construction Details in Emission Rate calculations to SAP 2009 or the Simplified Building Energy Model (SBEM). Detailed guidance can be found in the documents supporting the national Building Regulations.

Table 3 Insulation thickness required to achieve design U values — PVC rails /splines[1][2][3][4]

U value ($W \cdot m^{-1} \cdot K^{-2}$)[5]	Thickness of insulations (mm)			
	215 mm brickwork λ = 0.56 $W \cdot m^{-1} \cdot K^{-1}$		200 mm dense blockwork λ = 1.75 $W \cdot m^{-1} \cdot K^{-1}$	
	EPS 70 White	EPS 70 Grey	EPS 70 White	EPS 70 Grey
0.18	190	170	200	170
0.19	180	160	190	160
0.25	130	110	140	120
0.26	130	110	140	120
0.28	120	100	120	110
0.30	100	90	120	100
0.35	80	80	100	80

(1) Wall construction inclusive of 13 mm plaster (λ = 0.57 $W \cdot m^{-1} \cdot K^{-1}$), brickwork (protected) with 17.1% mortar or dense blockwork with 6.7% mortar (λ = 0.88 $W \cdot m^{-1} \cdot K^{-1}$) and an external render thickness of 5 mm with λ = 1 $W \cdot m^{-1} \cdot K^{-1}$.

(2) A gap correction (ΔU) of 0.01 is assumed. Incremental insulation thicknesses of 10 mm.

(3) A U value correction should be taken for the PVC rails and splines.

(4) Insulation layer comprises 93.3% EPS 70 (white or grey), and 6.7% mineral wool (lamella) acting as a fire break.

(5) When applying the maximum available insulation thickness, these walls can achieve U values from 0.15 to 0.18 $W \cdot m^{-2} \cdot K^{-1}$ depending on the insulation and wall type

Table 4 Insulation thickness required to achieve design U values — aluminium rails/ splines[1][2][3][4]

U value ($W \cdot m^{-1} \cdot K^{-2}$)[5]	Thickness of insulations (mm)			
	215 mm brickwork λ = 0.56 $W \cdot m^{-1} \cdot K^{-1}$		200 mm dense blockwork λ = 1.75 $W \cdot m^{-1} \cdot K^{-1}$	
	EPS 70 White	EPS 70 Grey	EPS 70 White	EPS 70 Grey
0.18	200	170	–	180
0.19	190	160	200	170
0.25	140	120	150	130
0.26	130	120	140	120
0.28	120	110	130	110
0.30	110	100	120	110
0.35	100	80	100	90

(1) Wall construction inclusive of 13 mm plaster (λ = 0.57 $W \cdot m^{-1} \cdot K^{-1}$), brickwork (protected) with 17.1% mortar or dense blockwork with 6.7% mortar (λ = 0.88 $W \cdot m^{-1} \cdot K^{-1}$) and an external render thickness of 5 mm with λ = 1 $W \cdot m^{-1} \cdot K^{-1}$.

(2) A gap correction (ΔU) of 0.01 is assumed. Incremental insulation thickness of 10 mm.

(3) A U value correction should be taken for the aluminium rails and splines.

(4) When applying the maximum available insulation thickness, these walls can achieve U values from 0.15 to 0.19 $W \cdot m^{-2} \cdot K^{-1}$ depending on insulation type and wall type.

(5) Insulation layer comprises 93.3% EPS 70 (white or grey) and 6.7% mineral wool (lamella) acting as a fire break.

6.4 In order to take account of the correction in a combined method U value calculation, the following table may be used:

Table 6 Corrections to U value using the combined method

Insulation thickness (mm)	Rail length, L (m)	Wall area, A (m^2)	Aluminium profile linear thermal transmittance, $\psi^{(1)}$ ($W \cdot m^{-1} \cdot K^{-1}$)	PVC profile linear thermal transmittance, $\psi^{(2)}$ ($W \cdot m^{-1} \cdot K^{-1}$)
50	1	1	0.076	0.011
60	1	1	0.055	0.008
70	1	1	0.042	0.006
80	1	1	0.034	0.005
90	1	1	0.028	0.004
100	1	1	0.024	0.003
110	1	1	0.019	0.003
120	1	1	0.017	0.003
130	1	1	0.015	0.002
140	1	1	0.013	0.002
150	1	1	0.011	0.002
160	1	1	0.010	0.002
170	1	1	0.009	0.001
180	1	1	0.008	0.001
190	1	1	0.007	0.001
200	1	1	0.007	0.001

(1) ψ can be characterised as a quad polynomial:
$\psi = 5.428e^{-10} * d^4 - 3.197e^{-7} * d^3 + 7.044e^{-5} * d^2 - 7.046e^{-3} * d + 0.2877$
where d is the insulation thickness in mm.

