Dryvit UK Ltd
Unit 4
Wren Park
Hitchin Road
Shefford
Bedfordshire SG17 5JD
Tel: 01462 819555 Fax: 01462 819556
e-mail: ukenquiries@dryvit.com
website: www.dryvit.co.uk

Agrément Certificate
98/3548
Product Sheet 3

DRYVIT EXTERNAL WALL INSULATION SYSTEM

OUTSULATION RAIL SYSTEM

PRODUCT SCOPE AND SUMMARY OF CERTIFICATE

This Certificate relates to the Outsulation Rail System, a rail-fixed external wall insulation system employing EPS insulation and a reinforced acrylic render finish incorporating a glassfibre mesh. It is for use above the dpc on new or existing domestic and non-domestic timber- or lightweight-steel-framed buildings sheathed with a suitable exterior grade sheathing board.

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

Strength and stability — a correctly designed system will have adequate resistance to wind loads and, in certain applications, impact damage (see section 5).

Behaviour in relation to fire — expanded polystyrene is combustible and will require certain measures to be taken. The system with different insulation thicknesses passed the fire-performance test (see section 6).

Risk of condensation — the system can contribute to limiting the risk of surface and interstitial condensation (see section 9).

Thermal performance — the system can be used to improve the thermal performance of external walls or contribute to meeting the Building Regulations requirements (see section 10).

Durability — with appropriate care, the insulation system should remain effective for at least 30 years (see section 12).

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

Date of First issue: 26 April 2011

Brian Chamberlain
Head of Approvals — Engineering

Greg Cooper
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.

Regulations

In the opinion of the BBA, the Outsulation Rail 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 2010 (England and Wales)

Requirement:	A1	Loading
Comment:		The system can sustain and transmit wind loads to the structural frame. See sections 5.5 and 5.10 of this Certificate.
Requirement:	B4(1)	External fire spread
Comment:		The system can meet this Requirement. See sections 6.1 to 6.6 of this Certificate.
Requirement:	C2(b)	Resistance to moisture
Comment:		The system provides a degree of protection against rain ingress. See sections 8.3 to 8.5 of this Certificate.
Requirement:	C2(c)	Resistance to moisture
Comment:		The system contributes to minimising the risk of interstitial and surface condensation. See sections 9.1, 9.2, 9.7 and 9.9 to 9.11 of this Certificate.
Requirement:	L1(a)(i)	Conservation of fuel and power
Comment:		The system can contribute to enabling a wall to meet the Target Emission Rate. See sections 10.2 and 10.4 of this Certificate.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The system is acceptable. See section 12.1 and the *Installation* part of this Certificate.

The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)(2)	Fitness and durability of materials and workmanship
Comment:		The system can contribute to a construction meeting this Regulation. See sections 11.1 and 12.1 and the *Installation* part of this Certificate.
Regulation:	9	Building standards — construction
Standard:	1.1	Structure
Comment:		The system can sustain and transmit wind loads to the structural frame. See sections 5.5 and 5.10 of this Certificate.
Standard:	2.6	Spread to neighbouring buildings
Comment:		The system has a 'low risk' surface classification. The system incorporates insulation which would not be classed as 'non-combustible'. Completed walls, therefore, would be regarded as unprotected areas, with reference to clauses 2.6.1[(1)(2)], 2.6.2[(1)(2)], 2.6.3[(1)(2)], 2.6.4[(1)(2)], 2.6.5[(1)] and 2.6.6[(2)]. See sections 6.1 to 6.6 of this Certificate.
Standard:	2.7	Spread on external walls
Comment:		The system incorporates insulation which would not be classed as 'non-combustible' and, therefore, should not be used on walls one metre or less from a boundary, with reference to clauses 2.7.1[(1)(2)] and 2.7.2[(2)]. See sections 6.1 to 6.6 of this Certificate.
Standard:	3.10	Precipitation
Comment:		Walls insulated with the system will contribute to a construction satisfying this Standard, with reference to clause 3.10.1[(1)(2)]. See sections 8.3 to 8.5 of this Certificate.
Standard:	3.15	Condensation
Comment:		Walls insulated with the system can satisfy the requirements of this Standard, with reference to clauses 3.15.1[(1)], 3.15.3[(1)] and 3.15.4[(1)]. See sections 9.1, 9.2 and 9.8 to 9.11 of this Certificate.
Standard:	6.1(b)	Carbon dioxide emissions
	6.2	Buildings insulation envelope
Comment:		The system can contribute to satisfying these Standards, with reference to clauses 6.2.0[(1)(2)], 6.2.4[(1)(2)] and 6.2.5[(2)]. See sections 10.2 and 10.4 of this Certificate.
		(1) Technical Handbook (Domestic).
		(2) Technical Handbook (Non-Domestic).

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

Regulation:	B2	Fitness of materials and workmanship
Comment:		The system is acceptable. See section 12.1 and the *Installation* part of this Certificate.
Regulation:	B3(2)	Suitability of certain materials
Comment:		The system is acceptable. See section 11.1 of this Certificate.
Regulation:	C4(b)	Resistance to ground moisture an weather
Comment:		Walls insulated with the system can satisfy this Regulation. See sections 8.3 to 8.5 of this Certificate.
Regulation:	C5	Condensation
Comment:		Walls insulated with the system can satisfy the requirements of this Regulation. See sections 9.1, 9.2 and 9.9 to 9.11 of this Certificate.
Regulation:	D1	Stability
Comment:		The system can sustain and transmit wind loads to the structural frame. See sections 5.5 and 5.10 of this Certificate.

Regulation:	E5(a)	External fire spread
Comment:		The system can satisfy this Regulation. See sections 6.1 to 6.6 of this Certificate.
Regulation:	F2(a)(i)	Conservation measures
Comment:		The system can enable a wall to meet this Regulation. See sections 10.2 and 10.4 of this Certificate.
Regulation:	F3(2)	Target carbon dioxide Emissions Rate
Comment:		The system can contribute to a building satisfying its target emission rate. See sections 10.2 and 10.4 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 storage* (2.4) of this Certificate.

Non-regulatory Information

NHBC Standards 2011

NHBC accepts the use of the Outsulation Rail System, when installed and used in accordance with this Certificate, in relation to *NHBC Standards*, Chapter 6.10 *Light steel framed walls and floors*.

General

This Certificate relates to the Outsulation Rail System, an external wall insulation system employing EPS insulation and a reinforced acrylic render finish incorporating a glassfibre mesh, for use on:

- sheathed lightweight steel-framed structures — the system incorporates specific reinforced renders and, when correctly installed, will create a 15 mm (nominal) wide drainage cavity
- timber-framed constructions — a breather membrane must be secured to the sheathing and an appropriate cavity created with a nominal width of 20 mm.

