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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(1) relates to InstaClad Robust External Wall Insulation Systems, comprising white or grey expanded polystyrene (EPS) insulation boards, mechanically fixed with supplementary adhesive, with a reinforced basecoat and render finishes. The systems are suitable for use on the outside of external masonry walls of new and existing domestic and non-domestic buildings, with height and boundary restrictions.

(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 can contribute to satisfying the requirements of the national Building Regulations (see section 6).

**Strength and stability —** the systems can adequately resist wind loads and impact damage. The impact resistance is dependent on the finish chosen (see section 7).

**Behaviour in relation to fire —** the Certificate holder has not declared a reaction to fire classification for the systems to BS EN 13501-1 : 2018 and their use is restricted (see section 8).

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

**Durability —** when installed and maintained in accordance with the Certificate holder's recommendations and the terms of this Certificate, the systems will remain effective for a least 30 years. The durability can be extended to 60 years by using different fixings and by following a planned inspection and an effective maintenance schedule as described in sections 12 and 13.

The BBA has awarded this Certificate to the company named above for the systems described herein. These systems have 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

Date of First issue: 17 June 2013

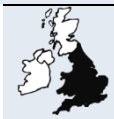
Sean Moriarty – Head of Approvals
Energy and Ventilation

Greg Cooper
Chief Executive

*Certificate amended on 23 August 2017 to include updated 'Behaviour in relation to fire' section.*
*Certificate amended on 12 November 2018 to reflect changes to sections 4 and 7 and other Certificate wording.*
*Certificate amended on 30 April 2020 regarding a revised fire classification and associated text.*

## Regulations

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



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

| | | |
|---|---|---|
| **Requirement:** | **A1** | **Loading** |
| Comment: | | The systems can sustain and transmit wind loads to the substrate wall. See sections 7.1 to 7.12 of this Certificate. |
| **Requirement:** | **B4(1)** | **External fire spread** |
| Comment: | | The systems are restricted by this Requirement. See sections 8.1 and 8.2 of this Certificate. |
| **Requirement:** | **C2(b)** | **Resistance to moisture** |
| Comment: | | The systems can provide a degree of protection against rain ingress. See section 10.1 of this Certificate. |
| **Requirement:** | **C2(c)** | **Resistance to moisture** |
| Comment: | | The systems can contribute to minimising the risk of interstitial and surface condensation. See sections 11.1, 11.2 and 11.4 of this Certificate. |
| **Requirement:** | **L1(a)(i)** | **Conservation of fuel and power** |
| Comment: | | The systems can contribute to satisfying this Requirement. See sections 6.2 and 6.3 of this Certificate. |
| **Regulation:** | **7(1)** | **Materials and workmanship** |
| Comment: | | The systems are acceptable. See sections 13.1 and 13.2 and the *Installation* part of this Certificate. |
| **Regulation:** | **7(2)** | **Materials and workmanship** |
| Comment: | | The systems are restricted by this Regulation. See sections 8.1 and 8.2 of this Certificate |
| **Regulation:** | **26** | **Minimum energy performance requirements for new buildings** |
| **Regulation:** | **26A** | **Fabric energy efficiency rates for new dwellings (applicable to England only)** |
| **Regulation:** | **26A** | **Primary energy consumption rates for new buildings (applicable to Wales only)** |
| **Regulation:** | **26B** | **Fabric performance values for new dwellings (applicable to Wales only)** |
| Comment: | | The systems can contribute to satisfying these Regulations; however, compensatory fabric/services measures may need to be taken. See sections 6.2 and 6.3 of this Certificate. |