(2) ψ can be characterised as a quad polynomial:
$\psi = 5.489e^{-11} * d^4 - 3.385e^{-8} * d^3 + 7.858e^{-6} * d^2 - 8.337e^{-4} * d + 0.03650$
where d is the insulation thickness in mm.

Correction to U-value should be made as follows:

$U = U_0 + [L * \psi]/A$
where:
U_0 is U-value of wall without rail present
ψ is linear thermal transmittance of rail (see Table 6 above)
L is length of rail (see Table 6 above)
A is wall area (see Table 6 above).

7 Strength and stability

General

7.1 Provided the substrate is suitable (see section 13.2), the fixings will effectively transfer the self-weight of the system to the substrate. The self-weight of the system, including the render and the

insulation, is transferred to the masonry substrate via the fixing rails. The intermediate rail fixings should be at 300 mm centres horizontally and 500 mm centre vertically.

7.2 Positive wind load (pressure) is transferred to the masonry substrate wall directly via bending and compression of the render and insulation to the supporting rail and cavity rails to the structural frame.

7.3 Negative wind pressure (suction) is resisted by the bond between each component; the insulation boards are retained by the supporting rail which is secured with appropriate fixing screws.

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

7.5 Assessment of structural performance for individual buildings should be carried out by a suitably qualified engineer or other appropriately qualified person to confirm that:

- the masonry wall has been designed to withstand the loads applied to it from the insulation system, resist the additional loads that may be applied as a result of installing the system (ignoring any positive contribution that may occur from the system) and give an acceptable resistance to pull-out of fixings. The system must be secured to the wall with a rail support system that is fixed to the cavity rail spacers.
- the proposed system and associated rail support system provide adequate resistance to negative wind loads based on the results of the site wind speed investigation and test results (section 7.7).
- an appropriate number of site-specific pull-out tests are conducted on the masonry wall to determine the minimum resistance to failure of the fixings. The characteristic pull-out resistance should be determined in accordance with the guidance given in ETAG 014 : 2011, Annex D, using 60% of this value as the characteristic resistance and applying a safety factor of 3.

7.6 The system can sustain an equivalent ultimate wind load pressure of 1.7 kPa.

7.7 Typical characteristic pull-out strengths for the fixings taken from tests are given in Table 7; the fixing must be selected to suit the loads concerned.

Table 7 Fixings — typical characteristic pull-out strengths

Fixing type	Substrate	Effective embedment depth (h_{ef}) (mm)		Typical pull-out strength (kN)
Ejot self-tapping screws	Brick (LBC)	25		3.25
		30		4.00
	Concrete	25		6.00
		30		7.50
Ejot SDK U hammer-in anchors		25	A	1.2
			B	1.5 (clay bricks) 1.5 (solid lime bricks) 0.5 (solid lightweight concrete)
			C	0.9 (perforated clay bricks) 1.5 (sand lime brick) 0.6 (hollow bricks)
Ejot SDK U screw-in anchors	Masonry A,B,C,D,E	25 (56)[1]	A	1.5
			B	1.5 (solid lime sand) 0.6 (solid masonry)
			C	1.2 (perforated clay bricks) 0.75 (coring bricks) 1.5 (sand lime perforated bricks) 0.6 (hollow blocks)
			D	0.9
			E	0.75

(1) For anchors in aerated concrete (Category E).

Impact resistance

7.8 Hard and soft body impact tests were carried out and the system is suitable for Use category III [1].

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

Category I — a zone readily accessible at ground level to the public and vulnerable to hard body impacts but not subjected to abnormally rough use

Category II — a zone liable to impacts from thrown or kicked objects, but in public locations where the height of the system will limit the size of the impact; or at lower levels where access to the building is primarily to those with some incentive to exercise care

Category III — a zone not likely to be damaged by normal impacts caused by people or by thrown or kicked objects.