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

Technical Specification

1 Description

1.1 The Outsulation Rail System comprises a rail support system mechanically fixed to the substrate and insulation boards locking into the frame and covered with render finishes (see Figure 1). The system comprises:

Rail support system

- rails — unplasticised polyvinyl chloride (PVC-U) or aluminium rails including starter tracks, holding tracks and termination tracks, fastened to the substrate
- vertical T-splines — for supporting vertical edges of insulation boards and fit into grooves in the insulation board edges
- deflection beads — channels for deflecting water present in the drainage cavity around openings and penetrations
- polyamide shims — used where required as spacers between the substrate and rails to achieve the desired cavity width. The rails are fixed to the substrate through the shims
- Dryvit approved mechanical fixings — for fixing the rails and other profiles to the substrate
- packers — pieces of EPS 600 mm long used behind the insulation board in the starter track and with deflection beads to close the cavity, where required.

Insulation

- insulation boards — expanded polystyrene (EPS) grooved-edge boards of size 500 mm by 500 mm, thickness from 50 mm to 250 mm in 10 mm increments and a minimum grade of EPS70 (classified as Euroclass E in accordance with BS EN 13501-1 : 2007) with a tensile resistance greater than 115 kPa).

Render finishes and reinforcement

- Genesis Adhesive/Basecoat — latex emulsion containing aggregate and coalescing and thickening agents. Mixed on site with Portland cement in the ratio of 1:1 by weight and can be used as either a base coat or an adhesive
- Dryvit Standard Plus Mesh — a woven, polymer-coated, reinforcing glassfibre mesh of nominal weight 210 $g \cdot m^{-2}$ and width 1.22 m
- Dryvit Detail Mesh — a woven, polymer-coated, reinforcing glassfibre mesh of nominal weight 145 $g \cdot m^{-2}$ and width 240 mm
- Dryvit Corner Mesh — a woven, polymer-coated, glassfibre mesh of nominal weight 320 $g \cdot m^{-2}$ supplied in sections to be fitted at corners, when required
- Dryvit Primer with Sand — pigmented acrylic emulsion primer containing fine sand and coalescing agents
- Dryvit PMRB finish — Quarzputz, acrylic-based emulsions containing aggregate and coalescing and thickening agents.

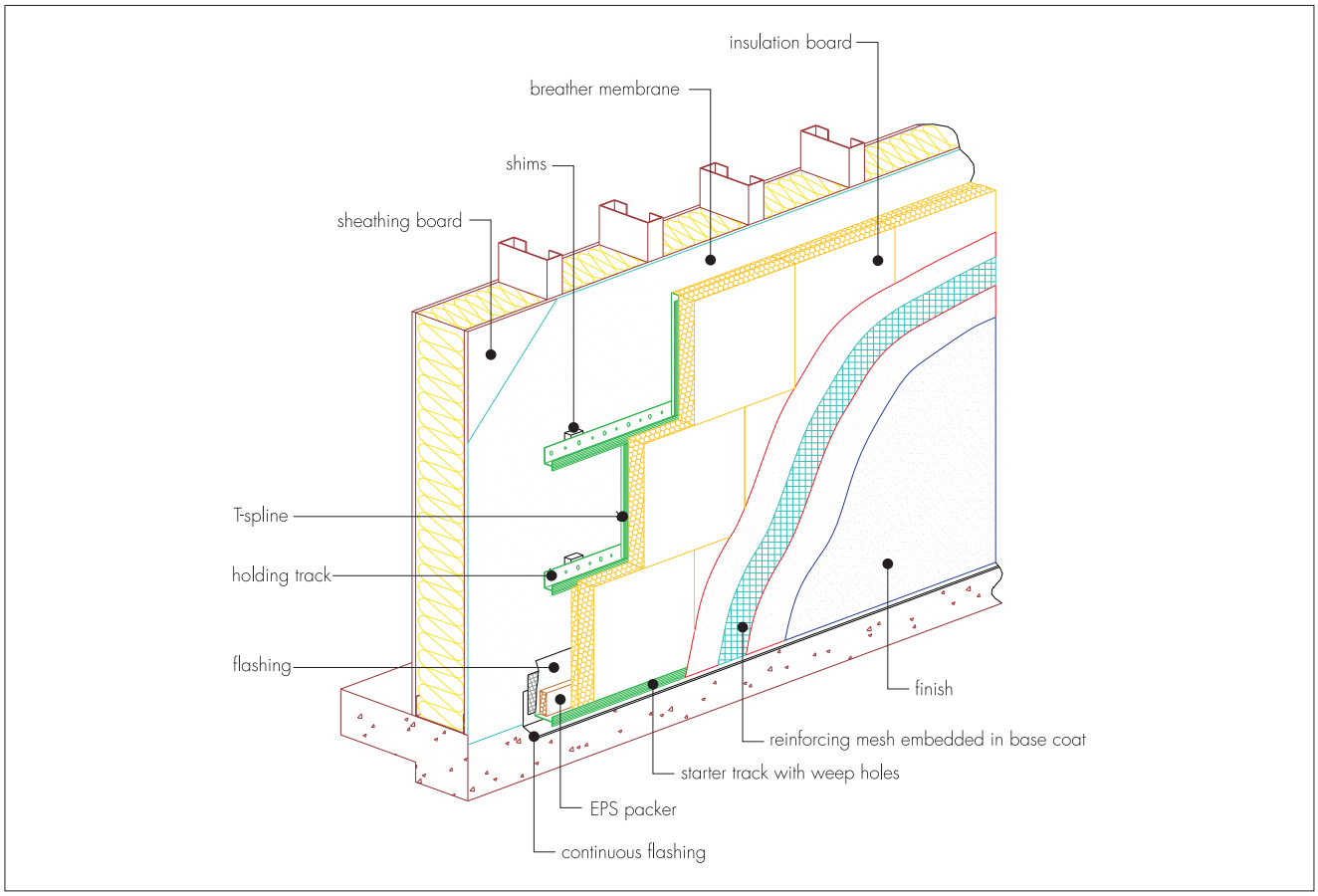
Ancillary components for render

- standard profiles — for wall base, end stop, corner mesh and expansion joint
- Dryvit corner bead with mesh — a woven, polymer-coated glassfibre mesh adhered to a perforated 90° PVC corner bar.

Ancillary components (used with the system but outside the scope of this Certificate)

- breather membrane — covered by a BBA Certificate and used between the substrate's sheathing board and the rail system. Used when required on steel-framed walls and in every case on timber-framed walls.
- sealant — low-modulus silicone sealant
- insect mesh.

Figure 1 Outsulation Rail System



2 Delivery and site storage

2.1 The insulation boards are delivered in shrink-wrapped polyethylene packs, bearing the manufacturer's name and product identification.

