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Agrément Certificate  
**12/4944**  
Product Sheet 2

### INSTACLAD EXTERNAL WALL INSULATION SYSTEMS

### INSTACLAD ROBUST EXTERNAL WALL INSULATION SYSTEMS

This Agrément Certificate Product Sheet<sup>(1)</sup> relates to InstaClad Robust External Wall Insulation Systems, comprising expanded polystyrene (EPS) insulation boards with glassfibre reinforcing meshes and a render finish for use on solid masonry and sheathed light-steel-frame constructions on existing domestic and non-domestic buildings.

(1) Hereinafter referred to as 'Certificate'.

#### CERTIFICATION INCLUDES:

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



#### KEY FACTORS ASSESSED

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

**Strength and stability** — the systems can adequately resist wind loads and, in certain applications, impact damage (see section 7).

**Behaviour in relation to fire** — The systems are suitable for use on solid masonry and/or sheathed light-steel framed constructions on buildings of up to 18 m high (see section 8).

**Condensation** — the systems can contribute to limiting the risk of surface and interstitial condensation (see section 10).

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

The BBA has awarded this Certificate to the company named above for the systems described herein. These systems has been assessed by the BBA as being fit for their intended use provided they are installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

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

Date of First issue: 17 June 2013

John Albon — Head of Approvals  
Energy and Ventilation

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

Claire Curtis-Thomas  
Chief Executive

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

In the opinion of the BBA, InstaClad Robust External Wall Insulation Systems, if installed, used and maintained in accordance with this Certificate, will meet or contribute to meeting the relevant requirements of the following Building Regulations (the presence of a UK map indicates that the subject is related to the Building Regulations in the region or regions of the UK depicted):



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

<b>Requirement:</b> A1	<b>Loading</b>
Comment:	The insulation systems can sustain and transmit wind loads to the substrate wall. See section 7.6 of this Certificate.
<b>Requirement:</b> B4(1)	<b>External fire spread</b>
Comment:	The insulation systems can meet this Requirement. See sections 8.1 and 8.2 of this Certificate.
<b>Requirement:</b> C2(b)	<b>Resistance to moisture</b>
Comment:	The insulation systems provide a degree of protection against rain ingress. See sections 9.2 to 9.4 of this Certificate.
<b>Requirement:</b> C2(c)	<b>Resistance to moisture</b>
Comment:	The insulation systems contribute to minimising the risk of interstitial and surface condensation. See sections 10.5 and 10.7 of this Certificate.
<b>Requirement:</b> L1(a)(i)	<b>Conservation of fuel and power</b>
Comment:	The insulation systems can contribute to meeting this Requirement. See sections 6.1, 6.2 and 6.4 of this Certificate.
<b>Regulation:</b> 7	<b>Materials and workmanship</b>
Comment:	The systems are acceptable. See section 12.1 and the <i>Installation</i> part of this Certificate.



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

<b>Regulation:</b> 8(1)(2)	<b>Fitness and durability of materials and workmanship</b>
Comment:	The use of the systems satisfies the requirements of this Regulation. See sections 11.1 and 12.1 and the <i>Installation</i> part of this Certificate.
<b>Regulation:</b> 9	<b>Building standards applicable to construction</b>
<b>Standard:</b> 1.1	<b>Structure</b>
Comment:	The systems can sustain and transmit wind loads to the substrate wall, with reference to clause 1.1.2 <sup>(1)(2)</sup> . See section 7.6 of this Certificate.
<b>Standard:</b> 2.6	<b>Spread to neighbouring buildings</b>
Comment:	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> and 2.6.2 <sup>(1)(2)</sup> . See sections 8.1 and 8.2 of this Certificate.
<b>Standard:</b> 2.7	<b>Spread on external walls</b>
Comment:	The system incorporates materials which would not be classed as 'non-combustible' as defined in clauses 2.7.1 <sup>(1)(2)</sup> and 2.7.2 <sup>(2)</sup> of this Standard, and should not therefore be used on walls one metre or less from a boundary. See sections 8.1 and 8.2 of this Certificate.
<b>Standard:</b> 3.10	<b>Precipitation</b>
Comment:	Walls insulated with the systems will provide a degree of protection against rain ingress, with reference to clauses 3.10.1 <sup>(1)(2)</sup> and 3.10.2 <sup>(1)(2)</sup> . See sections 9.2 to 9.4 of this Certificate.
<b>Standard:</b> 3.15	<b>Condensation</b>
Comment:	Walls insulated with the systems will contribute to minimising the risk of interstitial and surface condensation, with reference to clauses 3.15.1 <sup>(1)(2)</sup> , 3.15.4 <sup>(1)(2)</sup> and 3.15.5 <sup>(1)(2)</sup> . See sections 10.6 and 10.7 of this Certificate.
<b>Standard:</b> 6.1(b)	<b>Carbon dioxide emissions</b>
<b>Standard:</b> 6.2	<b>Buildings insulation envelope</b>
Comment:	The systems can contribute to satisfying these Standards, with reference to clauses 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)(2)</sup> , 6.2.3 <sup>(1)(2)</sup> , 6.2.4 <sup>(2)</sup> , 6.2.6 <sup>(1)(2)</sup> , 6.2.7 <sup>(1)(2)</sup> , 6.2.8 <sup>(2)</sup> , 6.2.9 <sup>(1)(2)</sup> , 6.2.10 <sup>(1)(2)</sup> , 6.2.11 <sup>(1)</sup> , 6.2.12 <sup>(2)</sup> , and 6.2.13 <sup>(1)</sup> . See sections 6.1, 6.2 and 6.4 of this Certificate.
<b>Standard:</b> 7.1(a)(b)	<b>Statement of sustainability</b>
Comment:	The product can contribute to meeting the relevant requirements of Regulation 9, Standards 1 to 6, and, therefore, will contribute to a construction meeting a bronze level of sustainability as defined in this Standard. See sections 6.1, 6.2 and 6.4 of this Certificate.
<b>Regulation:</b> 12	<b>Building standards applicable to conversions</b>
Comment:	All comments given for these systems under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to clause 0.12.1 <sup>(1)(2)</sup> and Schedule 6 <sup>(1)(2)</sup> . (1) Technical Handbook (Domestic). (2) Technical Handbook (Non-Domestic).



