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Agrément Certificate  
**09/4625**  
Product Sheet 1

## EPSITEC EXTERNAL WALL INSULATION SYSTEM

### PRODUCT SCOPE AND SUMMARY OF CERTIFICATE

This Certificate relates to the Epsitec External Wall Insulation System, for use on sheathed lightweight steel-framed structures. The system incorporates specific reinforced renders and phenolic insulation, and provides a 15 mm wide drainage cavity. The system can be used on domestic and non-domestic buildings and can enable or contribute to enabling a wall construction to meet the thermal performance requirements set out in the appropriate building regulations.

#### AGRÉMENT 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

**Practicability of installation** — the system must be installed by trained operatives (see section 3).

**Mechanical resistance and stability** — a correctly designed system will have adequate resistance to wind loads (see section 4).

**Properties in relation to fire** — the system with 50 mm thick insulation passed the BS 8414-2 : 2005 fire-performance test (see section 5).

**Thermal performance** — constructions utilising the system can enable a construction to meet, or contribute to meeting, the building regulations (see section 6).



The BBA has awarded this Agrément Certificate to the company named above for the product described herein. This product 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

Brian Chamberlain  
Head of Approvals — Engineering

Greg Cooper  
Chief Executive

Date of First issue: 27 February 2009

*The BBA is a UKAS accredited certification body — Number 1113. 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](http://www.bbacerts.co.uk)*

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

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In the opinion of the BBA, Epsitec External Wall Insulation System, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements of the following Building Regulations:



## The Building Regulations 2000 (as amended) (England and Wales)

Requirement:	<b>A1</b>	Loading
Comment:		Mechanical resistance and safety – the system can sustain and transmit wind loads to the structural frame. See sections 4.4 and 4.8 of this Certificate.
Requirement:	<b>B4(1)</b>	External fire spread
Comment:		The system can be classified Class 0 and, therefore, can meet this Requirement. See sections 5.1 to 5.4 and 5.6 of this Certificate.
Requirement:	<b>C2(b)(c)</b>	Resistance to moisture
Comment:		Walls incorporating the system can meet this Requirement. See sections 9.2 and 9.3 of this Certificate.
Requirement:	<b>L1(a)(i)</b>	Conservation of fuel and power
Comment:		The system can enable, or contribute to a construction meeting the Target Emission Rate. See sections 6.3 to 6.5 of this Certificate.
Requirement:	<b>Regulation 7</b>	Materials and workmanship
Comment:		The system is acceptable. See section 11.1 and the <i>Installation</i> part of this Certificate.



## The Building (Scotland) Regulations 2004 (as amended)

Regulation:	<b>8(1)(2)</b>	<b>Fitness and durability of materials and workmanship</b>
Comment:		The system can contribute to a construction meeting this Regulation. See sections 10.1 and 11.1 and the <i>Installation</i> part of this Certificate.
Regulation:	<b>9</b>	<b>Building standards – construction</b>
Standard:	<b>1.1</b>	Structure
Comment:		Mechanical resistance and safety – the system can sustain and transmit wind loads to the structural frame. See sections 4.4 and 4.8 of this Certificate.
Standard:	<b>2.6</b>	Spread to neighbouring buildings
Comment:		The system has a ‘low risk’ surface classification. The system incorporates materials which would not be classed as ‘non-combustible’. Completed walls, therefore, would be regarded as unprotected areas as defined in this Standard, with reference to clauses 2.6.1 <sup>(1)(2)</sup> , 2.6.2 <sup>(1)(2)</sup> , 2.6.4 <sup>(1)(2)</sup> , 2.6.5 <sup>(1)</sup> and 2.6.6 <sup>(2)</sup> . See sections 5.1 to 5.4 and 5.6 of this Certificate.
Standard:	<b>2.7</b>	Spread on external walls
Comment:		The system incorporates materials which would not be classed as ‘non-combustible’ as defined in this Standard, with reference to clauses 2.7.1 <sup>(1)(2)</sup> and 2.7.2 <sup>(2)</sup> and, therefore, should not be used on walls one metre or less from a boundary. See sections 5.1 to 5.4 and 5.6 of this Certificate.
Standard:	<b>3.10</b>	Precipitation
Comment:		Walls insulated with the system can satisfy this Standard, with reference to clauses 3.10.1 <sup>(1)(2)</sup> and 3.10.6 <sup>(1)(2)</sup> . See sections 9.2 to 9.4 of this Certificate.
Standard:	<b>3.15</b>	Condensation
Comment:		Walls insulated with the system can satisfy the requirements of this Standard, with reference to clauses 3.15.1 <sup>(1)</sup> , 3.15.4 <sup>(1)</sup> and 3.15.5 <sup>(1)</sup> . See sections 8.1 to 8.3 of this Certificate.
Standards:	<b>6.1(b)</b> <b>6.2</b>	Carbon dioxide emissions Buildings insulation envelope
Comment:		The system can contribute to satisfying these Standards, with reference to clauses (or parts of) 6.1.1 <sup>(1)</sup> , 6.1.2 <sup>(1)(2)</sup> , 6.1.3 <sup>(2)</sup> , 6.1.5 <sup>(2)</sup> , 6.1.6 <sup>(1)</sup> , 6.2.1 <sup>(1)</sup> , 6.2.3 <sup>(1)</sup> , 6.2.4 <sup>(1)</sup> , 6.2.5 <sup>(1)(2)</sup> and 6.2.10 <sup>(2)</sup> . See sections 6.3 to 6.5 of this Certificate. (1) Technical Handbook (Domestic). (2) Technical Handbook (Non-Domestic).



## The Building Regulations (Northern Ireland) 2000 (as amended)

Regulation:	<b>B2</b>	Fitness of materials and workmanship
Comment:		The system is acceptable. See section 11.1 and the <i>Installation</i> part of this Certificate.
Regulation:	<b>B3(2)</b>	Suitability of certain materials
Comment:		The system is acceptable. See section 10.1 of this Certificate.
Regulation:	<b>C4(b)</b>	Resistance to ground moisture and weather
Comment:		Walls insulated with the system can satisfy this Regulation. See sections 9.2 to 9.4 of this Certificate.
Regulation:	<b>C5</b>	Condensation
Comment:		Walls insulated with the system can satisfy the requirements of this Regulation. See sections 8.1 to 8.3 of this Certificate.
Regulation:	<b>D1</b>	Stability
Comment:		Mechanical resistance and safety – the system can sustain and transmit wind loads to the structural frame. See sections 4.4 and 4.8 of this Certificate.