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

| | | |
|---|---|---|
| **Regulation:** | **8(1)(2)** | **Durability, workmanship and fitness of materials** |
| Comment: | | The systems can contribute to a construction satisfying this Regulation. See sections 12, 13.1 and 13.2 and the *Installation* part of this Certificate. |
| **Regulation:** | **9** | **Building standards applicable to construction** |
| Standard: | 1.1 | Structure |
| Comment: | | The systems can sustain and transmit wind loads to the substrate wall. See sections 7.1 to 7.12 of this Certificate. |
| Standard: | 2.6 | Spread to neighbouring buildings |
| Comment: | | The systems are restricted by this Standard, with reference to clauses 2.6.4[(1)(2)], 2.6.5[(1)] and 2.6.6[(2)]. See sections 8.1, 8.3 and 8.4 of this Certificate. |

| | | |
|---|---|---|
| Standard: | 2.7 | Spread on external walls |
| Comment: | | The systems are restricted by this Standard, with reference to clause 2.7.1[(1)(2)]. See sections 8.1, 8.3 and 8.4 of this Certificate. |
| Standard: | 3.10 | Precipitation |
| Comment: | | The systems will contribute to a construction satisfying this Standard, with reference to clauses 3.10.1[(1)(2)] and 3.10.2[(1)(2)]. See section 10.1 of this Certificate. |
| Standard: | 3.15 | Condensation |
| Comment: | | The systems can contribute to satisfying this Standard, with reference to clauses 3.15.1[(1)(2)], 3.15.4[(1)(2)] and 3.15.5[(1)(2)]. See sections 11.3 and 11.4 of this Certificate. |
| Standard: | 6.1(b) | Carbon dioxide emissions |
| Standard: | 6.2 | Building insulation envelope |
| Comment: | | The systems can contribute to satisfying these Standards, with reference to clauses (or part of) 6.1.1[(1)], 6.1.2[(1)(2)], 6.1.3[(1)(2)], 6.1.4[(2)], 6.1.6[(1)], 6.1.8[(2)], 6.1.10[(2)], 6.2.1[(1)(2)], 6.2.3[(1)], 6.2.4[(1)], 6.2.5[(1)(2)], 6.2.6[(2)], 6.2.7[(2)], 6.2.11[(1)] and 6.2.13[(2)]. See sections 6.2 and 6.3 of this Certificate. |
| Standard: | 7.1(a)(b) | Statement of sustainability |
| Comment: | | The systems can contribute to satisfying the relevant requirements of Regulation 9, Standards 1 to 6, and therefore will contribute to a construction meeting the bronze level of sustainability as defined in this Standard. In addition, the systems can contribute to a construction meeting a higher level of sustainability as defined in this Standard with reference to clauses 7.1.4[(1)(2)] [Aspect 1[(1)(2)] and 2[(1)]], 7.1.6[(1)(2)] [Aspect 1[(1)(2)] and 2[(1)]] and 7.1.7[(1)(2)] [Aspect 1[(1)(2)]]. See sections 6.2 and 6.3 of this Certificate. |
| **Regulation:** | **12** | **Building standards applicable to conversions** |
| Comment: | | All comments given for the systems under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to clause 0.12.1[(1)(2)] and Schedule 6[(1)(2)]. |

(1) Technical Handbook (Domestic).
(2) Technical Handbook (Non-Domestic).

## The Building Regulations (Northern Ireland) 2012 (as amended)

| | | |
|---|---|---|
| **Regulation:** | **23** | **Fitness of materials and workmanship** |
| Comment: | | The systems are acceptable. See sections 13.1 and 13.2 the *Installation* part of this Certificate. |
| **Regulation:** | **28(b)** | **Resistance to moisture and weather** |
| Comment: | | The systems provide a degree of protection against rain ingress. See section 10.1 of this Certificate. |
| **Regulation:** | **29** | **Condensation** |
| Comment: | | Walls insulated with the systems can satisfy the requirements of this Regulation. See section 11.4 of this Certificate. |
| **Regulation:** | **30** | **Stability** |
| Comment: | | The systems can sustain and transmit wind loads to the substrate wall. See sections 7.1 to 7.12 of this Certificate. |
| **Regulation:** | **36(a)** | **External fire spread** |
| Comment: | | The systems are restricted by this Regulation. See sections 8.1 and 8.2 of this Certificate. |
| **Regulation:** | **39(a)(i)** | **Conservation measure** |
| Comment: | | The systems can contribute to satisfying this Regulation. See sections 6.2 and 6.3 of this Certificate. |

| | | |
|---|---|---|
| **Regulation:** | **40** | **Target carbon dioxide emission rate** |
| Comment: | | The systems can contribute to satisfying these Regulations. See sections 6.2 and 6.3 of this Certificate. |