2.2 The insulation must be protected from prolonged exposure to sunlight by either 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 base coat, primer and finish must be stored at or above 4°C in sealed containers out of direct sunlight.

2.4 Components are delivered in the containers and quantities listed in Table 1. Each container carries product identification.

Table 1 Component supply details

Component	Quantity and packaging
Insulation	wrapped in plastic film
Standard Plus Mesh	1.22 m wide roll
Detail Mesh	240 mm wide roll
Genesis	27.2 kg pail
Primer with Sand	27.2 kg pail
PMRB finishes	32 kg pail

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on the Outsulation Rail System.

Design Considerations

3 General

3.1 The Outsulation Rail System when installed in accordance with this Certificate, is effective in 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 systems.

3.2 The system will improve the weather resistance of a wall and provide a decorative finish. However, it may be installed only where other routes for moisture penetration have been dealt with separately and where there are no signs of dampness on the inner surface of the wall, other than those caused solely by condensation. The systems can be used to overcome condensation associated with the internal wall surface.

3.3 The system is suitable for use on new or existing domestic and non-domestic buildings one metre or more (more than one metre in Scotland) from a boundary and where the floor level of any storey above the ground floor is up to and over 18 m above ground level (see section 6) and can be installed on steel- or timber-framed buildings with vertical studs. It is essential that appropriate movement joints are incorporated into the system:

Steel-framed buildings

- the structural frame of the building is the responsibility of the building designer and is outside the scope of the Certificate. However, the frame and sheathing must be designed to withstand the loads applied to it from the insulation system and give an acceptable resistance to pull-out of fixings (see section 5). The system must be secured to the substrate with fixings that pass through the polyamide shims to create a nominal 15 mm wide cavity between the sheathing and insulation. This drainage cavity must not be vented to the outside air to an extent that would affect the thermal performance of the system.

Timber-framed buildings

- the buildings should be sheathed and designed in accordance with BS EN 1995-1-1 : 2004 and BS EN 1995-1-2 : 2004 (Eurocode 5). The system must incorporate an appropiate 20 mm (nominal) wide vented and drained cavity.

3.4 Existing buildings subject to the Building Regulations should have wall surfaces in accordance with section 13 *Site survey and preliminary work* of this Certificate.

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

- BS EN 1993-1-1 : 2005 (Eurocode 3) and other parts where appropriate
- BS EN 1995-1-2 : 2004 (Eurocode 5) and other parts where appropriate.

3.6 Other new buildings not subject to regulatory requirements should also be built in accordance with the Standards identified in section 3.5.

3.7 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 (see section 15.6).

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

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

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

4 Practicability of installation

Construction of the system is carried out by contractors trained and recommended by the Certificate holder in accordance with the Certificate holder's Installation Manual (see section 13).

5 Strength and stability

General

5.1 Installations incorporating the insulation system can be designed to provide adequate resistance to design loads applicable in the UK.

5.2 Negative wind pressure (suction) is resisted by the bond between the render and the insulation boards, the flexural strength of the render/insulation composite, the strength of the fixing rail to insulation connection and the strength of the connection between the fixing rail and substrate wall.

5.3 Positive wind load (pressure) is transferred to the substrate wall directly via compression and bending of the render and insulation, to the fixing rail and shims and through the sheathing board to the structural frame.

5.4 Provided the substrate is suitable (see section 5.9), 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 substrate via the fixing rails. The number of rail fixings and the span between fixings should be determined by the building designer.

5.5 The wind loads on the walls 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 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.

5.6 Tests carried out on an installation with horizontal rails attached to a rigidly supported timber substrate with steel fixings with a head diameter of 14 mm placed at a maximum of 300 mm centres, with vertical T-splines and injected polyurethane foam at the board edges indicated that the system can resist a wind load of 1000 Pa (ie 150 N per fixing) (see section 5.9).

5.7 From tests carried out in accordance with ETAG 004 : 2000, section 5.1.4.1, it is confirmed that the bond between the basecoat and insulation is adequate to resist negative pressures likely to occur in buildings in the UK.

5.8 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 insulation 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 5.9).

5.9 An appropriate number of site-specific pull-out tests should be conducted on the substrate of the building to determine the characteristic pull-out resistance of the fixings. This should be determined in accordance with the guidance given in ETAG 014 : 2002, Annex D, by:

- calculating the mean of the five lowest pull-out values and taking 60% of this value as the characteristic resistance. Applying a factor of safety of say 3 will give the design ultimate resistance (eg if mean of five = 1000 N, characteristic resistance = 600 N and ultimate resistance 200 N).
- from pull-through test data with a safety factor of 3 applied the design ultimate pull-through load per fixing is 150 N.
- the number of fixings required per square metre is found by dividing the ultimate load by the minimum of these two values (ie 150 N).

5.10 The system is not affected by the deflections permitted when designing steel-frame structures to BS EN 1993-1-3 : 2006, ie span/300. Deflection must be limited to prevent damage to the insulation system and the Certificate holder's advice sought.

5.11 The designer should ensure that the fire break used with the system is fixed adequately to resist the anticipated wind loading.

5.12 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 due to variation of temperature and moisture levels between elements of the substrate (see section 14). This is to ensure substrate movement does not damage the insulation system.

Impact loading

5.13 The system is suitable for use 1.5 m above pedestrian or floor level in areas accessible primarily to those with a high incentive to exercise care or areas with only a small chance of accidents or misuse occurring (location category E as defined in BS 8200 : 1985, Table 2). For areas likely to be prone to greater impacts, the advice of the Certificate holder should be sought.

6 Behaviour in relation to fire

General

6.1 The surface spread of flame classification of the external surface of the system is given in Table 3. 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 Volume 2, Diagram 40)

Scotland — Mandatory Standards 2.6 and 2.7, clauses 2.6.1[(1)(2)] to 2.6.5[(1)(2)], 2.6.6[(2)], 2.6.7[(2)], 2.7.1[(1)(2)] and 2.7.2[(2)] respectively, and Annexes 2.C[(1)] and 2.E[(2)]

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

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

Table 3 Surface spread of flame classification

Render	Classification to BS EN 13501-1 : 2007
PMRB Quarzputz[(1)]	B-s2, d0

(1) Basecoat Dryvit Genesis, Dryvit Primer with Sand and Dryvit PMRB Quarzputz.

6.2 The insulation material is combustible and must be used in accordance with the relevant building regulations.

6.3 The documents listed in section 6.1 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.

6.4 The 50 mm and 250 mm systems incorporating a 15 mm cavity[1] with the fire break described in section 15.13 were tested[2][3] in accordance with BS 8414-2 : 2005. The system (see section 17.4), 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 national Building Regulations. Guidance concerning this is given in BRE report (BR 135 : 2007) *Fire Performance of External Insulation for Walls of Multi-storey Buildings*.