Regulation:	<b>E5(a)</b>	External fire spread
Comment:		The system has a Class 0 surface and can satisfy this Regulation. See sections 5.1 to 5.4 and 5.6 of this Certificate
Regulations:	<b>F2(a)(i)</b> <b>F3(2)</b>	Conservation measures Target carbon dioxide Emissions Rate
Comment:		The system can enable a construction to meet the requirements of these Regulations. See sections 6.3 to 6.5 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: *2 Delivery and site handling (2.1).*

## Non-regulatory Information

### NHBC Standards 2008

NHBC accepts the use of the Epsitec External Wall Insulation System, when installed and used in accordance with this Certificate, in relation to *NHBC Standards, Chapter 6.9 Curtain walling and cladding.*

### Zurich Building Guarantee Technical Manual 2007

In the opinion of the BBA, the Epsitec External Wall Insulation System, when installed and used in accordance with this Certificate, satisfies the requirements of the *Zurich Building Guarantee Technical Manual, Section 4 Superstructure, Sub-section Pitched roofs.*

## General

This Certificate relates to the Epsitec External Wall Insulation System for use on sheathed, lightweight, steel-framed structures. The system incorporates specific reinforced renders and phenolic insulation, and provides a 15 mm wide drainage cavity.

The system can be used on new and existing domestic and non-domestic buildings.

## Technical Specification

### 1 Description

1.1 The insulation system is for use on steel-framed buildings which incorporate vertical steel studs (minimum thickness 1.5 mm and minimum flange width 50 mm) at 600 mm centres sheathed with cement particle board or boards with equivalent structural properties (see Table 1). The system incorporates steel top-hat sections secured to the particle board directly in line with the vertical steel studs and create a 15 mm wide cavity between the sheathing and insulation. This drainage cavity is not ventilated to the outside air to an extent that would compromise the thermal performance of the systems. In addition, intermediate top-hat sections are fixed to the sheathing midway between the vertical studs.

*Table 1 Minimum construction specification*

Item	Characteristic	Specification
Steelwork <sup>(1)</sup>	Grade and coating	BS EN 10326 type S 320 GD +Z275 with BBA Certificate
	Thickness	1.2 mm
Sheathing board <sup>(1)</sup> (fire rated)	Type	BS EN 634-2 (see Certificate holder for details)

(1) The board is of exterior grade and the minimum acceptable specification is given here. The specification of the frame and sheathing is outside the scope of this Certificate and should be determined by the building designer. The board thickness must also be determined by the building designer.

1.2 The insulation systems covered by this Certificate do not have provision for movement joints. The thermal expansion and differential movement between elements of the substrate and the requirement for movement joints should be considered when choosing a suitable insulation system for a particular construction.

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

1.4 The components of the basic wall system (see Figures 1 and 2) comprise:

- render topcoats — type Heck Siliconharputz K is available with aggregate sizes from 1.5 mm to 3 mm and Heck Siliconharputz R topcoat with aggregate sizes from 1.5 mm to 2 mm, a silicon ready-mixed paste.
- Heck Universalgrundierung primer — an emulsion used as a bonding agent and precoat
- Heck K+A Basecoat — a cement-based, ready-mixed render supplied as a powder to which clean water is added. Conforming to BS EN 13139 : 2002
- reinforcing scrim — a multi-stranded, alkali-resistant, glassfibre, 4 mm by 4 mm mesh, with a polymer coating and a nominal weight of 160 gm<sup>-2</sup>
- basecoat Heck K+A Basecoat — a cement-based, ready-mixed render supplied as a powder to which clean water is added. Conforming to BS EN 13139 : 2002
- mechanical fixing — an anchor used in external thermal insulation composite systems (ETICS), incorporating a 60 mm diameter plate with a central hole to accommodate a 3 mm diameter self-drilling screw of adequate length to suit the insulation thickness (see Figure 3)
- insulation boards – phenolic insulation 1200 mm by 600 mm faced with a glassfibre tissue in a range of thicknesses between 40 mm and 90 mm, a density of 50 kgm<sup>-3</sup> and a conductivity of between 0.021 and 0.023 Wm<sup>-1</sup>K<sup>-1</sup>.
- cavity spacer track – a galvanized steel top-hat section through which the mechanical fixings pass to create the 15 mm wide drainage cavity.