## The Building Regulations (Northern Ireland) 2012

Regulation:	23(a)(b)	Fitness of materials and workmanship
Comment:		The systems are acceptable. See sections 11.1 and 12.1 and the <i>Installation</i> part of this Certificate.
Regulation:	28(a)(b)	Resistance to moisture and weather
Comment:		Walls insulated with the systems provide a degree of protection against rain ingress and contribute to satisfying this Regulation. See sections 9.2 to 9.4 of this Certificate.
Regulation:	29	Condensation
Comment:		Walls insulated with the systems contribute to minimising the risk of interstitial and surface condensation to satisfy this Regulation. See section 10.7 of this Certificate.
Regulation:	30(a)(b)	Stability
Comment:		The insulation systems can sustain and transmit wind loads to the substrate wall. See section 7.6 of this Certificate.
Regulation:	36(a)	External fire spread
Comment:		The insulation systems have a Class '0' surface and can satisfy this Regulation. See sections 8.1 and 8.2 of this Certificate.
Regulation:	39(a)(i)	Conservation measures
Regulation:	40(2)	Target carbon dioxide emission rate
Comment:		The insulation systems can contribute to satisfying these Regulations. See sections 6.1, 6.2 and 6.4 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: 3 *Delivery and site handling* (3.1) of this Certificate.

## Additional Information

### CE marking

The Certificate holder has taken the responsibility of CE marking the products in accordance with ETAG 004 : 2011.

## Technical Specification

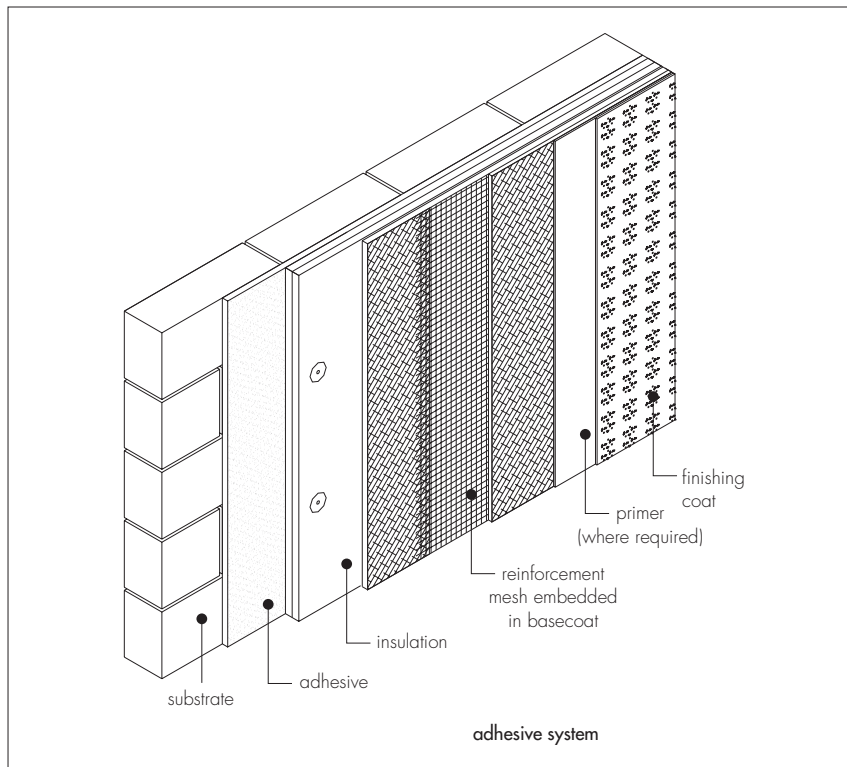
### 1 Description

1.1 InstaClad Robust insulation systems — square-edge or tongue-and-groove insulation boards of size 1000 mm by 500 mm<sup>(1)</sup>, thickness from 20 mm to 200 mm and minimum tensile resistance of 200 kPa, bonded to the substrate (with supplementary mechanical fixings) using one of:

- InstaClad Reinforcement Mortar — a polymer-based powder adhesive containing cement for mixing with clean water
- Sto Turbofix — a single-component polyurethane foam adhesive for use with tongue-and-groove EPS insulation and suitable substrates. Square-edged insulation boards may be used but greater attention must be given to the possibility of differential movement between boards before the adhesive has fully set and hardened.

(1) Other boards sizes are available from the Certificate holder.

Figure 1 InstaClad Robust External Wall Insulation Systems



1.2 The expanded polystyrene insulation boards used with the systems are available as InstaClad EPS Board K Square Edged, and InstaClad EPS Board K Tongue and Grooved. Each is available as K70 (white and grey with density in the range of  $14 \text{ kg}\cdot\text{m}^{-3}$  to  $17 \text{ kg}\cdot\text{m}^{-3}$ ), K90 (grey with density in the range of  $19 \text{ kg}\cdot\text{m}^{-3}$  to  $20 \text{ kg}\cdot\text{m}^{-3}$ ) or K200 ultra-high density [white for below damp-proof course (dpc) with a density of  $30 \text{ kg}\cdot\text{m}^{-3}$ ]. The boards are classified as Euroclass E in accordance with BS EN 13501-1 : 2007 and are not foil-faced. Ultra-high density (UHD) boards with a density of  $30 \text{ kg}\cdot\text{m}^{-3}$  for use below the damp-proof course, are outside the scope of this Certificate.

1.3 Other components of the systems include:

- InstaClad Flex Filler — for use below the damp-proof course (outside the scope of this Certificate). Further information is available from the Certificate holder
- Glass Fibre Mesh — multi-stranded, alkali-resistant glassfibre with a polymer coating, weighing approximately  $150 \text{ g}\cdot\text{m}^{-2}$ , supplied in 50 m rolls in widths of 0.15 m, 0.25 m, 0.33 m and 1.1 m
- Armor Mesh — used in conjunction with Glass Fibre Mesh, and weighing approximately  $490 \text{ g}\cdot\text{m}^{-2}$
- InstaClad Reinforcement Mortar — a ready-mixed, bagged, mineral basecoat
- InstaClad Silicone Render — a ready-mixed, silicone-based, textured coating
- InstaClad Dry Dash — receiver and aggregate
- Sto Color Lotusan — silicone-based paint available in a range of colours
- InstaClad resin brick slip — with adhesive and pointing Mortar.