(1) The Certificate holder holds an LPCB certificate (No 784b) relating to the product applied to a lightweight steel frame covering an insulation thickness range from 50 mm to 250 mm with a drainage cavity of 15 mm.

(2) The test performance described above was achieved using a fire barrier construction that incorporated intumescent material. Whilst a construction incorporating this product 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.

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

6.5 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.

6.6 Fire stopping or fire barriers should be incorporated into a construction where required by the relevant building regulations to maintain the continuity of fire resistance:

England and Wales — Approved Document B, Sections 5[1] and 8[2]

Scotland — Technical Standards 2.2[3][4]

Northern Ireland — Technical Booklet F, Section 3.

(1) Dwellinghouses.

(2) Buildings other than dwellinghouses.

(3) Technical Handbook (Domestic).

(4) Technical Handbook (Non-Domestic).

7 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]

Northern Ireland — Technical Booklet L.

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

8 Rain penetration

8.1 Guidance in BRE report (BR 262 : 2002) should be followed in that the designer should select a construction and cavity type 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

Northern Ireland – Technical Booklet C, Section 2.

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

8.2 The system has been assessed for use in sheltered areas.

8.3 In all cases, care should be taken to ensure that walls are weathertight prior to application of the insulation system. The insulation system should only be installed where there are no signs of dampness on the inner surface of the substrate other than those caused solely by condensation.

8.4 Where used, the sheathing board substrate must be of a suitable exterior grade with appropriately sealed joints, sealed penetrations and vapour control layers where required. Examples of relevant detailing for external wall insulation system with a drainage cavity can be seen in SCI Publication P343 *Insulated Render System Used With Light Steel Framing* (Steel Construction Institute, 2006).

8.5 The designer should check that the windows, doorsets, flashings, and other similar items have been specifically designed for this use. Particular attention should be paid to the prevention of water ingress. For example, at junctions between the insulation system and windows, openings and penetration details should be designed to deflect water away from the insulation and onto the external face of the wall.

8.6 At the tops of walls, the insulation system should be protected by an adequate overhang or other detail designed for use with this type of insulation system (see Figure 7).

9 Risk of condensation

9.1 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 — the values given in sections 9.4 and 9.5 may be used.

9.2 Designers should ensure that an appropriate condensation risk analysis has been carried out for all parts of a construction, including at junctions between the insulation system, windows, and the sheathing board, and the structural frame, and at other openings and penetrations to ensure condensation does not occur at the surface or within.

9.3 Dynamic condensation modelling can be carried out for light-steel-framed constructions to help establish the likelihood of moisture accumulating within the construction over the design life of the building.

9.4 The equivalent air thickness of 2.4 mm of the basecoat applied to the insulation is 0.08 m.

9.5 The resistivity of the EPS insulation boards can be taken as 300 $MNs \cdot g^{-1} \cdot m^{-1}$.

9.6 Internal wet work, eg screeding or plastering, should be completed and allowed to dry prior to the application of a system. Where this is not possible appropriate alternative means of continuous ventilation must be used to ensure the removal of construction moisture.

Surface condensation

9.7 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 9.

9.8 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 : 2002, Section 8, and BRE report (BR 262 : 2002).

Interstitial condensation

9.9 Weathertight walls incorporating the insulation system will adequately limit the risk of interstitial condensation when they are designed and constructed in accordance with BS 5250 : 2002, Section 8 and Annex D.

9.10 If the insulation 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 surface and interstitial condensation.

9.11 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.

10 Thermal performance

10.1 Calculations of the thermal transmittance (U value) must include the effect of the type of cavity included within the system (see section 8) should be carried out in accordance with BS EN ISO 6946 : 2007, BRE Digest (BR 443 : 2006) *Conventions for U-value calculations*, and, where required, BRE report (BR 465 : 2002) *U-values for light steel-frame construction*, using the declared thermal conductivity ($\lambda_{90/90}$ *value*) of 0.038 $W \cdot m^{-1} \cdot K^{-1}$.

10.2 The U value of a wall construction will depend on the selected insulation thickness, 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 a steel-framed construction with an unventilated cavity are given in Table 4.

Table 4 Insulation thickness required to achieve some typical design values[1][2]

U value[3] ($W \cdot m^{-2} \cdot K^{-1}$)	Insulation thickness[4] (mm)
0.19	200
0.26	150
0.28	140
0.30	130

(1) Wall construction:
- 150 mm steel C-sections with 50 mm flanges (λ = 50 $W \cdot m^{-1} \cdot K^{-1}$)
- 12 mm cement particle board (λ = 1 $W \cdot m^{-1} \cdot K^{-1}$)
- 20 mm wide cavity spacer (λ = 0.17 $W \cdot m^{-1} \cdot K^{-1}$)
- unventilated drainage cavity (BS EN ISO 6946 : 2007)
- PVC fixing rail (λ = 017 $W \cdot m^{-1} \cdot K^{-1}$)
- 5 mm diameter steel anchor (λ = 50 $W \cdot m^{-1} \cdot K^{-1}$)
- EPS insulation (λ = 0.038 $W \cdot m^{-1} \cdot K^{-1}$)
- 8 mm render (λ = 1 $W \cdot m^{-1} \cdot K^{-1}$)
- one 8 mm diameter stainless steel fire fixing (λ = 50 $W \cdot m^{-1} \cdot K^{-1}$).

(2) Based on calculations in accordance with BS EN ISO 6946 : 2007 and three-dimensional computer modelling in accordance with BS EN ISO 10211 : 2007.

(3) Plain wall U values only.

(4) Based upon incremental insulation thicknesses of 10 mm.

10.3 When considering insulation requirements, designers should refer to the detailed guidance given in documents supporting the national Building Regulations.

10.4 The product can maintain, or contribute to maintaining, continuity of thermal insulation at junctions between elements and openings. Detailed guidance for junctions and on limiting heat loss by air infiltration can be found in:

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

Scotland — Accredited Construction Details (Scotland)

Northern Ireland — Accredited Construction Details (version 1.0).

10.5 Care must be taken to ensure an appropriate thickness of insulation is used, particularly at points such as junctions between floors and walls and at window 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.

11 Maintenance

11.1 Regular checks should be made on the installed insulation system, particularly at joints with other elements, to ensure that ingress of water does not occur. This should verify that architectural details for shedding water clear of the building are present and functioning, and that external plumbing fitments are in good condition. Maintenance schedules should include the replacement and resealing of joints, for example between the insulation system and window and door frames. The interval between inspections should be considered for each building taking into consideration such factors as the building location and height. Necessary repairs should be effected immediately and the sealant at joints at window and door frames replaced whenever required.