8 Behaviour in relation to fire

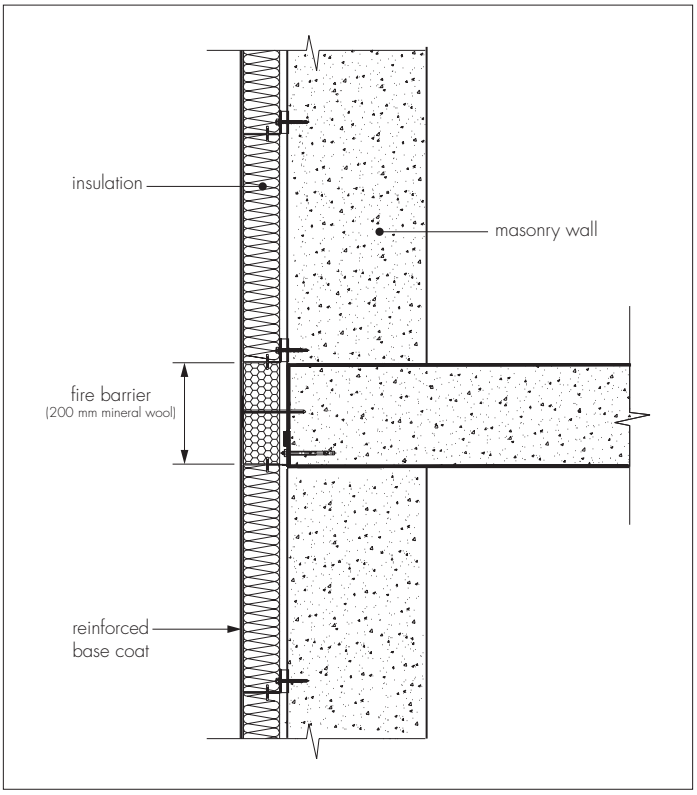
8.1 The reaction to fire classification for the system is B-s2, d0 in accordance with BS EN 13501-1 : 2007.

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

8.3 The system is suitable for use on, or at any distance from, the boundary (see section 8.4).

8.4 For a system using insulation boards up to 200 mm thick, and with fire barriers in line with compartment walls and floors (see Figure 2), and with one stainless steel fixing per metre square through the mesh, there is no restriction on the height. The system described in this clause, and section 1 has met the criteria set in BR 135 : 2013, Annex A.

Figure 2 Fire barriers



9 Proximity of flues and appliances

When the insulation 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 system shall 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 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 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 16.23).

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 the BS 5250 : 2011 should be followed.

Surface condensation

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

11.3 Walls will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed 1.2 $W \cdot m^{-2} \cdot K^{-1}$ at any point. Guidance may be obtained from BS 5250 : 2011 (section 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 water vapour resistance factor (μ) for the insulation boards and equivalent air layer thickness (s_d) for the render systems are shown in Table 7, and should be used in calculations in accordance with BS 5250 : 2011.

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

Description	Thickness	(s_d) (m)	(μ)
Expanded polystyrene — (white EPS 70)	60 to 200	—	20 to 40[1]
Rendering system: reinforced basecoat + finish coat (specific particle size) as indicated below			
Klebocem/Klebocem Minerale + TermoK8 Rivatone Plus render system (3.0 mm thickness)	6 to 10[2]	0.47	—
Klebocem/Klebocem Minerale + TermoK8 Rivatone Idrosiliconico Plus render system (1.2 mm thickness)	5 to 9[2]	0.31	—

(1) The water vapour resistance factor (μ value) of the insulation is taken from BS EN 13163 : 2012; the lower of these values should be used for condensation risk analysis calculations.

(2) The system thickness range includes basecoat, mesh, and finish.

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 will remain effective for at least 30 years provided any damage to the surface finish is repaired immediately and regular maintenance is undertaken, as described in section 12.

13.2 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 finishes may break up the flow of water on the surface and reduce the risk of discoloration by water runs. The finish may become discoloured with time, the rate depending on locality, initial colour, the degree of exposure and atmospheric pollution, as well as the design and detailing of the wall. In common with traditional renders, discoloration by algae and lichens may occur in wet areas. The appearance may be restored by a suitable power wash or, if required, by over coating.

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

14 Site survey and preliminary work

14.1 A pre-installation survey of the property must be carried out to determine the suitability for treatment and need for any repairs required to the building structure before application of Tremok8 Meccanico Rail (M) External Wall Insulation System. A specification is prepared for each elevation of the building indicating:

- position of starter tracks, cavity spacer tracks, and render beads
- additional reinforcing scrim at corners of openings detailing around windows, doors and at eaves dpc level where required, additional corner and reinforcement meshes
- location and type of weather seals to be used and location of water-deflection channels
- areas where flexible sealants must be used
- any alteration of the external plumbing
- position of fire barriers and cavity fire stops.

14.2 The survey should include tests conducted on the substrate wall of the building by the Certificate holder or their approved applicators (see section 15) to determine the pull-out resistance of the proposed OR/LT intermediate horizontal rail profile fixings. An assessment and recommendation is should be made on the fixings required to withstand the building's expected wind loading based on calculations using the relevant wind speed data for the site and the pull-out resistances (see section 7).