1.4 Ancillary items for use with the systems include specialised sealers and primers, starter tracks, trims and beads, filler, fixings and expansion joints. Refer to the Certificate holder for further details.

## 2 Manufacture

2.1 Renders in paste form are fed by weight by the automatic control unit into the mixer itself in a controlled way. Other materials are added by hand by the mixer operator.

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

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

2.3 The management system of Sto AG has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 by DGS (Certificate 003651QM).

2.4 The external wall insulation systems are manufactured by Sto AG in Germany and are imported and marketed in the UK by the Certificate holder.

### 3 Delivery and site handling

3.1 The insulation boards are delivered in shrink-wrapped polyethylene packs bearing the manufacturer's name and product identification. Each board is identified with a coloured stripe indicating the grade and fire classification.

3.2 The insulation boards must be stored on a clean, firm, level base and protected from prolonged exposure to sunlight. Open packs should be protected either by storing under cover or re-covering with opaque polythene sheeting. The boards must not come into contact with solvents or bitumen products, nor be exposed to open flame or other ignition sources. Care must be taken when handling the insulation to avoid damage.

3.3 All bagged products should be stored in dry conditions, off the ground, and protected from physical damage and moisture. All render products must be protected from excessive heat and frost.

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

*Table 1 Component supply details*

Component	Packaging and quantity/size
Standard reinforcing mesh	roll, 0.15/0.25/0.33/1.1 m by 50 m
Armor mesh	roll, 1 m by 25 m
Sto TurboFix adhesive	pressurised bottle, 10.4 kg and 750 ml canister
InstaClad cementitious adhesive	triple-lined bag, 20–25 kg
Coatings	pail, 15 litre
Primer/render	plastic pail, 23–25 kg
Cementitious basecoat/render	triple-lined bag, 20–25 kg

3.5 Sto Turbofix adhesive should be stored at temperatures between 15°C and 25°C.

3.6 Partially used materials remaining in bags or containers should be discarded.

## Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on InstaClad Robust External Wall Insulation Systems.

## Design Considerations

### 4 General

4.1 InstaClad Robust External Wall Insulation Systems are fixed to the external surface of the wall using adhesive. The InstaClad EPS boards are protected by a minimum 3 mm thick basecoat of InstaClad Reinforcement Mortar containing a glassfibre reinforcement mesh which, when dry, is overcoated with finishes detailed in section 1.3. Should a dash finish be required, application can only be made with a layer of InstaClad Dry Dash.

4.2 The minimum specification of sheathed steel-framed construction on which the insulation systems can be installed is given in Table 2.

*Table 2 Sheathed steel-framed construction — minimum specification*

Item	Characteristic	Standard or dimension (mm)
Steelwork	Standard	BS EN 10326 : 2004
	Grade and coating	Type S 320 GD +Z275
	Thickness	1.2
Sheathing board (fire-rated)	Type Thickness	BS EN 634-2 : 2007 12

4.3 Supplementary mechanical fixings may be used with the adhesive insulation systems, especially during the strength development phase of the adhesive curing. Care should be taken to ensure appropriate fixing on all substrates.

4.4 The systems are applied to the outside of external walls of masonry, dense or no-fines concrete constructions and light-steel-framed constructions. They are suitable for use on 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 not higher than 18 m above ground level.

4.5 The insulation systems are effective in reducing the thermal transmittance (U value) of the walls in existing buildings. It is essential that the detailing techniques specified in this Certificate are carried out to a high standard if the ingress of water into the insulation is to be avoided and the full thermal benefit obtained from the insulation systems.

4.6 The insulation systems will improve the weather resistance of a wall and provide a decorative finish. However, they may only be installed 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 by condensation. The insulation systems can be used to overcome condensation associated with the internal wall surface.

4.7 Existing buildings subject to the Building Regulations should have wall surfaces in accordance with section 14 *Site survey and preliminary work* in the *Installation* part of this Certificate.

4.8 It may be necessary, depending on the method of fixing utilised, that movement joints are used through the insulation systems to ensure all substrate movement is not transferred to the insulation system and is managed in a such a way that damage to the insulation systems does not occur. Designers must ensure the sheathing boards are adequately restrained and an appropriate number of movement joints are carried through the construction where required.

4.9 When using the system, consideration must be given to the overall design to minimise the risk of condensation and the recommendations of BS 5250 : 2011 should be followed.

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

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

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

## 5 Practicability of installation

The systems should only be installed by installers who have been trained and approved by the Certificate holder (see section 13).

## 6 Thermal performance

6.1 Calculations of the thermal transmittance (U value) 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) ( $\text{W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ ) of:

- InstaClad EPS Board K70 0.038
- InstaClad Grey EPS 0.030.

6.2 For the InstaClad resin brick slip applications, the following corrected thermal conductivity values ( $\lambda_{90/90}$  value) ( $\text{W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ ) should be used:

- InstaClad EPS Board K70 0.039
- InstaClad EPS Board K90 T&G 0.035
- InstaClad Grey EPS 0.031.

6.3 The U value of a wall construction will depend on the selected insulation thickness, the fixing method and the insulating value of the substrate masonry and its internal finish. Example U values are given in Table 3.

Table 3 *Insulation thickness required to achieve some typical design values<sup>(1)</sup>*

U value ( $\text{W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$ )	Insulation type	Thickness of insulation (mm)	
		Adhesive bonded <sup>(2)(3)</sup>	Anchor fixings <sup>(2)(4)</sup>
0.19	K70	200	—
	K90	190	—
	Grey EPS 90	—	—
0.26	K70	150	160
	K90	130	160
	Grey EPS 90	—	—
0.28	K70	150	160
	K90	120	150
	Grey EPS 90	—	—
0.30	K70	130	150
	K90	120	150
	Grey EPS 90	—	—

(1) Wall construction: 200 mm dense concrete block ( $\lambda = 1.75 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ ) with 12 mm dense plaster finish.