11.2 The designer should ensure suitable access is available to enable maintenance inspections to take place safely.

11.3 Damaged areas must be repaired using the appropriate components and the procedures detailed in the Certificate holder's technical literature. The Certificate holder should be consulted on the appropriate measures for a particular installation.

11.4 The finishes may become soiled in time, the rate depending on the product chosen, initial colour, the degree of exposure, level of atmospheric pollution and the design and detailing of the wall. The Certificate holder's advice should be sought for the restoration of the surface finish.

12 Durability

12.1 The system should remain effective for at least 30 years, provided any damage to the surface finish is repaired immediately, and regular maintenance is undertaken (see section 11).

12.2 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, dependent upon pigment colour and type, discoloration by algae and lichens may occur in wet areas.

12.3 Render containing cement may be subject to lime bloom. The occurrence of this may be reduced by avoiding application in adverse weather conditions. The effect is less noticeable on lighter colours.

Installation

13 General

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

- employing operatives who have been trained and recommended by the Certificate holder to install the system and have operatives that, upon completion of their training, have been issued with an appropriate training certificate 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 a training certificate.
- subject to supervision by the Certificate holder, including site inspections.

14 Site survey and preliminary work

14.1 Before application of the 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, shims, tracks, and render beads
- position and amount of reinforcing mesh
- additional reinforcing mesh 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.

14.2 The suitability of the construction for the installation of the system is determined as part of the pre-installation survey.

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

14.4 The flatness of surfaces must be checked; this may be achieved by using a straight-edge spanning the storey height. Any excessive irregularities, ie greater than 10 mm, must be made good prior to installation to ensure that an appropriate width of drainage cavity is maintained.

14.5 On existing buildings, purpose-made sills must be fitted to extend beyond the finished face of the system. New buildings should incorporate suitably deep sills.

14.6 Where appropriate, external plumbing should be removed and alterations made to underground drainage to accommodate its repositioning on the finished face of the insulation system.

15 Procedure

General

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

15.2 Application of coating materials must not be carried out at temperatures below 4°C or 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.

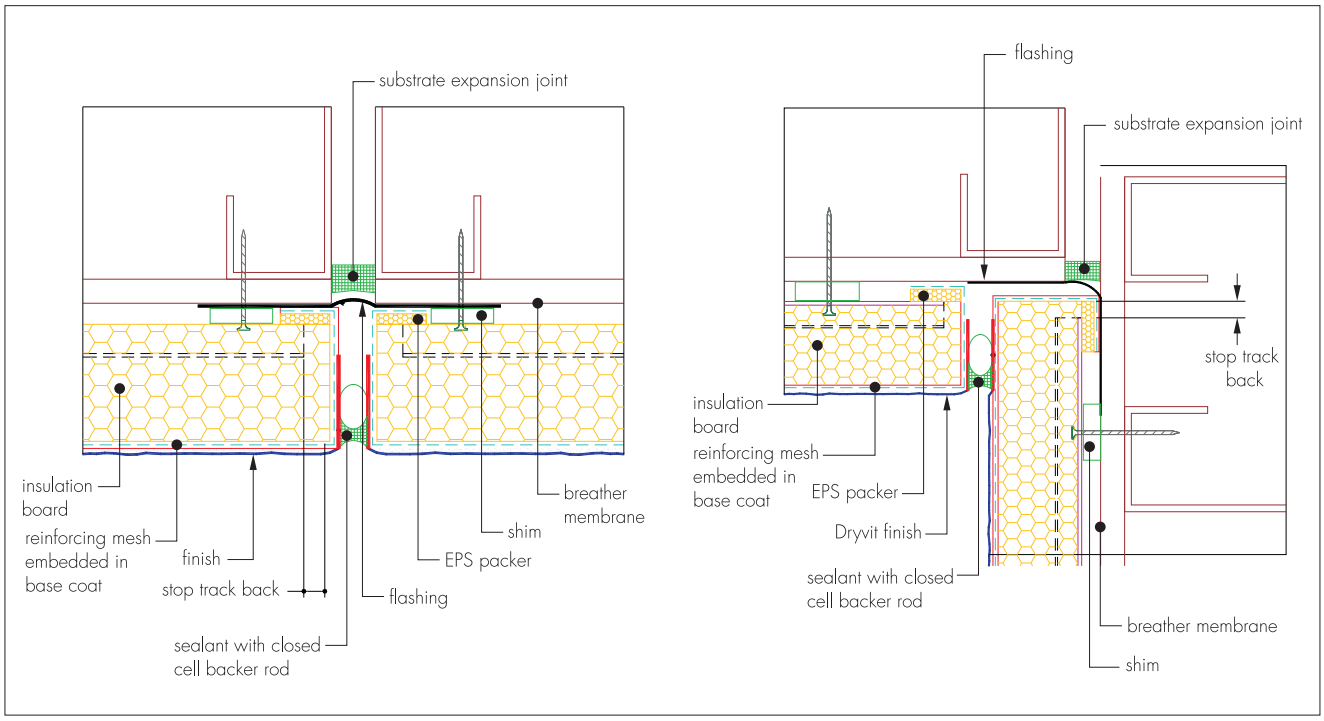
15.3 All rendering should be in accordance with the relevant recommendations of BS EN 13914-1 : 2005 and BS EN 13914-2 : 2005.

Movement joints

15.4 Movement joints should be incorporated into the system at the locations identified by the building designer (see section 1). Existing movement joints should be continued through the system. A typical movement detail can be seen in Figure 2.

15.5 Expansion joints are installed at predetermined positions where necessary, along the building depending on the individual requirements of each job.

Figure 2 Movement joint



Positioning and securing insulation boards

15.6 The base profile is secured to the external wall above the damp-proof course using the appropriate profile fixings at a maximum of 300 mm centres. Drainage deflection beads are mechanically fixed over all window and door openings, penetrations and other items that cross the drainage cavity. Horizontal and vertical fire barriers are installed following the designer's instructions.