Figure 1 The Epsitec External Wall Insulation System for framed structures

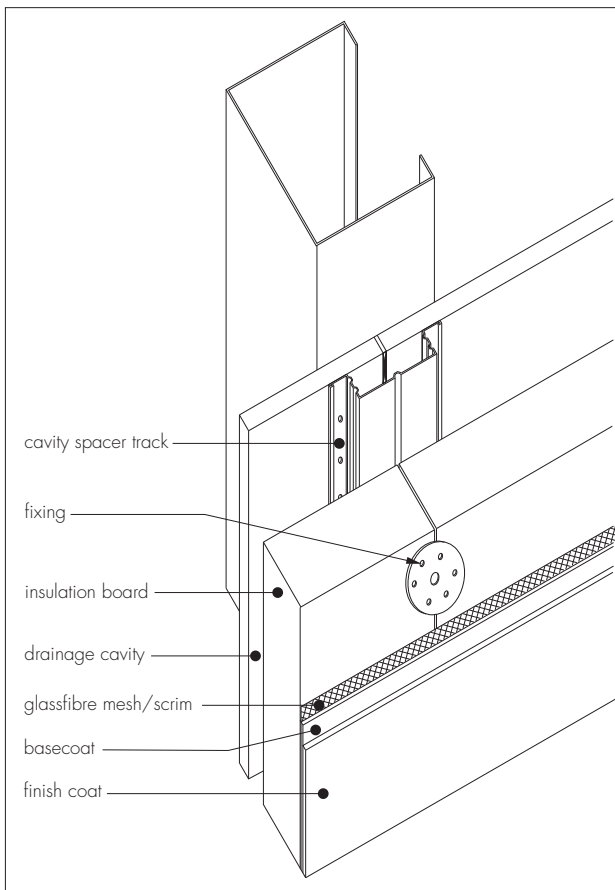


Figure 2 Typical section at base level

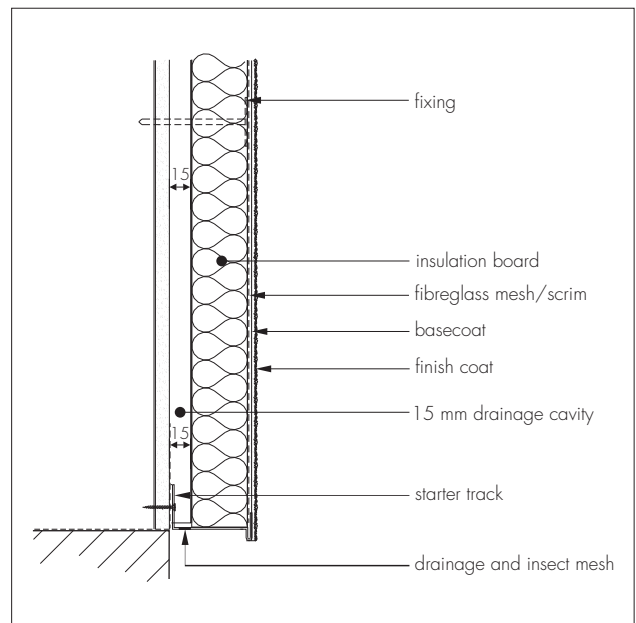
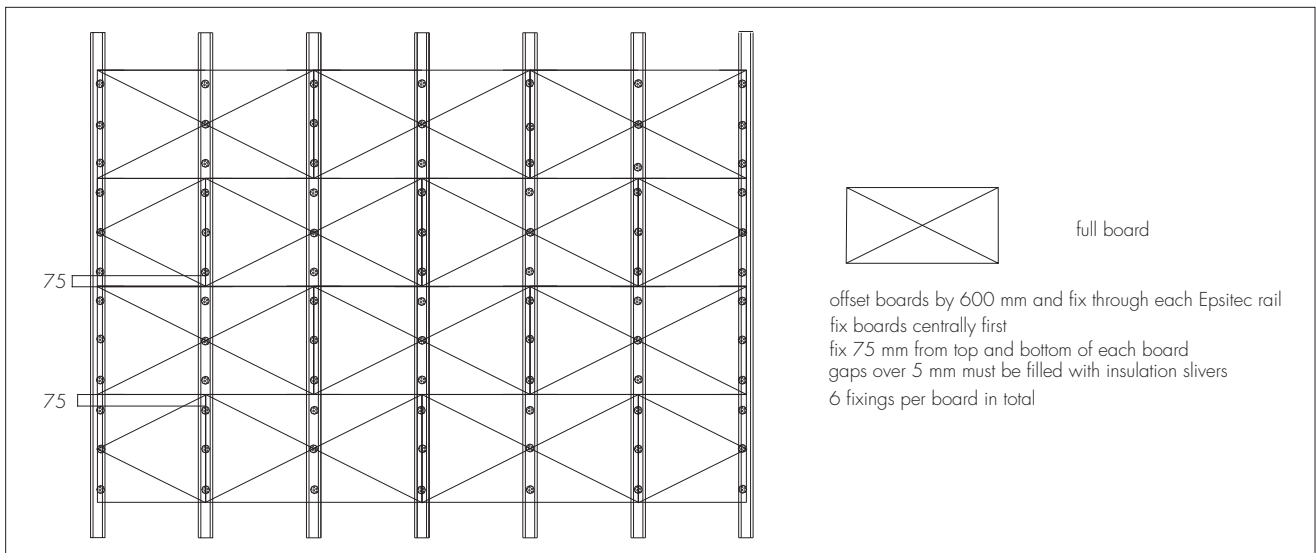


Figure 3 Typical fixing pattern



1.5 Ancillary items supplied by the Certificate holder for use in particular locations/forms of construction include:

- starter tracks (to suit each insulation thickness)
- insect mesh
- end stops
- water drainage deflector channels (for use above openings).

1.6 Ancillary items outside the scope of this Certificate and not supplied by the Certificate holder but may be required to ensure the completed construction complies with the building regulations and is fit for purpose, include:

- sealant
- fire stops
- cavity stops.

## 2 Delivery and site handling

2.1 Components are delivered in the packaging and quantities listed in Table 2. Each basecoat bag carries the product identification and manufacturer's batch number.

Table 2 Component supply details

Component	Quantity and packaging
Insulation	polythene wrapped
Reinforcing scrim	1 metre wide rolls, 50 metre length
Basecoats	25 kg bag
Primer	25 kg tub
Finish coat	25 kg tub
Mechanical fixings	boxed by manufacturer

2.2 The insulation must be protected from prolonged exposure to sunlight either by storing opened packs under cover or re-covering with opaque sheeting. In addition, 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 boards to avoid both damage and contact with solvents or bitumen products. The boards must not be exposed to open flame or other ignition sources.

2.3 The basecoat must be stored in dry conditions, off the ground, and protected from moisture.

## Assessment and Technical Investigations

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

## Design Considerations

### 3 Practicability of installation

Construction of the system is carried by contractors trained and approved by the Certificate holder in accordance with the Certificate holder's Installation Manual (see section 12).


## 4 Mechanical resistance and stability

### General

4.1 Installations utilising the insulation system can be designed to provide adequate resistance to some design loads applicable to use in some sheltered areas of the UK.

4.2 Positive wind load (pressure) is transferred to the substrate wall directly via bending and compression of the render, insulation and adhesive.

4.3 Negative wind pressure (suction) is resisted by the bond between each component; the insulation boards are retained by the ETICS anchor and secured to the frame with the appropriate fixing screw (intermediate fixings relay the load via the sheathing board to the structural frame).


 4.4 The wind loads on the wall should be calculated in accordance with BS EN 1991-1-4 : 2005 or BS 6399-2 : 1997. 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.

4.5 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 substrate wall has adequate strength to resist the additional loads that may be applied as a result of installing the system ignoring any positive contribution that may occur from the ETIC system.
- the proposed system and associated fixing layout provide adequate resistance to negative wind loads (based on the results of the site investigation) (see section 4.7).

4.6 Provided the substrate is suitable and an appropriate fixing is used, the mechanical fixings will transfer the self-weight of the render insulation system to the substrate wall. The self-weight of the system including the render and the insulation is transferred to the steel frame via the fixings and supported at the base by the starter track. The number of fixings and the span between fixings should be determined by the system designer. The ETICS anchor must be selected to give adequate resistance to the self-weight at the minimum spacing given in the certificate.

4.7 Tests carried out by the BBA indicate that an ETICS anchor with a 60 mm diameter anchor plate of adequate stiffness will have an ultimate pull-over resistance of 550 N and that the pull-out resistance of a 4 mm diameter fixing from a 1.5 mm thick steel frame will be approximately 600 N. Therefore, the recommended design load per fixing is 183 N. However, the pull-out resistance of intermediate fixings will depend on the grade of sheathing board and may be considerably less. If fixings are spaced at 300 mm horizontal centres and span 600 mm, the equivalent ultimate pressure is 1000 Pa. Site-specific tests should be conducted on the sheathing boards of the building to determine the pull-out resistance of the fastenings. This is the minimum of five tests divided by a factor of safety of 3.


 4.8 The system is not affected by the deflections permitted when designing steel-frame structures to BS 5950-5 : 1998 (ie span/300).

### Impact loading

4.9 Hard body impact tests were carried out generally in accordance with MOAT No 22 : 1988. It is recommended that the use of the system is restricted to category E<sup>(1)</sup> as defined in BS 8200 : 1985, Table 2.

(1) 1.5 m to 6 m above pedestrian or floor level in location categories A and B, where location category A is defined as: Readily accessible to public and others with little incentive to exercise care. Prone to vandalism and abnormally rough use, eg external walls of housing and public buildings in vandal prone areas; and location category B as: Readily accessible to public and others with little incentive to exercise care. Chances of accident occurring and of misuse, eg walls adjacent to pedestrian thoroughfares or playing fields when not in category A.

## 5 Properties in relation to fire

 5.1 The white external surfaces of the system are classified as Class 0 or 'low risk' as defined in the documents supporting the national Building Regulations. The system, therefore, may be used in accordance with the provisions of:

**England and Wales** — Approved Document B, Volume 1, paragraph 8.4, and Volume 2, paragraph 12.6 (see also Approved Document B, Volume 2, Diagram 40).