(2) Based upon incremental insulation thickness of 10 mm.

(3)  $\Delta_{\text{jf}}$  based on  $n_i = 2 \text{ m}^2$ ,  $\lambda_{\text{steel}} = 50 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ , diameter of fixing = 5.5 mm (assumes that the fixing penetrates the whole insulation layer).

(4)  $\Delta_{\text{jf}}$  based on  $n_i = 9 \text{ m}^2$ ,  $\lambda_{\text{steel}} = 50 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ , diameter of fixing = 5.5 mm (assumes that the fixing penetrates the whole insulation layer).



6.4 The systems can maintain, or contribute to maintaining, continuity of thermal insulation. 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. 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).

## 7 Strength and stability

### General

7.1 The resistance to wind loads will depend upon the insulation system used. The systems can be designed to provide adequate resistance to design loads applicable in the UK.

7.2 The self-weight of the insulation systems including the render and the insulation is transferred to the substrate via the relevant fixing method. The suitability of adhesive should be determined by the building designer.

7.3 Where the adhesive insulation system is used, trial tests shall be conducted on the walls of the building to determine the adequacy of the adhesive to withstand the expected wind loading (derived from calculations using the relevant wind speed data for the site) and a safety factor of 5.7. Details of the use of the systems without supplementary fixings can be obtained from the Certificate holder.

7.4 Negative wind pressure (suction) is resisted by the bond between the render and the insulation boards, the flexural strength of the render and insulation and for:

- InstaClad adhesive insulation systems with supplementary fixings — the adhesive bond strength between the insulation and the adhesive and the adhesive bond strength between the adhesive and substrate.

7.5 Positive wind load (pressure) is transferred to the substrate wall directly via compression and bending of the render and insulation and the bearing of the insulation through the adhesive into the substrate.

7.6 The wind loads on the walls should be calculated in accordance with BS EN 1991-1-4 : 2005 or BS 6399-2 : 1997, BS EN 1993-1-1 : 2005, BS EN 1993 -1-3 : 2006. Special consideration should be given to locations with high wind-load pressure coefficients (additional fixings or adhesive coverage 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 insulation systems.

7.7 Assessment of structural performance for individual buildings should be carried out by a suitably qualified and experienced person.

7.8 For resistance to wind loads see Table 4:

- With InstaClad adhesive insulation systems, where the surface bond of the substrate is in question, an appropriate number of site-specific bond strength tests should be conducted on the substrate of the building to determine the minimum resistance to failure of the adhesive. The design bond strength is the average of the five smallest measured values at the ultimate load divided by a factor of safety of 9. Supplementary fixings are used where required. It is essential that the appropriate movement joints and expansion joints are used through the insulation systems to ensure all substrate movement is managed in such a way that damage to the insulation systems does not occur.

*Table 4 InstaClad External Wall Insulation Systems — example wind loading calculations<sup>(1)</sup>*

Characteristic	Instaclad Robust adhesive insulation systems
Resistance to wind loads (Pa) <sup>(1)</sup>	—
Material factor <sup>(2)</sup>	—
Design resistance to wind loads (Pa)	—
Characteristic anchor pull-out resistance per anchor or adhesive bond strength (N) <sup>(3)</sup>	20000
Factor of safety	5.7
Design pull-out resistance or design adhesive bond strength (N)	3509
Design pull-out resistance multiplied by the number of fixings (N)	—
Limiting resistance (Pa) <sup>(4)</sup>	3509

(1) From test results (see section 7.8).

(2) Based upon the EPS used and the manufacturing controls in place.

(3) From site tests (see section 7.9).

(4) The lesser of the board design pull-out resistance and the resistance to wind loads for the system. This value must be higher than the value calculated from section 7.6 (see section 7.10).

7.9 An appropriate number of site-specific pull-out tests shall be conducted on the substrate of the building to determine the minimum resistance to failure of the fixings. The characteristic pull-out resistance should be determined in accordance with the guidance given in ETAG 014 : 2002, Annex D, using 60% of the mean value of the five smallest measured values at the ultimate load. The design pull-out resistance per square metre is the mean pull-out resistance multiplied by the number of fixings (minimum of either 4 or 6) and divided by a factor of safety of 2. This value must be higher than the resistances given in section 7.8.

7.10 The designer should ensure that firebreaks used with the insulation systems are fixed adequately to resist the anticipated wind loading.

### Impact loading

7.11 The systems are suitable for use at zones liable to impacts from thrown or kicked objects, but in public locations where the height of the system will limit the size of the impact; or at lower levels where access to the building is primarily to those with some incentive to exercise care in accordance with ETAG 004 : 2011, use category II. For areas likely to be prone to greater impacts, the advice of the Certificate holder should be sought.

## 8 Behaviour in relation to fire

### General



8.1 The surface spread of flame classification of the external surface of the system is given in Table 5.

Table 5 Surface spread of flame performance<sup>(1)</sup>

Maximum declared organic content of the rendering system <sup>(2)</sup>	Minimum declared flame retardant of the rendering system <sup>(2)</sup>	Euroclass according to BS EN 13501-1 : 2007
Reinforcement coat: 16% Finishing coat: 14.75%	Reinforcement coat: 20% Finishing coats: 7.5%	B-s2, d0 B-s2, d0

(1) The effects of primer and paint need to be taken into account by the building designer.

(2) Percentage relative to the initial weight after drying.

8.2 The insulation material is combustible and, therefore, its use in the system is restricted to buildings of up to 18 m in height only.