14.3 Surfaces should be sound, clean, and free from loose material. The flatness of surfaces must be checked; this may be achieved by using a straight-edge spanning the storey height. Excessive irregularities, ie greater than 10 mm, must be made good prior to installation to ensure that the system is 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. 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 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, must be carried out by approved installers recommended or recognised by the Certificate holder. Such an installer is a company:

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

16 Procedure

General

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

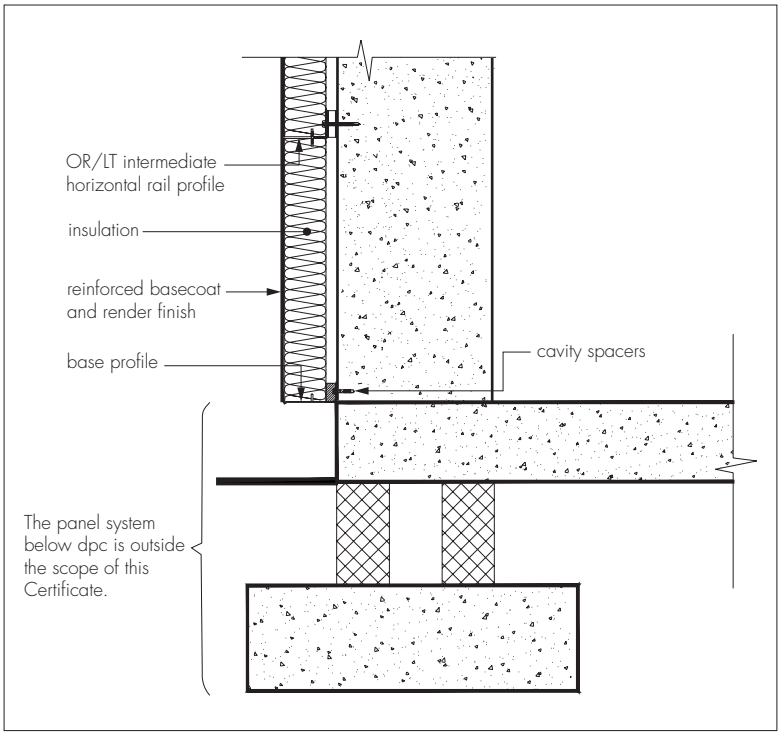
16.2 Application of coating materials must not be carried out at temperatures below 5°C, above 30°C, or if exposure to frost is likely, and the coating must be protected from rapid drying. Weather conditions, therefore, should be monitored to ensure correct curing conditions.

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

Positioning and securing insulation boards

16.4 The starter track is mechanically fixed to the masonry wall structure above the dpc (see Figure 3) at a maximum of 300 mm centres. Packing shims are used at fixing points to maintain a level drainage cavity and, when necessary, can also be used behind the starter track to overcome surface irregularities. Extension profiles are fixed to the front lip of the starter track rail or stop end channel where appropriate. Care must be taken to ensure the fixings are not overdriven.

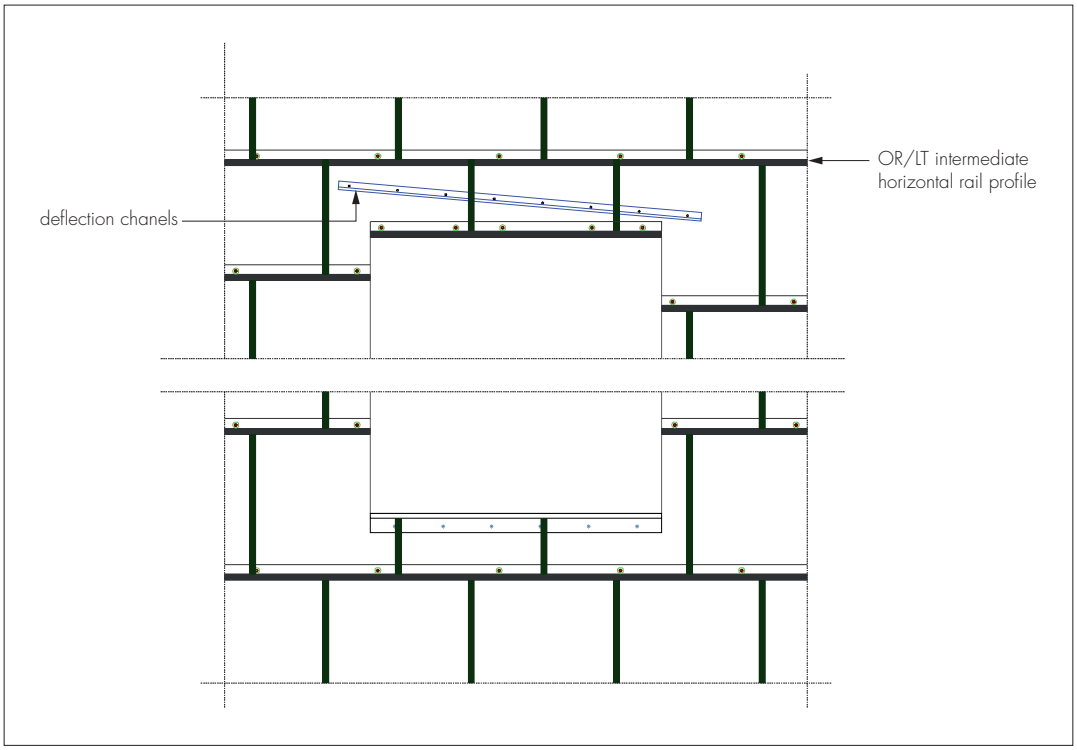
Figure 3 Typical section of base profile