**Scotland** — Mandatory Standards 2.6 and 2.7, clauses 2.6.1<sup>(1)(2)</sup> to 2.6.5<sup>(1)(2)</sup>, 2.6.6<sup>(2)</sup>, 2.6.7<sup>(2)</sup>, 2.7.1<sup>(1)(2)</sup> and 2.7.2<sup>(2)</sup> respectively, and Annexes 2.C<sup>(1)</sup> and 2.E<sup>(2)</sup>

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

**Northern Ireland** — Technical Booklet E, paragraph 4.3 (see also Diagram 4.1).

5.2 The classifications stated in section 5.1 were achieved on light-coloured render (further details can be obtained from the Certificate holder). However, the classification of darker colours should be confirmed by:

**England and Wales** — test or assessment in accordance with Approved Document B, Appendix A, Clause 1

**Scotland** — test to conform with Regulation 9, Annex 2.C<sup>(1)</sup>, Table, and Annex 2.E<sup>(2)</sup>

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

**Northern Ireland** — test or assessment by a UKAS accredited laboratory or an independent consultant with appropriate experience.

5.3 The documents listed in section 5.1 give full details of permissible heights and boundary conditions of domestic and non-domestic buildings and the relevant guidance with regard to external wall claddings of external wall insulation systems with render surfaces. However, the following information is for guidance purposes:

#### **England and Wales**

- for buildings one metre or more from a boundary, the systems are acceptable
- for buildings less than one metre from a boundary, the systems can be acceptable provided the wall meets the fire-resistance requirements in Tables A1 and A2, from both sides
- the systems can be acceptable, subject to the aforementioned conditions, for use on a building which has a floor up to and over 18 m above the ground level.

#### **Scotland**

- domestic and non-domestic use – for buildings more than one metre from a boundary, up to and over 18 m above ground level, the systems can be acceptable. The systems are not classified as non-combustible, therefore, calculations for unprotected areas apply<sup>(1)</sup>.

(1) Combustible cladding need not be included in the calculation for unprotected area where:

- the combustible cladding is attached to the structure of the building and the external wall does not contain openings other than the small openings described in Mandatory Standard 2.6.2, clause 2.6.2b; and the wall behind the cladding has the appropriate fire-resistance duration from the inside
- in Mandatory Standard 2.6, clause 2.6.2b, unprotected areas are described as an area of not more than 0.1 m<sup>2</sup>, which is at least 1.5 m from any other unprotected area in the same wall.

#### **Northern Ireland**

- for buildings one metre or more from a boundary, the systems are acceptable
- for buildings less than one metre from a boundary, the systems can be acceptable provided the wall meets the fire-resistance requirements given in Tables 3.1 and 3.2, from both sides
- the systems are acceptable, subject to the aforementioned conditions, for use on a building which has a storey, the floor of which is up to 18 m above the ground level. For a building which has a storey the floor of which is 18 m or more above the ground level, in addition, the insulation component must be a material of limited combustibility.

5.4 The system with a 50 mm thickness of insulation was tested<sup>(1)(2)</sup> in accordance with BS 8414-2 : 2005. The system, without fire barriers incorporated within the insulation product (between the render and the drainage cavity), as described in section 16.4, met the requirements of BRE Digest 501 : 2007 BR 135 : Annex B, Performance criteria and classification method for BS 8414-2 : 2005. This relates to the requirement for fire barriers to limit the risk of fire spread between floors in buildings subject to the Building Regulations in England and Wales, Scotland and Northern Ireland. Further guidance is given in BRE report (BR 135 : 2007) *Fire Performance of External Insulation for Walls of Multi-storey Buildings*.

(1) The test performance described above was achieved using a construction that incorporated Pyrospan intumescent strips fixed to the sheathing board, Pyromat A intumescent mastic and Tenmat FF102/25 Ventilated Fire Barriers (foil-wrapped). Whilst a construction incorporating these products met these requirements, it has not been assessed by the BBA. The building designers need to satisfy themselves that, when specified for use in a particular construction, these types of components have appropriate performance and durability.

(2) The fire performance of other insulation thicknesses should be confirmed by a fire expert from a United Kingdom Accreditation Service (UKAS) accredited fire test house.

5.5 The fire-resistance performance of a wall incorporating the system is outside the scope of this Certificate and can only be determined from tests performed by a UKAS accredited laboratory for the test concerned.



5.6 Any cavities present within the system, such as those formed between the external wall insulation system and the substrate, must have an appropriate fire stop or cavity barrier in accordance with the relevant clauses or sections of:

**England and Wales** — Approved Document B, Volume 1, Section 6, and Volume 2, Section 9

**Scotland** — Mandatory Standards 2.4, 2.6 and 2.7, clauses 2.1.4<sup>(1)(2)</sup>, 2.4.2<sup>(1)(2)</sup>, 2.4.7<sup>(1)</sup>, 2.4.9<sup>(2)</sup>, 2.6.1<sup>(1)(2)</sup> to 2.6.5<sup>(1)(2)</sup>, 2.6.6<sup>(2)</sup>, 2.6.7<sup>(2)</sup>, 2.7.1<sup>(1)(2)</sup> and 2.7.2<sup>(2)</sup> respectively, and Annex 2.A<sup>(1)</sup>

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

**Northern Ireland** — Technical Booklet E, Section 3, paragraphs 3.35 to 3.39, and Section 4.

## **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 465 : 2002) *U-values for light steel-frame construction*, using the declared thermal conductivity ( $\lambda_{90/90}$  value) of the insulation as can be seen in Table 3.

6.2 The U value of a completed wall will depend on the selected insulation thickness, the number of fixings, the insulating value of the substrate and its internal finish. A calculated U value for an example construction is given in Table 4.

Table 3 Thermal conductivity values<sup>(1)</sup>

Insulation	Thickness (mm)	$\lambda_{90/90}$ value ( $\text{Wm}^{-1}\text{K}^{-1}$ )
Phenolic board	40–45	0.023
(40 $\text{kgm}^{-3}$ density)	$\geq 45$	0.021

(1) Not assessed by the BBA.

Table 4 Example wall U value ( $\text{Wm}^{-2}\text{K}^{-1}$ )<sup>(1)</sup>

Construction	U value
12.5 mm plasterboard	0.321
100 mm steel C-sections with 50 mm flanges	
12 mm cement particle board	
15 mm steel cavity spacer rail	
15 mm air cavity	
60 mm phenolic insulation	
4 mm diameter steel anchor	
8 mm render <sup>(2)</sup>	0.27
As above but with 80 mm of phenolic insulation	

(1) This U value has not been corrected to take into account losses at junctions.

(2) Water vapour diffusion — equivalent air layer thickness  $s_d$  (m)  $\leq 1$  m.



6.3 When considering insulation requirements, designers should refer to the detailed guidance contained in the documents supporting the national Building Regulations. The typical design U values referred to in those supporting documents are given in Tables 5 and 6.