## Construction (Design and Management) Regulations 2015
## Construction (Design and Management) Regulations (Northern Ireland) 2016

Information in this Certificate may assist the client, designer (including Principal Designer) and contractor (including Principal Contractor) to address their obligations under these Regulations.

See section: 3 *Delivery and site handling* (3.1 and 3.3) of this Certificate.

# Additional Information

## NHBC Standards 2018

In the opinion of the BBA, InstaClad Robust External Wall Insulation Systems, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements in relation to *NHBC Standards*(1), Part 6 *Superstructure (excluding roofs)*, Chapter 6.9 *Curtain walling and cladding*.

(1) There is a general requirement in *NHBC Standards*, Chapter 6.9, for fire-retardant-treated EPS insulation to be used with the systems in accordance with BS EN 13163 : 2012.

# Technical Specification

## 1 Description

1.1 InstaClad Robust External Wall Insulation Systems comprise square-edge or tongue-and-groove EPS insulation boards mechanically fixed to the external masonry wall with supplementary adhesive (nominal 40% coverage), with reinforced basecoat, primer and render finishes (see Figure 1).

1.2 The systems can be designed to achieve either a 30- or 60-year service life (see Figures 1a and 1b). Mechanical fixings are applied through the insulation boards (for a 30-year system) or through the reinforcement mesh and insulation boards (for a 60-year system). See sections 1.3 and 1.4.

**30-year durability (see Figure 1a)**

1.3 After the boards have been secured to the wall with insulation adhesive, rasped flat and mechanical fixings installed, the basecoat is trowel-applied to the specified thickness, followed by the reinforcement mesh, which is fully embedded within the basecoat. The system is left to cure before application of the primer, finish and decorative coats.

**60-year durability (see Figure 1b)**

1.4 After the boards have been secured to the wall with insulation adhesive and rasped flat, the basecoat is trowel-applied to the specified thickness, followed by the reinforcement mesh, which is fully embedded within the basecoat. While the basecoat is still wet, mechanical fixings are applied through the mesh and insulation boards into the substrate, followed by the application of mesh patches over the fixing heads, with more basecoat applied to fully embed the fixing plate and the mesh patches. Additional basecoat is applied to achieve the same thickness that would be applied over the insulation boards for 30-year durability applications (the required thickness measured from the top of the fixing plate). The system is left to cure before application of the primer, finish and decorative coats.

1.5 The systems components are specified in Table 1.

*Table 1 Systems components*

| Components | Instaclad Robust |
|---|---|
| Adhesive (supplementary) | Insta DP Mortar<br>Sto Turbofix |
| Insulation | EPS K70 White 038<br>EPS K70 Grey 032<br>EPS K90 Grey 030 |
| Mechanical fixings | See Section 1.6 – Mechanical Fixings |
| Basecoats | Insta DP Mortar |
| Reinforcement mesh | Insta Reinforcement Mesh<br>Armour Mesh(1) |
| Primer | Insta Primer |
| Finish coats | Insta Silcarend<br>Sto Miral Dry Dash Receiver(1)<br>ICR Adhesive/Pointing Mortar<br>Sto Acrylic Brick-slips |
| Decorative coat | Spar Dash aggregate(1) |

(1) For use without primer.