16.5 The insulation boards are slotted in, aligning the track flanges with the board grooves and installing VR/T vertical T spline profiles between each board. Installation continues in this way until the first row of boards is complete.

16.6 After positioning the first row, the OR/LT intermediate horizontal rail profiles slot into the pre-cut grooves of the top edges of the installed insulation boards (see Figure 4). The level is checked and the rail is positioned away from the substrate using a specially designed 20 mm spacer. It is important that the fixing rail fits tightly and locates fully into the groove in the insulation without being forced into position.

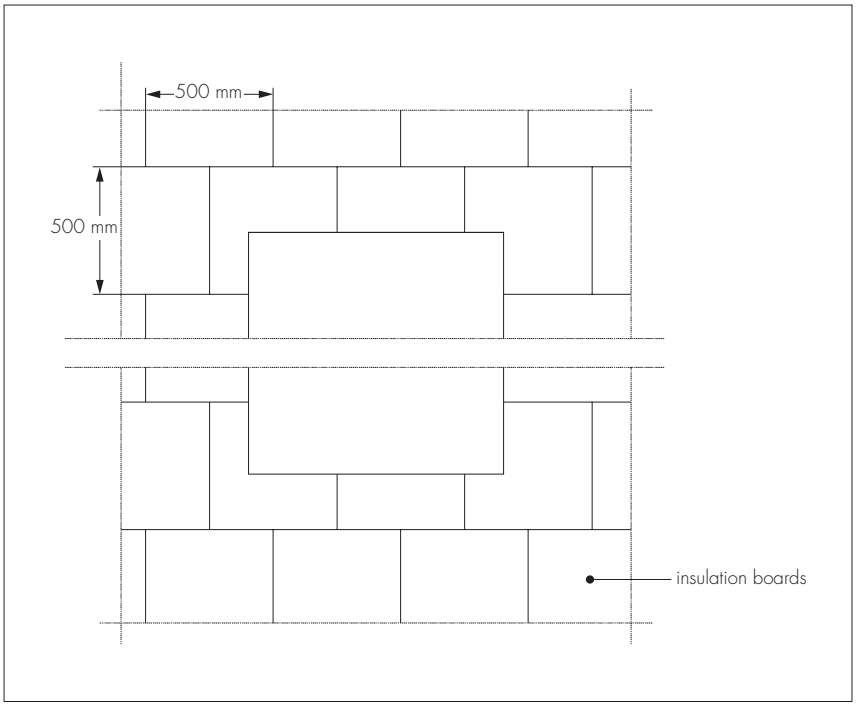
Figure 4 Arrangement of OR/LT intermediate horizontal rail profiles



16.7 The OR/LT intermediate horizontal rail profiles are fastened to the substrate with hammer-drive screws at 300 mm centres vertically and 500 mm centres horizontally. Subsequent rows of boards are installed using the same procedure.

16.8 The boards must be butted tightly together with the vertical joints staggered by a minimum of 200 mm (see Figure 5) and overlapped at the building corners. Any open joints in the insulation system must be filled with slivers of insulation board or PU foam. Horizontal fire barriers are installed following the Certificate holder's instructions.

Figure 5 Arrangement of insulation boards and pattern



16.9 To fit around details such as doors and windows, insulation boards may be cut with a sharp knife or a fine-tooth saw. Purpose-made window-sills, seals and deflection channels are mechanically fitted over all window and door openings. They are designed to prevent or manage water ingress and allow water to be shed clear of items bridging the cavity.

16.10 Care must be taken to ensure that the alignment is checked as work proceeds. Any high spots or irregularities should be removed by lightly planning with a rasp over the entire surface to provide a key for the reinforcing coat.