Table 5 Typical design values for walls — England, Wales and Northern Ireland

U value ( $\text{Wm}^{-2}\text{K}^{-1}$ )	Construction type
0.30	Mean for new extensions
0.35	'notional' mean in SAP and SBEM and limit mean for new-build
0.35	Limit mean for replacement <sup>(1)</sup> , renovation <sup>(1)</sup> and retained <sup>(1)</sup> walls
0.70	Individual limit for new-build and flexible approaches

(1) Details of alternative/flexible approaches are given in relevant document supporting the national Building Regulations.

Table 6 Typical design U values for walls — Scotland

U value ( $\text{Wm}^{-2}\text{K}^{-1}$ )	Construction type
0.20	'notional' mean for dwellings in SAP and the 'simplified' approach: — solid fuel, package 6
0.25	
0.27	Limit mean for new extensions, conversions <sup>(1)</sup> , alterations <sup>(1)</sup> and reconstructions <sup>(1)</sup>
0.30	'notional' mean for non-domestic buildings in SBEM and limit mean for new-build
0.70	Individual limit for new-build, new extensions, conversions, alterations and reconstructions

(1) Details of alternative/flexible approaches are given in relevant document supporting the national Building Regulations.

## New buildings

6.4 Walls with U values lower than (or the same as, for dwellings in Scotland) the relevant 'notional' value specified in Table 5 or Table 6 will contribute to a building meeting its Target Emission Rate. Walls with higher U values will require additional energy saving measures in the building envelope and/or services.

## Existing buildings



6.5 For existing buildings, extensions, conversions and similar work, walls will be acceptable where they do not exceed the relevant U value given in Table 5 or Table 6, and junctions and openings comply with section 6.4 or BRE report (BR 262 : 2002) *Thermal insulation: avoiding risks*.

## All cases

6.6 Care must be taken to ensure an appropriate thickness of insulation is used particularly at points, such as windows and door reveals, to avoid thermal bridging and reduce the risk of condensation forming at these points. Items such as windows and doors should be selected taking into account the thickness of insulation required at the reveals to help prevent condensation forming at these junctions.

6.7 Cold bridging can also occur at the eaves and at ground-floor level, and care should be taken to minimise this, eg roof or loft insulations should continue over the wall head. Care should be taken to ensure that ventilation openings are not obstructed.

## 7 Proximity of flues and appliances

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

**England and Wales** — Approved Document J

**Scotland** — Mandatory Standard 3.19

**Northern Ireland** — Technical Booklet L.

## 8 Risk of interstitial condensation



8.1 The components of the system have a water vapour resistance such that, under the adverse conditions likely to be found in dwellings in the United Kingdom, interstitial condensation should not occur within the insulation.

8.2 If a system is to be used on the external walls of rooms expected to have continuous high humidities, care must be taken in the design of the rooms to avoid possible problems from the formation of interstitial condensation in the wall.

8.3 Care must be taken to ensure the building is adequately sealed and ventilation is in place to help prevent surface condensation forming on the internal face of the sheathing board or the surface of the steel frame.

8.4 Designers should ensure that an appropriate condensation risk analysis has been carried out for all parts of a construction, including openings and penetrations, to ensure condensation does not occur within a particular construction.

## 9 Weathertightness and moisture penetration

9.1 The building should be airtight and weather-proof before the installation of the system. The cement particle board substrate must be a suitable exterior grade sheathing with appropriately sealed joints and a vapour control layer where required. The Epsitec External Wall Insulation System improves the weather resistance of a wall construction and provides a decorative finish. The system may only be installed where there are not signs of dampness on the inner surface of the substrate other than those caused solely by condensation.



9.2 Tests show that the system can resist the passage of moisture. The designer should check that the windows, doorsets, flashings, and other similar items have been specifically designed for use with this type of insulation system. Particular attention should be made to the prevention of water ingress into the system. For example, junctions between the insulation systems and windows must avoid creating a direct path that could facilitate the transfer of water from the external surface of the wall into the wall construction or to the internal surface; also opening and penetration details should be designed to deflect water away from the insulation and onto the external face of the wall. Examples of relevant detailing for external wall insulation systems with a drainage cavity can be seen in SCI Publication P343 *Insulated Render System Used With Light Steel Framing*, Steel Construction Institute, 2006.

9.3 Guidance 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. Additional guidance can be found in:

**England and Wales** — Approved Document C, Section 5

**Scotland** — Mandatory Standard 3.10<sup>(1)(2)</sup>

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

**Northern Ireland** — Technical Booklet C, Section 2.



9.4 When using the system, consideration must be given to the overall design to minimise the risk of condensation and the recommendations of BS 5250 : 2002 should be followed.

9.5 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 14.20).

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

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

## 10 Maintenance



10.1 As part of a maintenance programme, regular inspections should be made on the installed system to ensure that ingress of water does not occur. Such programmes should include the replacement and resealing of joints, eg those between the insulation system and window and door frames. The interval between inspections should be considered on a building-by-building basis taking into consideration, for example, such factors as the building location and height. Necessary repairs should be effected immediately and the joints at window and door frames replaced at regular intervals.

10.2 The designer should ensure appropriate provision for access is available to enable maintenance inspections to take place safely.

10.3 Damaged areas must be repaired using the appropriate components; the Certificate holder should be contacted for further information.

## 11 Durability



11.1 The results of accelerated ageing tests in accordance with MOAT No 22 : 1988 indicate that the system is durable. The system should remain effective for at least 30 years, provided any damage to the surface finish is repaired immediately, and regular maintenance is undertaken (see section 10). This includes checks on joints in the systems and on penetrations to enable corrective action to be taken to rectify the defects.

11.2 The finish may become discoloured with time, the rate depending on the initial colour, the degree of exposure and atmospheric pollution, as well as the design and detailing of the wall. In common with traditional renders, discoloration by algae and lichens may occur in wet areas.

## Installation

### 12 General

Application of the systems, within the context of this Certificate, is 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 systems and have operatives that, upon completion of their training, have been issued with an appropriate identification card by the Certificate holder
- having undertaken to comply with the Certificate holder's application procedure, containing the requirement for each application team to include at least one member with an identification card
- subject to supervision by the Certificate holder, including site inspections.

### 13 Site survey and preliminary work

13.1 Before application of the Epsitec External Wall Insulation System, a pre-installation survey of the property is carried out to determine whether repairs are required to the sheathing board or steel frame. Repairs should be carried out before installation commences. A specification is prepared for each elevation of the building indicating, for example:

- position of starter tracks, cavity spacer tracks, and render beads
- position and amount of reinforcing scrim
- additional reinforcing scrim at corners of openings
- detailing around windows, doors and at eaves
- dpc level
- location and type of weather seals to be used and location of water-deflection channels (see Figure 4)
- areas where suitable silicone sealants must be used
- position of fire barriers.

13.2 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 insulation boards or slabs are installed with a smooth, in-plane finished surface.

13.3 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.

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

### 14 Procedure

#### General

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

14.2 Application of coating materials must not be carried out at temperatures below 5°C, above 30°C nor 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.

14.3 All rendering should be in accordance with the relevant recommendations of BS EN 13914-1 : 2005 and BS EN 13914-2 : 2005.