1.6 The systems comprise the following components:

**Adhesive (supplementary)**

- Insta DP Mortar — a polymer-based cementitious powder adhesive, supplied in 25 kg bags for mixing with 4 to 5 litres of clean water, with a coverage rate of between 4.5 and 6.0 kg·m$^{-2}$
- Sto Turbofix — a single-component polyurethane foam adhesive with a coverage rate of between 0.1 and 0.25 kg·m$^{-2}$.

**Insulation(1)**

- EPS K70 White 038 — square-edged or tongue-and-groove EPS boards, 1000 mm by 500 mm, in a standard range of thicknesses between 60(2) mm and 200 mm in 10 mm increments (the squared-edged thickness range is 20 mm to 200 mm and the tongue-and-groove thickness range is 60 mm to 200 mm). The boards have a nominal density of 15 kg·m$^{-3}$, a compressive strength of 70 kPa, a minimum tensile strength of 100 kPa and are classified as Euroclass E in accordance with BS EN 13501-1 : 2007. They are manufactured to comply with the requirements of BS EN 13163 : 2012
- EPS K70 Grey 032 — square-edged or tongue-and-groove EPS boards, 1000 mm by 500 mm, in a standard range of thicknesses between 60(2) mm and 200 mm in 10 mm increments (the squared-edged thickness range is 20 mm to 200 mm and the tongue-and-groove thickness range is 60 mm to 200 mm). The boards have a nominal density of 15 kg·m$^{-3}$, a compressive strength of 70 kPa, a minimum tensile strength of 100 kPa and are classified as Euroclass E in accordance with BS EN 13501-1 : 2007. They are manufactured to comply with the requirements of BS EN 13163 : 2012
- EPS K90 Grey 030 — tongue-and-groove EPS boards, 1000 mm by 500 mm, in a standard range of thicknesses between 80 mm and 200 mm in 10 mm increments. The boards have a nominal density of 17 kg·m$^{-3}$, a compressive strength of 90 kPa, a minimum tensile strength of 100 kPa and are classified as Euroclass E in accordance with BS EN 13501-1 : 2007. They are manufactured to comply with the requirements of BS EN 13163 : 2012.

(1) For declared thermal conductivity ($\lambda_D$) values see Table 3.
(2) Insulation thicknesses of 20 mm, 30 mm, 40 mm and 50 mm would generally be used in reveals.

**Mechanical fixings**

- Mechanical insulation fixings(1)(2) — anchors with adequate length to suit the substrate and the insulation thickness, approved and supplied by the Certificate holder, and selected from:

— Ejot H1 eco — HDPE anchor sleeve with galvanized steel pin and a polyamide, PA GF 50 mounting plug

— Ejotherm STR U[3] — polyethylene, PE-HD or polyamide ribbed or anchor sleeve with a stainless steel or electro-galvanized screw
— Ejotherm STR U 2G[3] — polyethylene, PE-HD or polyamide ribbed or anchor sleeve with a stainless steel or electro-galvanized screw

(1) Alternate fixings may be used provided they can be demonstrated to have equal or higher pull-out, plate diameter and plate stiffness characteristics
(2) Polyethylene, PE-HD or polyamide ribbed anchor sleeve with a stainless pin to achieve 60-years durability performance
(3) This fixing can be used for 60-years durability only when used with a stainless-steel pin or screw.

**Basecoat**

- Insta DP Mortar — a polymer - modified cementitious basecoat, mixed with 4 to 5 litres of clean water per bag and applied to a total thickness of 5 mm as a reinforcement basecoat, with a coverage rate of 5.6 $kg \cdot m^{-2}$.

**Reinforcement mesh**

- Insta Reinforcement Mesh — a multi-strand, alkali-resistant glass fibre, with a 6.0 mm by 6.0 mm grid size and a polymer coating. Supplied in rolls 1.1 m wide and 50 m long, with a nominal weight of 150 $g \cdot m^{-2}$
- Armour Mesh — a high impact alkali-resistant glass fibre, with a 7.5 mm by 7.5 mm grid size and a polymer coating, used to improve impact resistance. Supplied in rolls 1.0 m wide and 25 m long, with a nominal weight of 500 $g \cdot m^{-2}$.