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

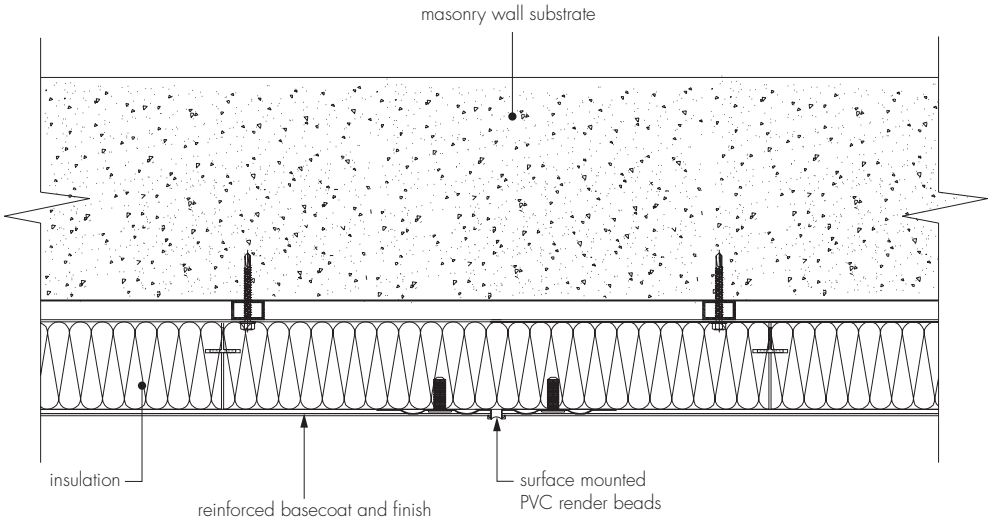
Movement joints

16.12 Generally, movement joints are not required in the system but, if an expansion joint is already incorporated in the substrate, a movement joint must be provided in the insulation system (see Figure 6).

16.13 Where applicable, expansion beads are fixed horizontally and vertically in predetermined positions, according to the installation specification and the individual requirements of each project

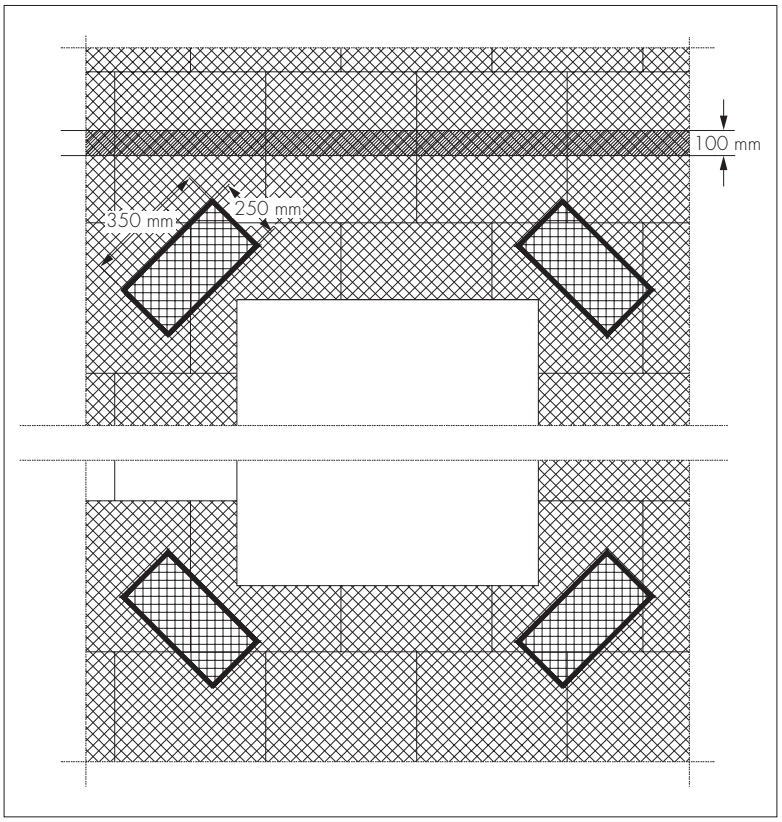
16.14 Surface mounted PVC render beads are fixed (using firtree fixings) to the insulation boards where required.

Figure 6 Vertical movement joint



16.15 In all cases, pieces of reinforcing mesh (250 mm by 350 mm) are applied diagonally at the corners of windows and doors or similar openings (as shown in Figure 7) before the basecoat is applied.

Figure 7 Additional reinforcement at openings



Basecoat

16.16 The basecoat is prepared by mixing each bag with 4 litres to 5 litres of clean water using a paddle mixer, and is applied over the insulation slabs using a stainless steel trowel, and floated with a Darby float to a 3 mm thickness.

16.17 The basecoat is applied progressively, working in one-metre sections in a vertical or horizontal direction, insuring that meshed corner beads are bedded into the basecoat at external corners and around openings as required.