8.3 Fire stopping or fire barriers (see Figure 2) should be incorporated into a construction at each floor level above the first floor. Guidance is given in:

**England and Wales** — Approved Document B, Volume 1, Sections 8 and 9, and Volume 2, Sections 12 and 13

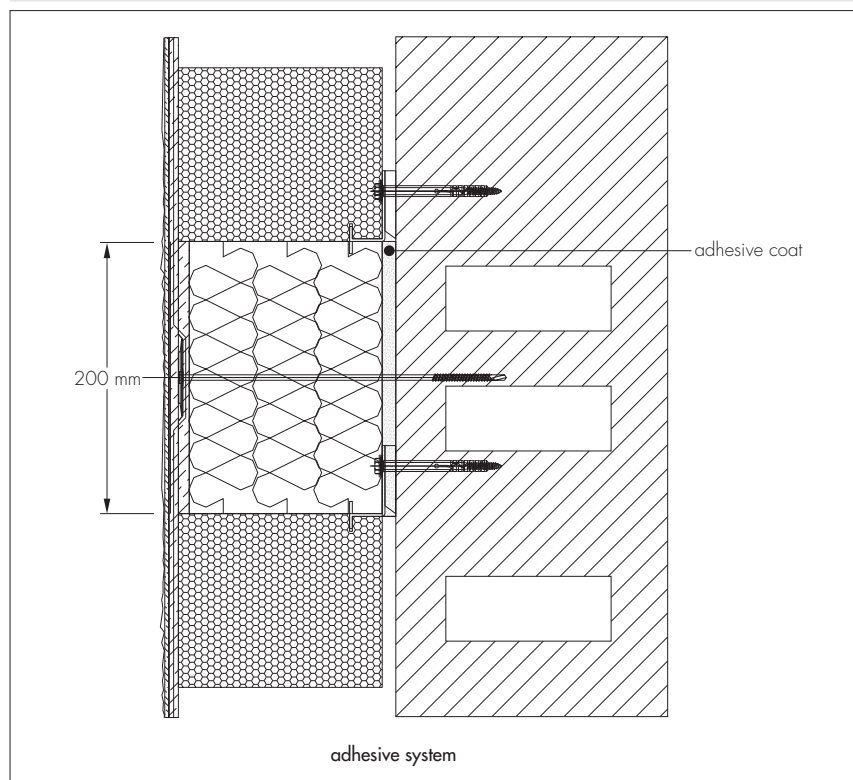
**Scotland** — Mandatory Standard 2.2, clause 2.4.1<sup>(1)(2)</sup>

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

**Northern Ireland** — Technical Booklet E, Section 5.

Figure 2 Fire barriers





## 9 Rain penetration

9.1 Guidance in BRE Report (BR 262 : 2002) *Thermal insulation: avoiding risks* should be followed in that 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, clauses 3.10.2<sup>(1)(2)</sup>, 3.10.3<sup>(1)(2)</sup> and 3.10.5<sup>(1)(2)</sup>

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

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



9.2 In all cases, care should be taken to ensure that walls are weathertight prior to application of the insulation systems. The insulation systems 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.

9.3 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 systems with a drainage cavity can be seen in SCI Publication P343 *Insulated Render Systems Used With Light Steel Framing* (Steel Construction Institute, 2006).

9.4 The designer should check that 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 systems and windows, openings and penetration details should be designed to deflect water away from the insulation and onto the external face of the wall.

9.5 At the tops of walls, the insulation systems should be protected by an adequate overhang or other detail designed for use with this type of insulation systems (see Figure 5).

## 10 Condensation

10.1 When using the systems, consideration must be given to the overall design to minimise the risk of condensation, and the recommendations given in BS 5250 : 2011 should be followed.

10.2 Dynamic condensation modelling in accordance with BS EN 15026 : 2007 can be carried out for light-steel constructions to help establish the likelihood of moisture accumulating within the construction over the design life of the building.

10.3 The water vapour resistivity for the basecoat with the render finishes is not more than  $2000 \text{ MN}\cdot\text{s}\cdot\text{g}^{-1}\cdot\text{m}^{-1}$ .

10.4 The resistivity of the EPS insulation boards can be taken as  $300 \text{ MN}\cdot\text{s}\cdot\text{g}^{-1}\cdot\text{m}^{-1}$ .

### Surface condensation



10.5 Walls will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed  $0.7 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$  at any point, and the junctions with other elements and openings comply with the requirements given in section 9.4.



10.6 Walls and ceilings will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed  $1.2 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$  at any point. Guidance may be obtained from BS 5250 : 2011, Annex G, and BRE Report (BR 262 : 2002).

### Interstitial condensation



10.7 Weathertight walls incorporating the insulation systems will adequately limit the risk of interstitial condensation when they are designed and constructed in accordance with BS 5250 : 2011, Annexes D and G, and BS EN ISO 10456 : 2007.

## 11 Maintenance and repair



11.1 Regular checks should be made on the installed insulation systems, 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 fittings are in good condition. Maintenance schedules should include the replacement and resealing of joints, for example between the insulation systems and window and door frames. The interval between inspections should be considered for each building allowing for 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 at regular intervals.

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 InstaClad 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 appearance may be restored by a powerwash at 30 bar maximum pressure and 30°C maximum temperature with the nozzle no closer than 500 mm from the finish coating or, if required, overcoating by the application of a further finish of paint, but great care must be taken not to adversely affect the water vapour transmission characteristics of the insulation systems.

## 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 standard reinforcing mesh has adequate resistance to accidental damage where used in situations where walls are exposed but have some protection, eg walls of private dwellings and walls of communal dwellings above ground-floor level. In other situations, eg walls of public buildings at ground-floor level, the combined heavy-duty and standard reinforcing meshes are required to increase the resistance to impact. Guidance may be obtained from BRE Current Paper CP 6 : 81 : 1981 *Assessment of external walls: hard body impact resistance*, ETAG 004 : 2011 and the Certificate holder.

## Installation

### 13 General

Application of the InstaClad Robust External Wall Insulation Systems, within the context of this Certificate, should be carried out by registered installers as recommended by the Certificate holder. A Certificate-holder registered installer is a company which:

- employs operatives who have been trained and approved by the Certificate holder to install the insulation systems and who, upon completion of their training, have been issued with an appropriate identification card or certificate by the Certificate holder
- has undertaken to comply with the Certificate holder's application procedure, including the requirement for each application team to include at least one member with an identification card or training Certificate
- is subject to audits by the Certificate holder, including site inspections.