**Primer**

- Insta Primer — an acrylate-copolymer-based ready to use primer, for use on existing organic renders and finishes.

**Finish coats**

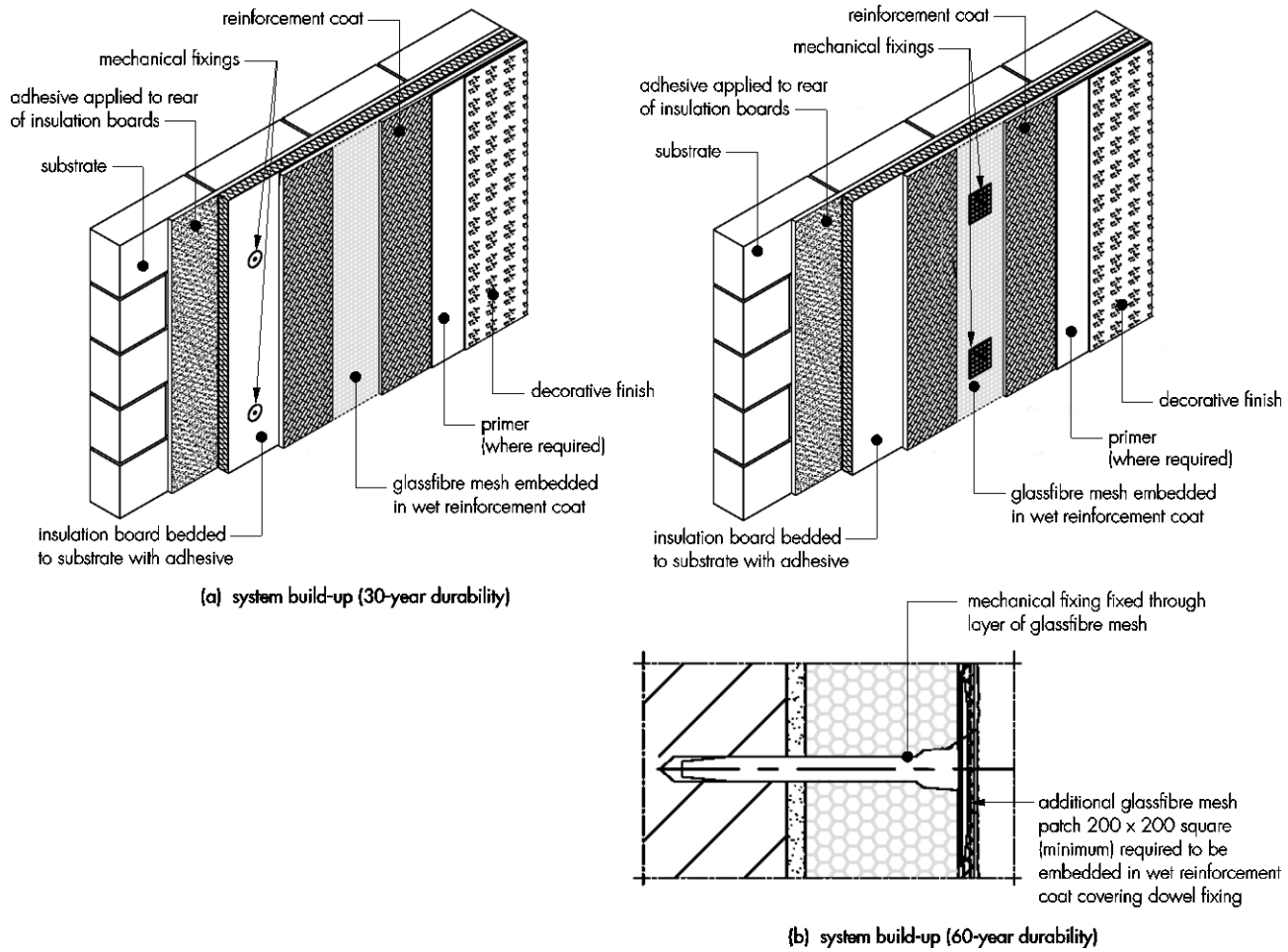
- Insta Silcarend — a ready-mixed, silicone-based, textured coating with 1.0 mm to 3.5 mm particle sizes[1], and a coverage rate of between 2.3 and 4.3 $kg \cdot m^{-2}$
- Sto Miral Dry Dash Receiver — a polymer-modified cementitious powder, mixed with 5 litres of clean water per kg bag and applied to a minimum thickness of 8 mm, directly onto reinforcement basecoat, with a coverage rate of 15 $kg \cdot m^{-2}$
- ICR Adhesive/Pointing Mortar — high-adhesive-strength acrylic-based bonding and joint mortar, supplied pre-coloured and applied to a thickness of 3.0 mm to 4.0 mm, directly to the reinforcement basecoat, with a coverage rate of 3.5 $kg \cdot m^{-2}$
- Sto Acrylic Brick-slips — preformed brick-slips, available in a range of sizes which equate to 58 items per $m^2$.