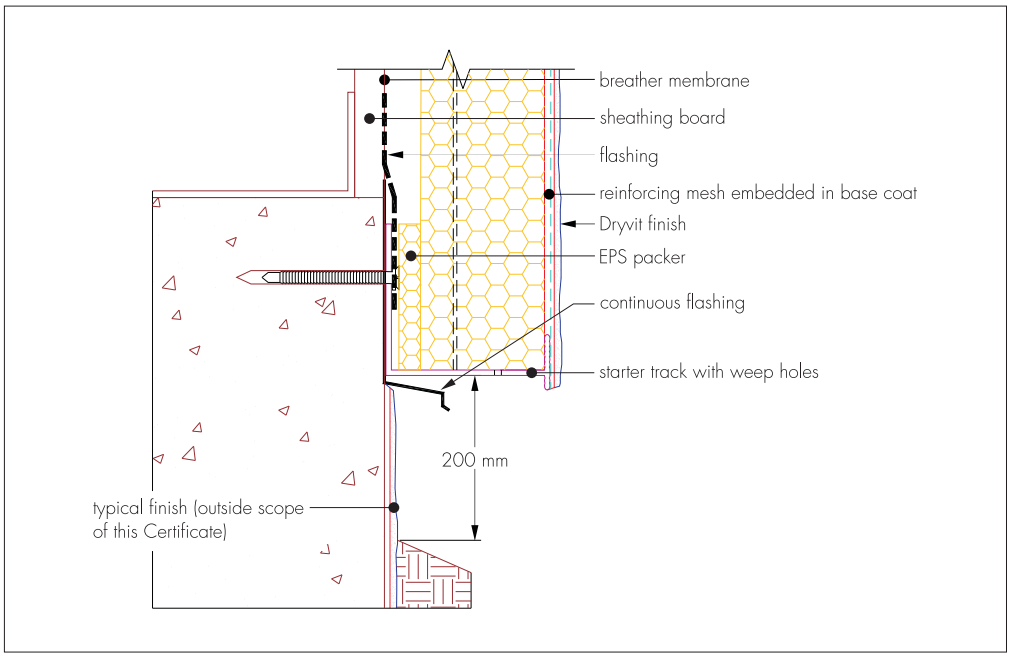
15.7 The first insulation board is positioned onto the base profile, and is used to position the first horizontal holding track. The holding and termination track slots into the pre-cut groove in the insulation board. The level is checked and the rail positioned away from the substrate using a shim. It is important that the holding track and shim fits tightly and that the track locates fully into the groove in the insulation; it should not be forced into position. It is important to ensure the insulation boards are tightly butted together, particularly attention should be made to board corners.

15.8 The horizontal holding and termination tracks are fixed to the substrate with mechanical fixings at a maximum of 300 mm centres. The fixings pass through the shim and into the substrate. Where required, fire breaks or cavity barriers should be incorporated into the system in accordance with the manufacturer's installation instructions.

15.9 Once the horizontal holding tracks are in position and the insulation board is placed onto the holding track, the vertical T-splines are placed vertically into the pre-cut grooves and the next insulation board is slotted into place.

15.10 Installation continues as described above, with the insulation boards being staggered. The level of the holding and termination tracks and the width of the cavity should be checked at regular intervals to help ensure a uniform level is maintained. A typical layout of the base detail is shown in Figure 3.

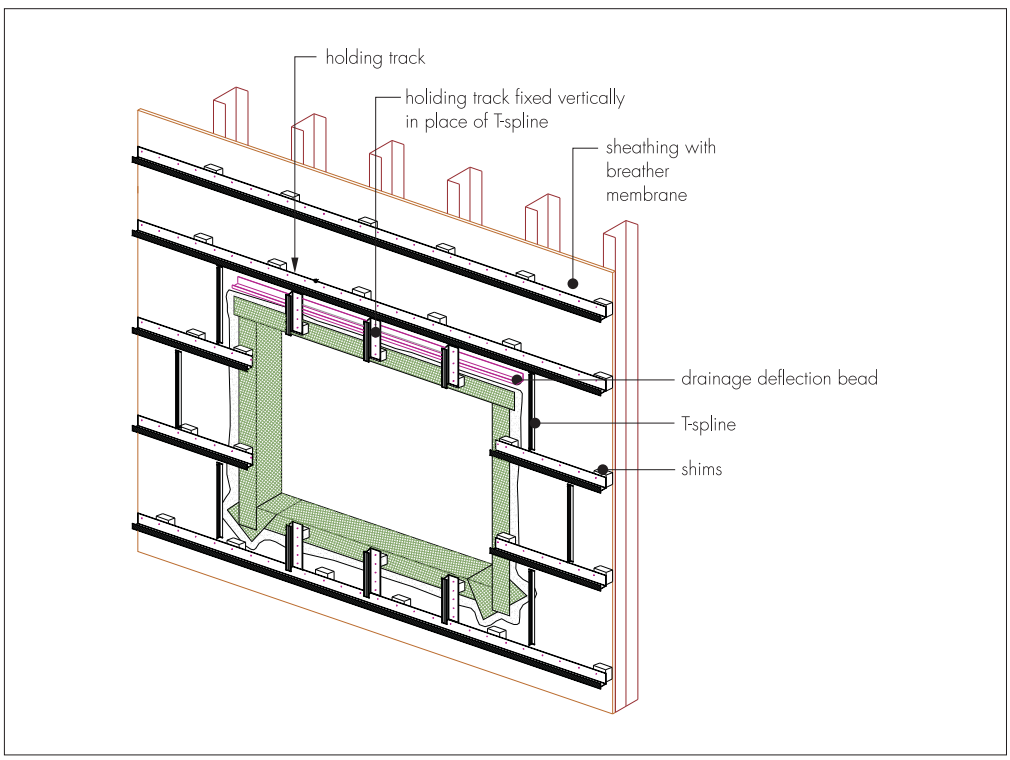
Figure 3 Base detail



15.11 Holding and termination tracks, EPS pieces (boards cut to ensure a tight fit around openings) and mesh are used to ensure the insulation fits around opening details such as doors and windows. Where necessary, the insulation can be cut and grooved on site using tools supplied by the Certificate holder.

15.12 The layout of holding tracks around openings and the location of the drainage deflection beads is shown in Figure 4.