### 14 Site survey and preliminary work

14.1 It is essential that the substrate is weathertight before the installation of the insulation systems. A pre-installation survey of the property is carried out to determine whether repairs are required to the building structure or sheathing boards. The survey should include tests and an assessment and recommendation on the type and number of fastenings required in respect of the building's expected wind loading. A specification is prepared for each project covering each elevation of the building, and with details indicating:

- position of tracks
- position of starter profile or starter mesh
- reinforcing mesh(es)
- detailing around windows, doors and at eaves
- dpc level
- exact position of expansion joints, if required
- areas where exterior grade sealants must be used
- location and type of weather seals to be used
- location of water deflection channels
- alterations required to external plumbing
- position of fire barriers.

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

14.3 All necessary repairs to the building structure are completed before installation of the insulation systems commences.

14.4 Surfaces should be sound, clean, and free from loose material. The flatness of surfaces must be checked against the tolerances of the proposed insulation systems; 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 the insulation boards are installed with a smooth, in-plane finished surface.

14.5 Where surfaces are covered with an existing rendering it is essential that the bond between the background and the render is adequate. All loose areas should be hacked off and reinstated. An alternative fixing method should be used if the adhesive bond strength is not sufficient.

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

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

14.8 Internal wet work, eg screeding or plastering, must be completed and allowed to dry prior to the application of the insulation systems.

## 15 Procedure

### General

15.1 Application of the InstaClad Robust External Wall Insulation Systems is carried out in accordance with ETAG 004 : 2011 and the Certificate holder's technical literature.

15.2 Application of coating materials must not be carried out on damp substrates, if rain is expected, at temperatures below 5°C or above 30°C, or if exposure to frost is likely. 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.

### Movement joints

15.4 Movement joints should be included where required. For example, if an expansion joint is incorporated in the substrate, a movement joint must be provided in the insulation systems.

15.5 Movement joints extend through the full insulation systems and are made using InstaClad profiles E or V or sealed with an expansion joint sealant against a backer rod<sup>(1)</sup>.

(1) Sealant and backer rod to be approved by the Certificate holder.

15.6 Where necessary, expansion beads are fixed vertically in predetermined positions across the building depending on the individual requirements of each job.

15.7 The movement joint sealant must not come into direct contact with the insulation board. Therefore, it is essential to ensure that the reinforcement mesh and the basecoat are taken around the complete edge of the insulation board.

### Adhesive systems

15.8 InstaClad Reinforcement Mortar adhesive is prepared by mixing with the correct quantity of clean water with every 25 kg bag.

15.9 Installation begins at the base of the wall above the dpc. A firm, horizontal support of either the InstaClad aluminium profile or a temporary timber batten, is used to mount the first row of boards.

15.10 If a temporary timber batten is to be used, a strip of mesh is partially adhered to the wall so that 200 mm (plus the thickness of the insulation) of it is hanging from the starting line of the installation. The InstaClad reinforcement render is subsequently used to wrap the overhanging mesh around the lower edge and adhere it to the first row of insulation boards. All exposed edges of the insulation boards are protected in this manner.

15.11 The adhesive is applied over the entire face of the insulation board, using a notched trowel, or in a continuous line around the perimeter of the board with six additional dabs of adhesive distributed over the remaining surface (minimum 40% coverage or 20% where augmented with a minimum of eight fixings per m<sup>2</sup>).

15.12 The boards must be pressed firmly against the wall and butted tightly together with the vertical joints staggered. Open joints in the insulation systems should be filled with slivers of insulation board or InstaClad PU foam and high spots or irregularities removed by lightly rasping over the whole surface.

15.13 With substrates of no-fines concrete or low loadbearing capacity, InstaClad Thermo expanding dowels are used as supplementary mechanical fixings at the specified minimum frequency of eight per square metre (additional fixings should be used where required). As with all installations using mechanical fixings pull-out testing should be used to verify the dowel performance in these substrates.

15.14 For fixing Sto-TurboFix adhesive systems, the substrate must be level, loadbearing, clean and free from efflorescence and separating agents. The air and substrate temperature should not be less than + 5°C nor more than + 30°C. Substrate unevenness of up to approximately 20 mm may be equalised using Sto-Turbofix and supplementary mechanical fixings where required. Unevenness greater than 20 mm will require a different fixing method.

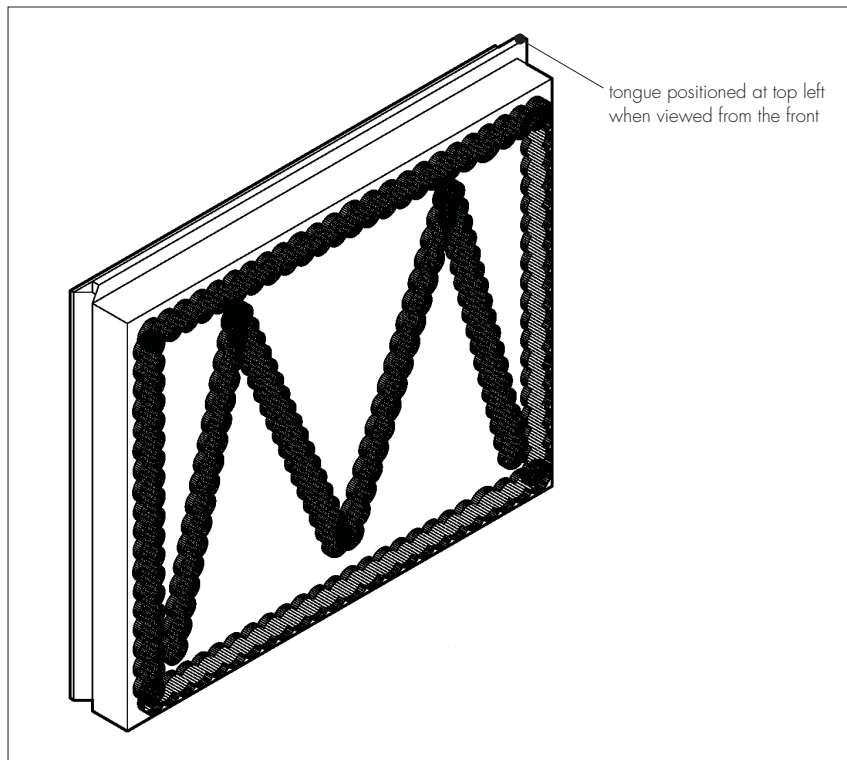
15.15 The bottle containing the adhesive foam should be shaken thoroughly 20 to 30 times at the beginning of works, and again after each successive 1 to 2 hours. The material should be protected against direct sunlight and temperatures above 50°C.