(1) Thickness is regulated by particle size.

**Decorative coat**

- Spar Dash Aggregate — 3 mm to 8 mm in size, for use with Sto Miral Dry Dash receiver.

*Figure 1 InstaClad Robust External Wall Systems*




1.7 Ancillary materials used with the systems are:

- a range of aluminium, PVC-U or stainless-steel profiles, comprising:
  - base profile
  - corner-mesh profile
  - corner profile with optional PVC-U nosing
  - render stop profile.

1.8 Ancillary materials also used with the systems, but outside the scope of this Certificate, are:

- a range of aluminium, PVC-U or stainless-steel profiles, comprising:
  - base profile clip
  - movement joint (E or V)
  - expansion joint
- PVC packing shim
- specialist profiles including parapet capping and flashing section
- profile connectors and fixings
- fungicidal wash
- fire barriers
- silicone sealants in accordance with BS EN ISO 11600 : 2003
- expansion foam — polyurethane foam used for filling gaps between insulation boards
- Sto Seal Tape – compressible foam tape for sealing system interfaces
- a range of decorative coatings (available from the Certificate holder).

## 2 Manufacture

2.1 The systems components are manufactured by the Certificate holder or bought in from suppliers, to an agreed specification.

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

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

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

2.4 The systems are distributed from the Certificate holder's premises in Glasgow and Birmingham.

## 3 Delivery and site handling

3.1 The systems components are delivered to site in the packaging and quantities listed in Table 2. Each package carries the product identification and batch number.

*Table 2 Component supply details*

| Component | Quantity/packaging |
|---|---|
| EPS Insulation boards | sealed packs |
| Insta DP Mortar | 25 kg paper bags |
| Sto Turbofix | 10.4 kg pressurised canisters |
| Mechanical fixings | boxed by manufacturer |
| Insta Reinforcement Mesh | 1.10 m wide rolls, 50 m length |
| Armour Mesh | 1 m wide rolls x 25 m length |
| Insta Primer | 23 to 25 kg plastic pails |
| Insta Silcarend<br>ICR Adhesive/Pointing Mortar | 25 kg plastic pails |
| Sto Miral Dry Dash receiver<br>Spar Dash aggregate | 25 kg bags |
| Sto Acrylic brick-slips | boxed by manufacturer |

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

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

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

3.5 The other components should be stored in a safe area, under cover and protected from excessive heat and frost at all times.

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

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

4.3 The systems are for application to the outside of external walls of masonry, normal weight concrete, lightweight concrete, autoclaved concrete and no-fines concrete construction, on new or existing domestic and non-domestic buildings (with or without existing render) with height and boundary restrictions (see section 8 of this Certificate). Prior to installation of the systems, wall surfaces should comply with section 14.