16.18 While the basecoat is still wet, the reinforcement mesh is applied then trowelled over to ensure completely coverage. Overlapping at all mesh joints should not be less than 100 mm. Further basecoat is applied as necessary, to achieve a total overall minimum thickness of 6 mm.

16.19 The basecoat should be left to dry thoroughly before application of the finish; the drying time will depend upon the conditions, but at least 48 hours should elapse before applying the finish coats.

Finish

16.20 TermoK8 Rivatone Plus or TermoK8 Rivatone Idrosiliconico Plus is applied to a thickness from1.2 mm to 3 mm (see section 1.2 of this Certificate).

16.21 Continuous surfaces should be completed without a break.

16.22 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 10).

Figure 8 Typical parapet details

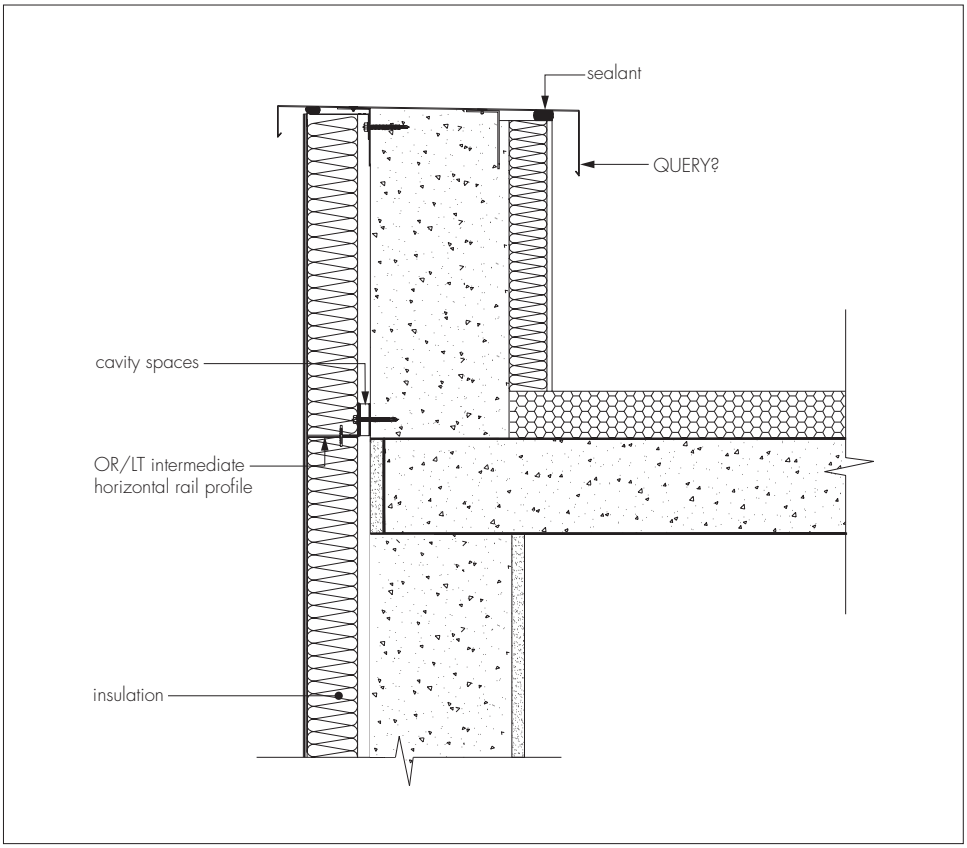


Figure 9 Typical opening details

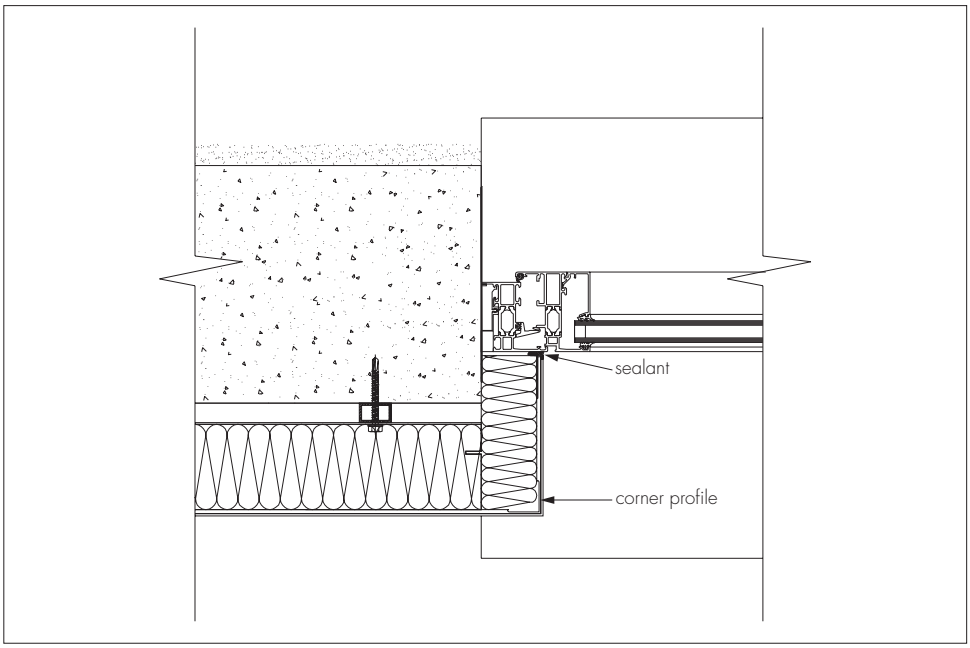
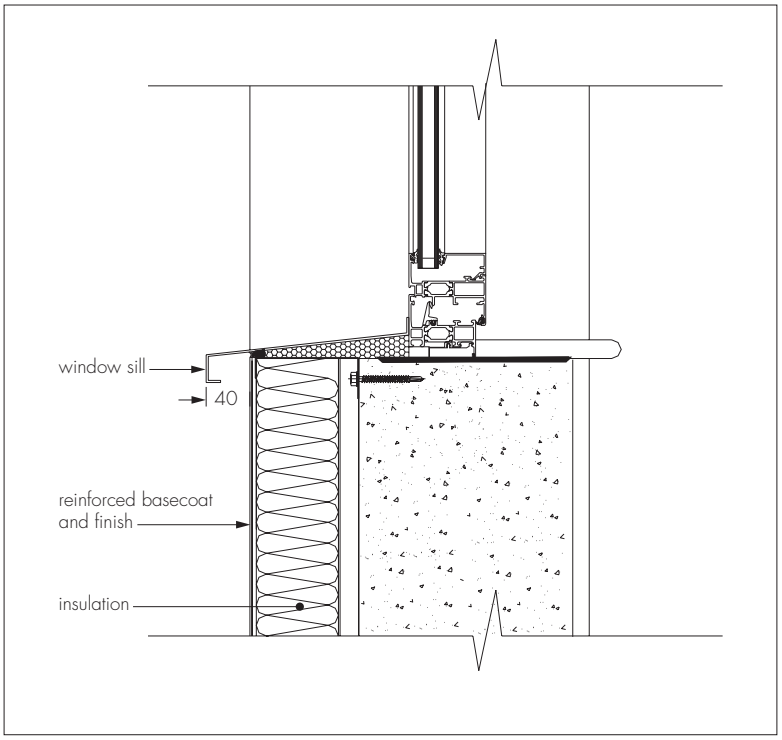


Figure 10 Window sill detail



16.23 On completion of the installation, external fittings, eg rainwater goods, are securely fixed to grounds or extended fixings that have been built into the system during installation.

Technical Investigations

17 Investigations

17.1 The system was examined and assessed to determine:

- fire performance
- bond strength
- hygrothermal performance and resistance to freeze/thaw
- water vapour permeability
- resistance to hard and soft body impacts
- resistance to dynamic wind up lift.
- fire resistance tests in accordance with BRE Report BR 135 : 2013
- thermal conductivity
- durability
- risk of interstitial condensation was undertaken
- the adequacy of fixings and durability of finish.

17.2 A visit to site in progress were undertaken to assess the practicability of installation and the effectiveness of detailing techniques.

17.5 Visits to existing sites were undertaken to assess performance in service.

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

Bibliography

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 1062-1 : 2004 *Paints and varnishes — Coating materials and coating systems for exterior masonry and concrete — Classification*

BS EN 1990 : 2002 *Eurocode — Basis of structural design*

BS EN 1991-1-4 : 2005 *Eurocode 1 : Actions on structures — General actions — Wind actions*

BS EN 1992-2 : 2006 *Eurocode 2 : Design of concrete structures — Liquid retaining and containing structures*

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

BS EN 13163 : 2012 *Thermal insulation products for buildings — Factory made products of expanded polystyrene*

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

BS EN 13914-1 : 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*

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

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

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

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

ETAG 014 : 2011 *Guideline for European Technical Approval of Plastic Anchors for fixing of External Thermal Insulation Composite Systems with Rendering*

18 Conditions

18.1 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.

18.2 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.

18.3 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.

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

18.5 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.

18.6 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.

British Board of Agrément
Bucknalls Lane
Watford
Herts WD25 9BA
©2014
tel: 01923 665300
fax: 01923 665301
e-mail: clientservices@bba.star.co.uk
website: www.bbacerts.co.uk