15.16 Installation begins at the base of the wall above the dpc. A firm, horizontal support of either the InstaClad aluminium profile or a temporary timber batten, is used to mount the first row of boards. The aluminium profile is installed as previously described.

15.17 If a temporary timber batten is to be used, a strip of mesh is partially adhered to the wall so that 200 mm (plus the thickness of the insulation) is hanging from the starting line of the installation. The InstaClad reinforcement render is subsequently used to wrap the overhanging mesh around the lower edge and adhere it to the first row of insulation boards. All exposed edges of the insulation boards are protected in this manner.

15.18 The Sto-TurboFix foam adhesive is applied to the face of the insulation board in a continuous line around the perimeter of the board with additional lines of adhesive in an enclosed M or W shape over the remaining surface (see Figure 3). The adhesive pattern must ensure an even adhesive covering of greater than 40%.

Figure 3 Typical pattern for application of Sto-TurboFix



15.19 The insulation board coated with Sto-Turbofix must be applied to the wall immediately after application of the adhesive foam.

15.20 The boards must be pressed gently in place against the wall and butted tightly together, working from bottom to top, with the vertical joints staggered. The insulation boards must not be knocked onto the wall. The position of the board can be adjusted within 10 minutes of application. Open joints in the insulation systems should be filled with slivers of insulation board or InstaClad PU foam and high spots or irregularities removed by lightly rasping over the whole surface.

15.21 With substrates of no-fines concrete or low loadbearing capacity, InstaClad expanding dowels are used as supplementary mechanical fixings at the specified minimum frequency of eight per square metre.

### Basecoat

15.22 Prior to the application of the basecoat, seals are applied where required and 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. Seal tape is installed as the insulation boards are placed in position and cannot be applied after installation of the insulation.

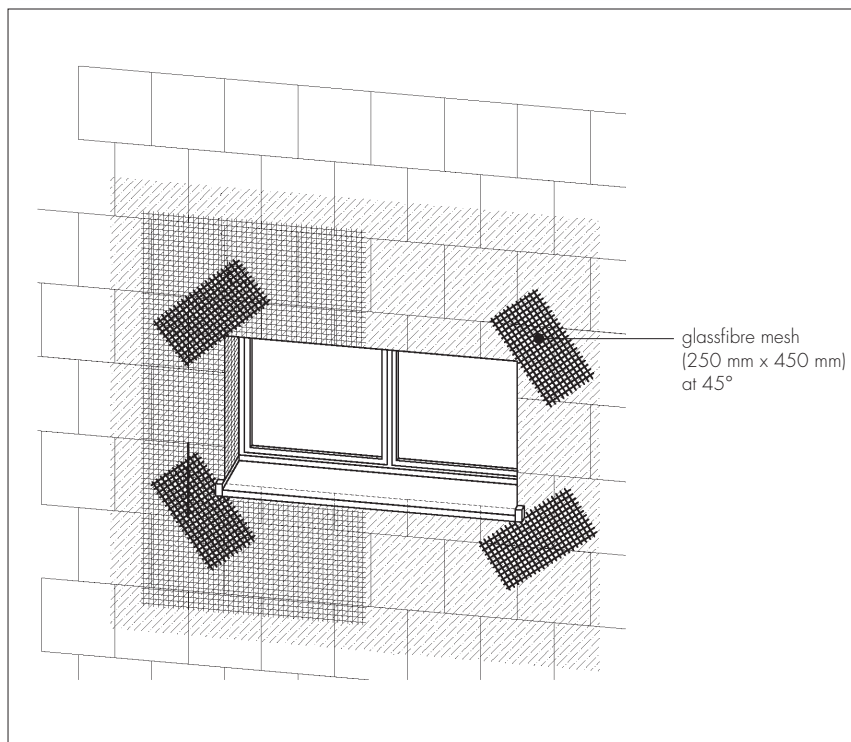
15.23 The prepared basecoat is applied to a minimum thickness of 3 mm over the insulation boards using spray equipment or a stainless steel trowel. The basecoat is applied progressively, working in 1.2 m sections in a vertical or horizontal direction.

### Reinforcing

15.24 The reinforcement mesh is immediately embedded into the wet basecoat, overlapping at all mesh joints by not less than 100 mm. Corner details are reinforced using PVC Mesh Angle Beads for external corners and Armour Angle in internal corners.

15.25 Additional pieces of reinforcing mesh (450 mm by 250 mm) are used diagonally at the corners of openings (see Figure 4).

Figure 4 Additional reinforcement at openings



15.26 The mesh should be free of wrinkles and fully embedded in the basecoat with the mesh pattern just visible on the finished surface.

15.27 The basecoat should be left to dry thoroughly before application of a primer and the decorative finish. Depending on conditions, the drying time will be between 24 hours and 48 hours.

### Finishing

15.28 The render finishes are prepared in accordance with the Certificate holder's Technical Datasheets and project method statement and are trowel-applied using a stainless steel trowel or spray-applied, in thicknesses of 1.5 mm.

15.29 A dash finish may be applied to InstaClad Dry Dash Receiver. The coating must be at least 6 mm thick, with the 6 mm to 8 mm aggregate applied immediately after application, while the coating is still soft. On completion, the surface must be checked to ensure an even coverage of spar dash has been achieved. Where necessary, the aggregate should be lightly tamped to ensure a good bond.