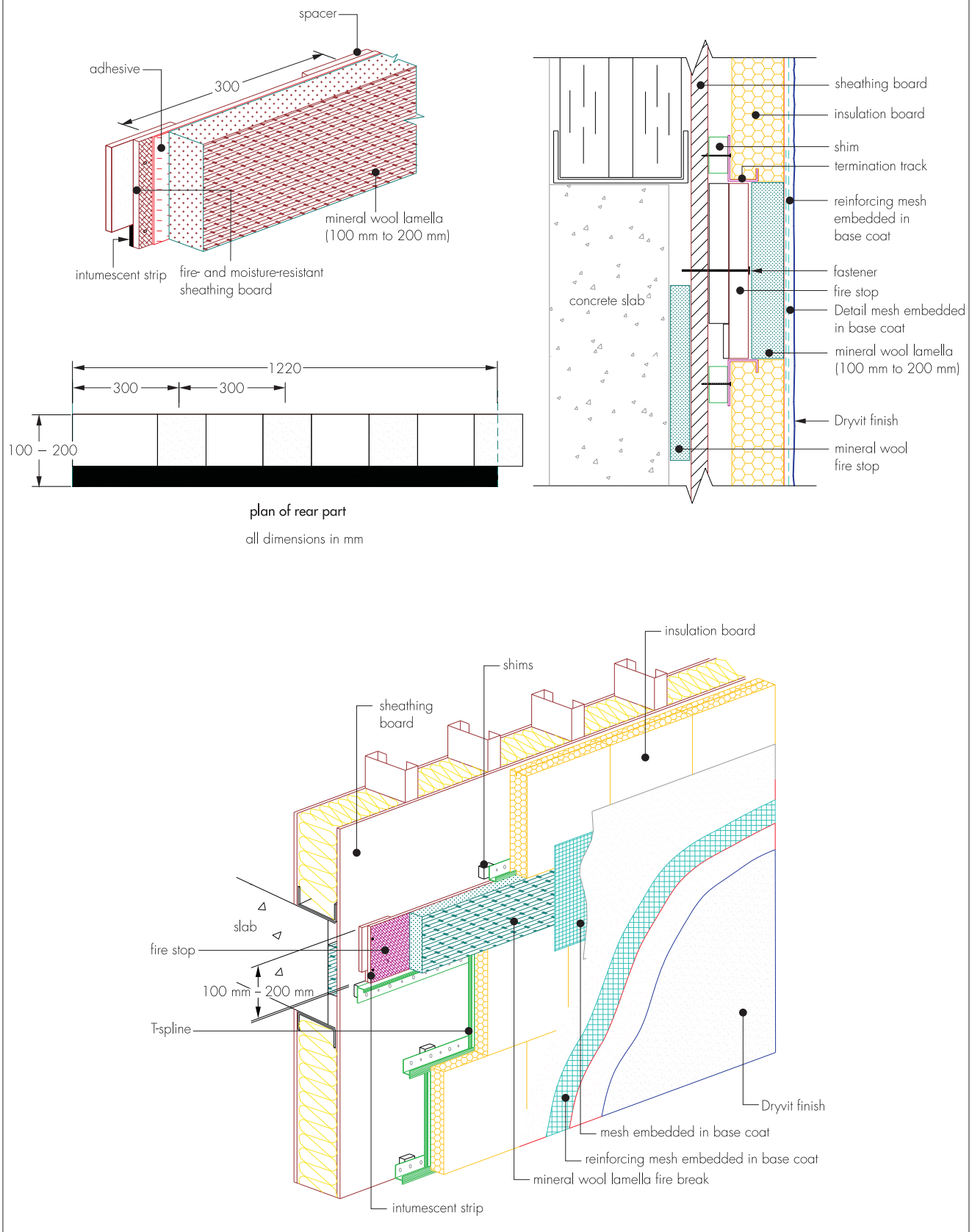
Figure 4 Track arrangement around openings, including the location of deflection beads



Fire barriers

15.13 Fire barriers must be incorporated into the system where required. A typical fire-break detail is shown in Figure 5.

Figure 5 Typical fire break detail



Basecoat

15.14 Sealant is applied to the primed basecoat where required and seals or a bead of sealant is applied to window and door frames, overhanging eaves, gas and electric meter boxes, wall vents or where the render abuts any other building material or surface.

15.15 The Genesis base coat should be mixed to disperse the ingredients before Portland cement is added in a ratio of 1:1 (by weight) in small quantities and mixing thoroughly each time. Care should be taken not to overmix.

15.16 A skim of base coat is applied over the surfaces of the boards to receive the Standard Plus reinforcing mesh, which is embedded in the base coat. A second layer of base coat is applied to fully encapsulate the mesh.

Reinforcement

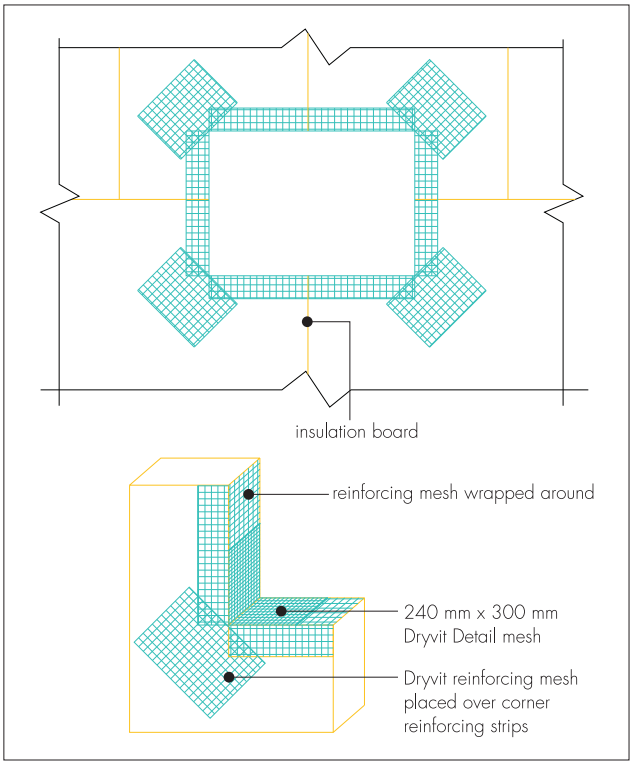
15.17 Where the heavy duty mesh is required, a thick layer of base coat, is applied over the surface of the boards to receive the heavy duty mesh. The drying period for any render will depend on weather conditions, however, the base coat with heavy duty mesh embedded should be allowed to dry for at least 24 hours before application of a second layer of base coat: the Standard Plus mesh should be embedded in the second coat immediately.

15.18 When Standard Plus mesh is used, joint overlaps should be at least 65 mm and board terminations should be back-wrapped. Detail mesh can be used for backwrapping and the joint overlaps with the standard mesh should be at least 65 mm. When heavy duty mesh is used within the first base coat, it should not be overlapped but fitted with close butt joints.

15.19 The mesh should be wrapped around board edges, at openings, penetrations, or other termination points. The base coat is applied to the surface of the insulation board, to a uniform thickness. The reinforcing mesh is immediately embedded with its concave surface to the wall to reduce its tendency to curl. The surface is smoothed with a trowel, working from the centre toward the edges, until the bare mesh is fully covered and not visible. The reinforcing mesh is also wrapped around the wall corners over the corner mesh, and fixed in position by coating the faces and edges with the adhesive/base coat. After the base coat has dried (normally a minimum of 24 hours), the finish is applied to a thickness appropriate to the grade. The overall render thickness achieved is 4.1 mm with standard reinforcing mesh and 7.6 mm with the combined standard and heavy duty mesh.

15.20 Additional pieces of reinforcing mesh should be used diagonally at the corners of openings, as shown in Figure 6. Angle beads and stop beads are positioned in accordance with the Certificate holder's installation instructions.