14.4 Before installation takes place, the building designer must confirm where items such as rainwater goods, satellite dishes, clothes lines and hanging baskets will be placed. The fixing points for these items must be specifically designated and built into the system as the insulation is installed.

#### Positioning and securing insulation boards

14.5 Vertical cavity spacer bars are mechanically fixed to the cement particle board and/or steel at a maximum of 600 mm centres. Rails may need packing to ensure they are true to line and level. Drainage-deflection channels are mechanically fixed over all window and door openings and horizontal and vertical fire barriers are installed following the designer's instructions.

14.6 The first insulation board is positioned on the starter track and secured through the cavity spacer track into the sheathing board using a self-drilling, self-tapping fastening. Subsequent boards are positioned so that the joints are staggered and overlapped at the building corners (see Figures 4 and 5). Care must be taken to ensure the fixings are not overdriven.

Figure 4 Arrangement of insulation boards and typical fixing pattern

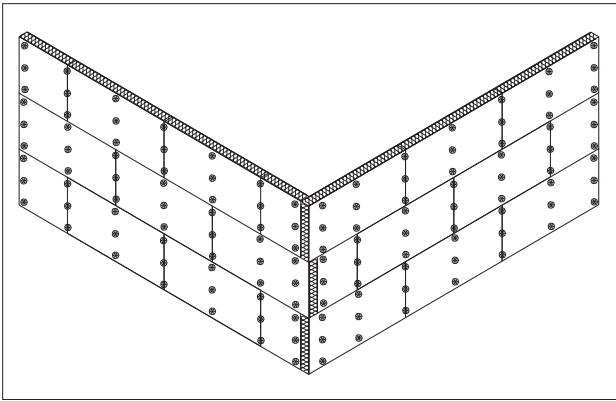
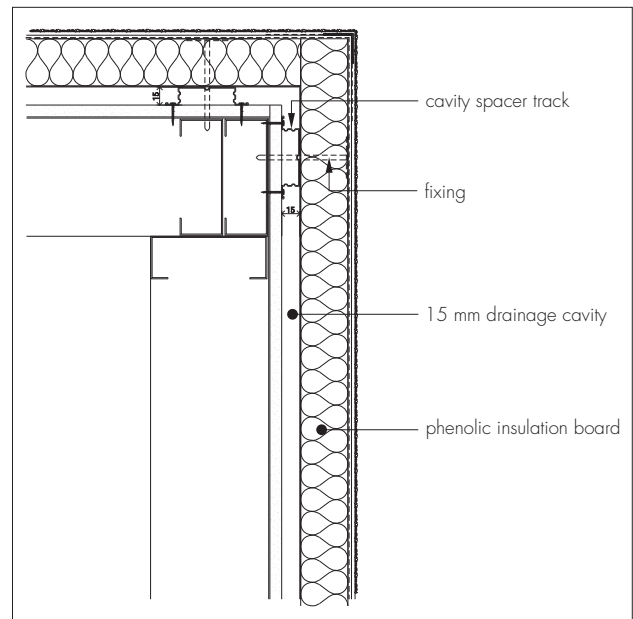


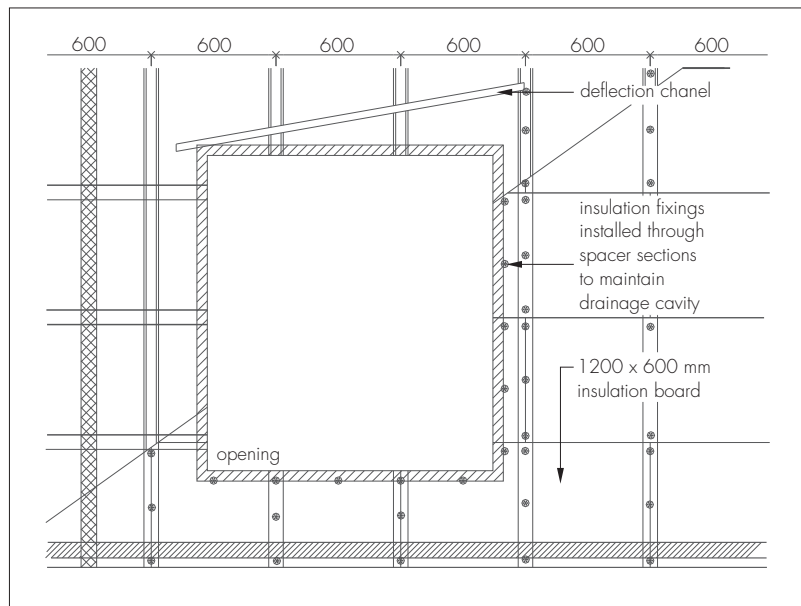
Figure 5 Typical corner detail



14.7 Care must be taken to ensure that all insulation board edges are butted tightly together, and alignment is checked as work proceeds. The surface of the boards should be smooth without high spots or irregularities.

14.8 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 fitted (see Figure 6). They are designed to prevent or manage water ingress and allow water to be shed clear of items bridging the cavity.

Figure 6 Typical opening details showing deflection channels and other guards against water ingress



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

### Movement joints

14.10 The insulation systems covered by this Certificate do not have provision for movement joints (see section 4).

### Reinforcing

14.11 In buildings above two storeys, holes are drilled at 1 m centres for additional fixings before the basecoat hardens, and stainless steel fixings are inserted through the scrim, insulation and fixing channel into the cavity spacer track, sheathing board and steel frame or into the cavity spacer track and sheathing board.

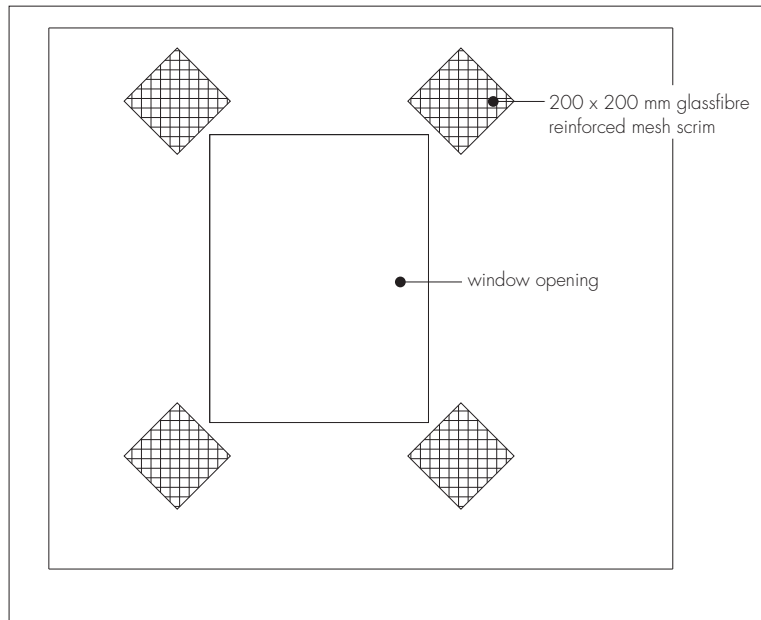
14.12 Fixings are inserted into the centre of each board through the wet scrim adhesive.