15.30 The finish coats should be allowed to dry thoroughly before any of the paint coatings covered by this Certificate are applied to any features.

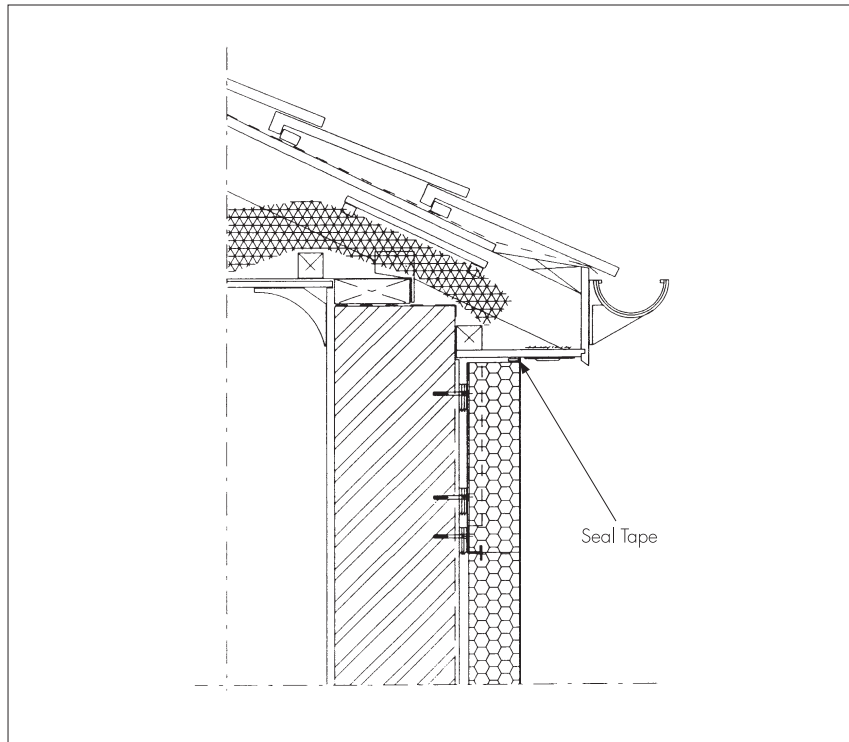
15.31 Continuous surfaces must be completed without a break, so the coatings must always be applied to a wet edge.

15.32 At the top of the wall the insulation boards must be protected by fitting under capping or coping stones or similar projection and be sealed using Seal Tape or appropriate beads.

15.33 Wallheads are formed by returning the reinforcing coat and reinforcement on to the horizontal surface. For an overhanging soffit, a seal is installed between the insulant and the underside of the soffit.

15.34 Care should be taken in the detailing of the insulation systems around openings and projections (see Figure 5).

Figure 5 Eaves detail on pitched roofs



15.35 At windows and doors the insulation should be continued around the reveals where there is sufficient clearance. New buildings should be built to allow this. Where there is insufficient clearance, the basecoat, reinforcement mesh and render decorative finish should be continued into the reveal (otherwise the reveal should be insulated using alternative means).

15.36 The insulation systems must be sealed around window frames and sills to give an elastic joint using Seal Tape or, in uninsulated reveals, appropriate acrylic sealant. Additional insulation should be fitted around openings, if required, to maintain the continuity of the insulation.

15.37 Window sills must be designed to shed water away from the joints between the render and opening detail by, for example, fitting with stooled ends. Seal tape is installed between the vertical flange and the window frame and beneath the sill and around the stooled ends.

15.38 Window/door reveals and heads are sealed using the appropriate bead (a PVC bead incorporating integral Seal tape and a polythene masking strip to help protect other finishes. Where the bead cannot be installed, Seal tape may be used.

15.39 Mineral fibre lamella (class A1) fire break boards are adhesively fixed to the substrate at the appropriate position using Sto Levell Uni.

15.40 On completion, external fittings should be re-fixed to the substrate using a suitable method. Further information is available from the Certificate holder.

## 16 Site practice

It is essential that appropriate site surveillance is in place to ensure detailing is carried out to the correct level. Additionally, the installation of the insulation systems should be checked by the person supervising the works at the end of each relevant stage. Further information is available from the Certificate holder.

## Technical Investigations

### 17 Investigations

17.1 An examination was made of test data relating to:

- test reports
- adequacy of fixing systems
- durability of finish
- fire
- fire barrier suitability
- pull-out strength of the systems
- thermal conductivity

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

17.2 Calculations and reports were assessed in connection with the structural performance of the insulation systems.

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

17.4 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 were examined.

17.5 An assessment of the risk of interstitial condensation was undertaken.

## Bibliography

BS 5250 : 2011 *Code of practice for control of condensation in buildings*

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

BS 8000-3 : 2001 *Workmanship on building sites — Code of practice for masonry*

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 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 1996-1-1 : 2005 *Eurocode 6 : Design of masonry structures — General rules for reinforced and unreinforced masonry structures*

BS EN 10326 : 2004 *Continuously hot-dip coated strip and sheet of structural steels — Technical delivery conditions*

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 15026 : 2007 *Hygrothermal performance of building components and building elements — Assessment of moisture transfer by numerical simulation*

BS EN ISO 6946 : 2007 *Building components and building elements — Thermal resistance and thermal transmittance — Calculation method*

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

BS EN ISO 10456 : 2007 *Building materials and products — Hygrothermal properties — Tabulated design values and procedures for determining declared and design thermal values*

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

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

## 18 Conditions

18.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page — no other company, firm, organisation or person may hold or claim that this Certificate has been issued to them
- is valid only within the UK
- has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English Law.

18.2 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

18.3 This Certificate will remain valid for an unlimited period provided that the product/system and its manufacture and/or fabrication, including all related and relevant parts and processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

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

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

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

18.6 Any information relating to the manufacture, supply, installation, use, maintenance and removal of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used, maintained and removed. It does not purport in any way to restate the requirements of the Health and Safety at Work etc. Act 1974, or of any other statutory, common law or other duty which may exist at the date of issue or reissue of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care.