Figure 6 Additional reinforcement at openings



15.21 Where corners require additional impact resistance, corner mesh or corner bead with mesh should be embedded into the adhesive base coat before the overall reinforced base coat is installed.

15.22 The reinforced base coat should be left for a minimum of 24 hours to cure and should be hard, dry and free from any irregularities (eg trowel marks, exposed mesh) before proceeding.

Primer

15.23 A coat of primer is roller applied to the basecoat prior to application of the finish coat.

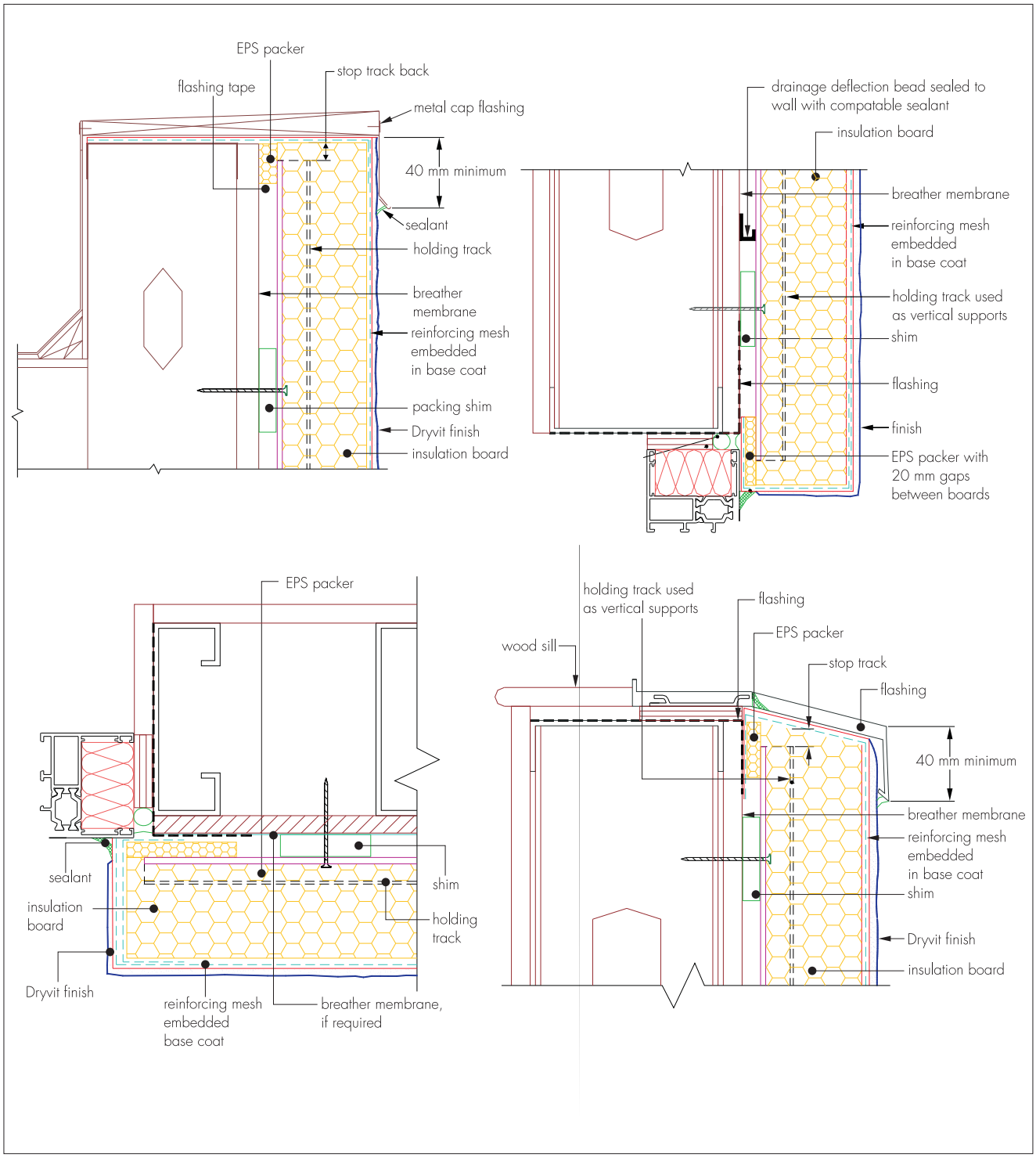
Finishing

15.24 The finish should be thoroughly mixed, taking care not to overmix. It is applied directly over the base coat to a thickness appropriate to the grade. Texturing of the surface can be carried out as required.

15.25 Care should be taken to prevent the base and finish coats from either drying too rapidly or freezing. Continuous surfaces must be completed without a break, eg working to a wet edge.

15.26 Care should be taken in detailing joints and seals around openings and projections. At the tops of walls and around openings such as windows and doors, the system should be protected by an adequate overhang and adequately sealed with a purpose-made flashing (see Figure 7).

Figure 7 Details



15.27 Continuous surfaces should be completed without a break.

16 Site practice

It is essential that appropriate site surveillance is in place to ensure the detailing is carried out to the correct level. Additionally, the installation of the system should be checked by the person supervising the works, at the end of each relevant stage of the installation. Information from the Certificate holder should be sought on this subject.

17 Tests

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

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

17.2 An examination was made of data relating to:

- adequacy of fixing system
- durability of finish
- Euroclassification of the finish in accordance with BS EN 13501-1 : 2007.

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

17.4 An examination was made of data relating to BS 8414-2 : 2005. Full details of the construction tested can be found in BRE Test Reports 240418-1 and 240418-2.

18 Investigations

18.1 The structural performance of the insulation system was assessed.

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

Bibliography

BS 5250 : 2002 *Code of practice for control of condensation in buildings*

BS 6399-2 : 1997 *Loading for buildings — Code of practice for wind loads*

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

BS EN 1993-1-1 : 2005 *Eurocode 3 : Design of steel structures — General rules and rules for buildings*
BS EN 1993-1-3 : 2006 *Eurocode 3 : Design of steel structures — General rules — Supplementary rules for cold-formed members and sheeting*

BS EN 1995-1-2 : 2004 *Eurocode 5 : Design of timber structures — General — Structural fire design*

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 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 : 2007 *Building components and building elements — Thermal resistance and thermal transmittance — Calculation method*

ETAG 004 : 2000 *Guideline for European Technical Approval of External Thermal Insulation Composite Systems with Rendering*

ETAG 014 : 2000 *Guideline for European Technical Approval of Plastic Anchors for fixing of external thermal insulation composite systems with rendering.*

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

19 Conditions

19.1 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.

19.2 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.

19.3 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.

19.4 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.

19.5 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.

British Board of Agrément
Bucknalls Lane
Garston, Watford
Herts WD25 9BA

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