## Rendering and finishing

14.13 The basecoat Heck K+A Basecoat render is prepared by mixing the contents of each 25 kg bag with approximately 4 litres to 5 litres of cold, clean water, using a paddle mixer. Mixing time should be at least five minutes after the addition of the last bag of render to allow an even dispersion of the resins.

14.14 The mixed basecoat render is trowel-applied to the surface of dry insulation boards to a minimum thickness of 4 mm. The scrim is bedded into the adhesive with 100 mm laps at joints. Additional reinforcement should be applied at corners of windows and doors in accordance with Figure 7.

Figure 7 Corner reinforcement



14.15 Prior to the render coat, the relevant seals are positioned and installed at all openings (for example windows and doors), overhanging eaves, gas and electric meter boxes, wall vents or where the render abuts any other building material or surface. This helps to reduce the risk of water ingress into the structure.

14.16 The drying period of any render will depend on weather conditions; however, once applied, the basecoat must be left to harden for at least one day before application of the topcoat. The topcoat is supplied pre-mixed in a tub and is trowel-applied to a thickness of from approximately 2 mm to 4 mm.

14.17 Surface mounted PVC render beads are fixed with firtree fixings and bedded in scrim adhesive.

14.18 A second coat of Heck K+A Basecoat adhesive is applied to a thickness of between 2 mm and 4 mm and finished smooth to receive the silicone texture coat.

14.19 When the basecoat render is dry a primer coat is applied.

14.20 Care should be taken in the detailing of the system around such features as openings, projections and at eaves (see Figures 8 and 9) to ensure adequate protection against water ingress and to limit the risk of water penetrating the system.

Figure 8 Typical roof eaves detail

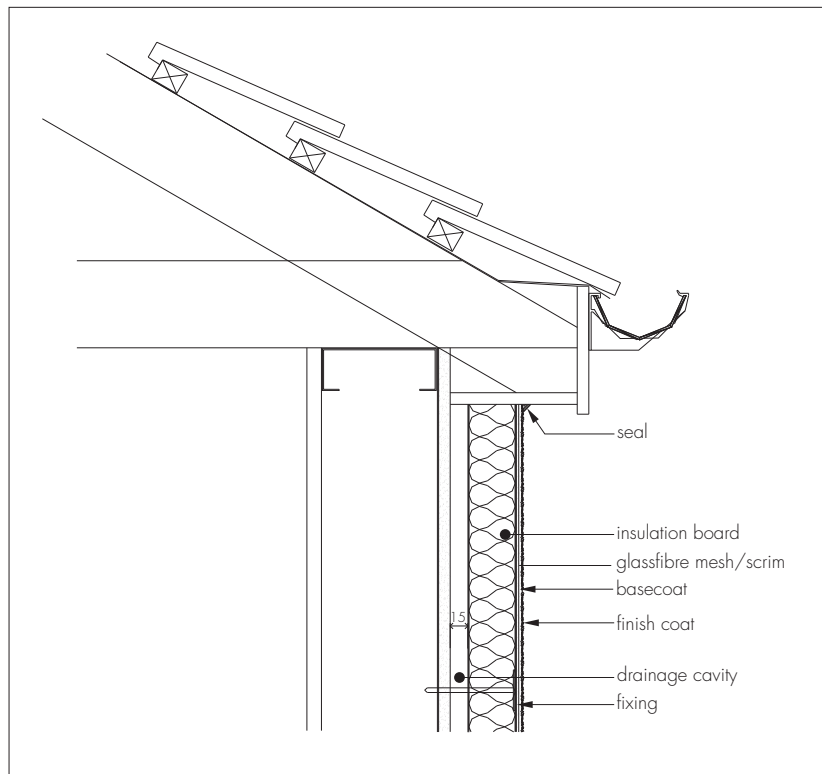
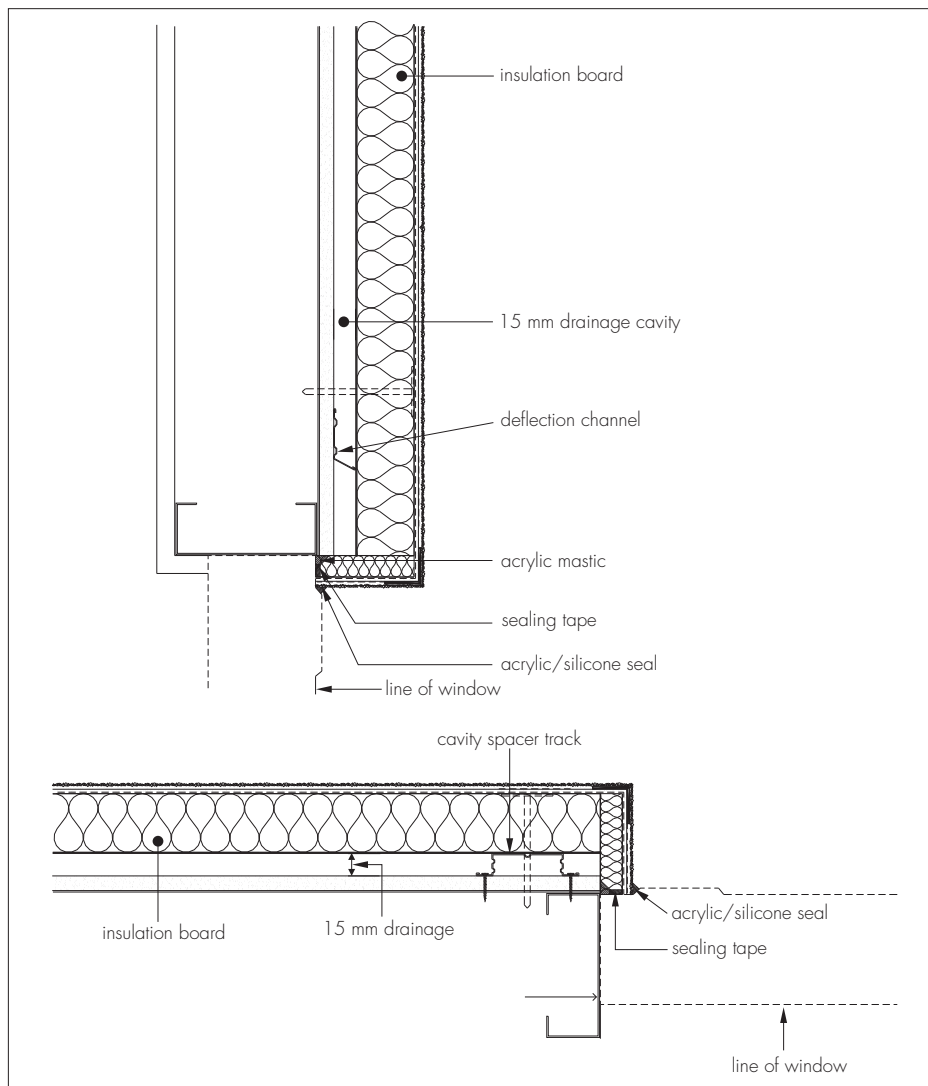


Figure 9 Typical opening details



14.21 The silicone texture render is lightly mixed and applied in an even thickness to the grain size. Prior to setting, the render is polished with a plastic float to give uniform even texture and remove all trowel lines. Elevations should be completed in one application and finished to natural breaks in render, ie beads or building corners. Texture should be checked to ensure same batches are applied to each elevation, where possible drums can be batch mixed to ensure colour consistency.

## 15 Site practice

### Installation checklist

The items shown in Table 7 must be checked by the person supervising the installation of the system at the end of each relevant stage of the work.

Stage of installation	Item to check	Criterion
Initial installation	Starter track	In place, level and with the correct number of fixings, appropriate insect mesh is in place?
	Cavity spacer track	In place, level or plumb and with the correct number of fixings and positioned to ensure water is directed away from the sheathing and towards the rear face of the insulation?
	Fire stop details	Installed in the appropriate positions and shielded from any water that may be present in the cavity?
	Drainage deflector bead	Correctly installed at the appropriate position to ensure water is directed away from the sheathing and towards the rear face of the insulation?
	Sealing	Correctly positioned and effective?
Positioning and fixing of insulation	Insulation boards	Set out as detailed in this Certificate?
	Fixings	As specified in the design?
	Fixing pattern	Appropriate fixings used at the correct spacing as detailed in the fixing pattern?
	Jointing and sealing	All correctly positioned and effective. No joints that would enable water to move straight through from the external face to the internal face?
Basecoat and reinforcing	Basecoat and mesh	Correct thickness and embedment as detailed in this Certificate?
	Reinforcing	Positioned and fully embedded?
	PVC surface render beads	Positioned and fully embedded?
	Additional fixings	Correctly positioned and fixed into the cavity spacer rail?
	Basecoat	Correct thickness and finish?
	Jointing and sealing	All correctly positioned and effective. No joints that would enable water to move straight through from external face to internal face?
Finish	Primer	Set out as detailed in this Certificate?
	Finish coat	Set out as detailed in this Certificate?
	Sealing	Correctly positioned and effective?
Final checks	Sealing	Correctly positioned and effective?
	General	Good order throughout, have the correct materials been used?
		Have the appropriate details been installed?
		Have all openings through the insulation systems been appropriately sealed?
		Have the sheathing boards been damaged during the insulation?
	Has the galvanizing to the steel frame been damaged during the installation of the systems?	
	Have the windows and door sets, etc been installed in accordance with best practice?	

## Technical Investigations

### 16 Tests

16.1 Tests were carried out in accordance with MOAT No 22 : 1988 to determine:

- heat/spray cycling
- resistance to freeze/thaw
- impact resistance.

16.2 An examination was made of data relating to:

- adequacy of fixing system
- durability of finish.

16.3 The practicability of installation and the effectiveness of typical details were examined.

16.4 An overview of the test wall construction used in the BS 8414-2 : 2005 test is given in Table 8. Full details of the construction tested can be found in BRE Test Report 233775-1.

Table 8 An overview of the test wall construction used in the BS 8414-2 : 2005 test

System substrate
1.2 mm thick 90 mm by 190 mm steel studwork spaced at 600 mm centres.
12 mm thick cement particle sheathing boards 2400 mm by 1200 mm fixed to the external face of the steel studwork at 300 mm centres vertically and 600 mm centres horizontally. The joints between the sheathing boards were sealed on the internal face with intumescent acrylic mastic sealant, and on the external face with mastic sealant.
Intumescent fire seal was incorporated into the construction at 2.5 m intervals from the top of the opening; no fire breaks were installed into the phenolic insulation.
A Pyrospan intumescent strip was also installed vertically between the top-hat sections and the internal corner.
A 15 mm steel top-hat section was fixed vertically to the sheathing boards and the phenolic insulation was installed onto the steel top-hat section and held in place using mechanical fastenings.
The insulation was coated with a 5 mm coat of Heck K and A polymeric based adhesive, embedded into this was a glassfibre mesh of 160 gm <sup>-2</sup> . Following the application of the basecoat an Epsicon silicone primer was applied.

## 17 Investigations

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

## Bibliography

- BS 5250 : 2002 *Code of practice for control of condensation in buildings*
- BS 5950-5 : 1998 *Structural use of steelwork in building — Code of practice for design of cold formed thin gauge sections*
- BS 6399-2 : 1997 *Loading for buildings — Code of practice for wind loads*
- BS 8000-10 : 1995 *Workmanship on building sites — Code of practice for plastering and rendering*
- BS 8200 : 1985 *Code of practice for design of non-loadbearing external vertical enclosures of buildings*
- BS 8414-2 : 2005 *Fire performance of external cladding systems — Test method for non-loadbearing external cladding systems fixed to and supported by a structural steel frame*
- BS EN 634-2 : 2007 *Cement bonded particleboards — Specification — Requirements for OPC bonded particleboards for use in dry, humid and exterior conditions*
- 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 10326 : 2004 *Continuously hot-dip coated strip and sheet of structural steels — Technical delivery conditions*
- BS EN 13163 : 2001 *Thermal insulation products for buildings — Factory made products of expanded polystyrene (EPS) — Specification*
- BS EN 13914-1 : 2005 *Design, preparation and application of external rendering and internal plastering — External rendering*
- BS EN 13914-2 : 2005 *Design, preparation and application of external rendering and internal plastering — Design considerations and essential principles for internal plastering*
- BS EN ISO 6946 : 1997 *Building components and building elements — Thermal resistance and thermal transmittance — Calculation method*
- MOAT No 22 : 1988 *UEAtc Directives for the Assessment of External Insulation Systems for Walls (Expanded Polystyrene Insulation Faced with a Thin Rendering)*

## 18 Conditions

18.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is granted only to the company, firm or person named on the front page — no other company, firm or person may hold or claim any entitlement to this Certificate
- 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 and documents referred to in this Certificate are those that the BBA deems to be relevant at the date of issue or re-issue of this Certificate and include any: Act of Parliament; Statutory Instrument; Directive; Regulation; British, European or International Standard; Code of Practice; manufacturers' instructions; or any other publication or document similar or related to the aforementioned.

18.3 This Certificate will remain valid for an unlimited period provided that the product/system and the manufacture and/or fabrication including all related and relevant 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 In granting this Certificate, the BBA is not responsible for:

- 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
- individual installations of the product/system, including the nature, design, methods and workmanship of or related to the installation
- the actual works in which the product/system is installed, used and maintained, including the nature, design, methods and workmanship of such works.

18.5 Any information relating to the manufacture, supply, installation, use and maintenance 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 and maintained. It does not purport in any way to restate the requirements of the Health & Safety at Work etc Act 1974, or of any other statutory, common law or other duty which may exist at the date 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. In granting this Certificate, the BBA does not accept responsibility to any person or body for any loss or damage, including personal injury, arising as a direct or indirect result of the manufacture, supply, installation, use and maintenance of this product/system.