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

- BS EN 1992-1-1 : 2004 and its UK National Annex
- BS EN 1996-1-1 : 2005 and its UK National Annex
- BS EN 1996-2 : 2006 and its UK National Annex
- BS 8000-0 : 2014
- BS 8000-2.2 : 1990
- BS 8000-3 : 2001.

4.5 New walls not subject to regulatory requirements should also be built in accordance with the Standards identified in section 4.4.

4.6 Movement joints should be incorporated into the systems in line with existing movement joints in the building structure and in accordance with the Certificate holder's recommendations for the specific installation.

4.7 The systems will improve the weather resistance of a wall and provide a decorative finish. However, for existing buildings, they should only be installed where there are no signs of dampness on the inner surface of the wall other than those caused solely by condensation.

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

4.9 The fixing of sanitary pipework, plumbing, rainwater goods, satellite dishes, clothes lines, hanging baskets and similar items to the systems is outside the scope of this Certificate. See section 4.10 of this Certificate.

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

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

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

4.13 Instaclad Robust External Wall Insulations can be adapted to achieve an extended service life of 60 years instead of the standard 30. The difference between 30- and 60-year durability systems is covered in sections 1.1 to 1.4, with the detailed installation procedure covered in section 16.

4.14 For 60-year durability systems, the following components must be constructed from stainless steel grade 1.4301 to BS EN 10088-2 : 2014:

- base profile and render stop end including the fixings. In addition, any other profile components which would remain exposed after the application of the finish coat
- pin or screw for mechanical fixings.

## 5 Practicability of installation

The systems should only be installed by specialist contractors who have successfully undergone training and registration by the Certificate holder.

Note: The BBA operates a UKAS-accredited Approved Installer Scheme for external wall insulation (non-mandatory); details of approved installer companies are included on the BBA's website (www.bbacerts.co.uk).

## 6 Thermal performance

6.1 Calculations of thermal transmittance (U value) should be carried out in accordance with BS EN ISO 6946 : 2017 and BRE Report BR 443 : 2006, using the insulation manufacturer's declared thermal conductivity ($\lambda_D$) values of the insulation given in Table 3.

*Table 3 Thermal conductivities of the insulation ($\lambda_D$ value)*

| Insulation types | Insulation board thickness range (mm) | Thermal conductivity ($W \cdot m^{-1} \cdot K^{-1}$) |
|---|---|---|
| EPS K70 White 038 | 60 to 200 | 0.038 |
| EPS K70 Grey 032 | 60 to 200 | 0.032 |
| EPS K90 Grey 030 | 80 to 200 | 0.030 |

6.2 The U value of a completed wall will depend on the selected insulation type and thickness, fixing method and type and number of fixings, and the insulating value of the substrate masonry and its internal finish. Calculated U values for sample constructions in accordance with the national Building Regulations are given in Tables 4 and 5, and are based on the thermal conductivity given in Table 3.

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

| U value[4] ($W \cdot m^{-2} \cdot K^{-1}$) | Insulation thickness[3] (mm) | | | | | |
|---|---|---|---|---|---|---|
| | 215 mm brickwork, $\lambda = 0.56\ W \cdot m^{-1} \cdot K^{-1}$ | | | 200 mm dense blockwork, $\lambda = 1.75\ W \cdot m^{-1} \cdot K^{-1}$ | | |
| | EPS K70 White 038 | EPS K70 Grey 032 | EPS K90 Grey 030 | EPS K70 White 038 | EPS K70 Grey 032 | EPS K90 Grey 030 |
| 0.18 | —[5] | 190 | 180 | —[5] | 200 | 190 |
| 0.19 | —[5] | 180 | 170 | —[5] | 190 | 180 |
| 0.25 | 150 | 130 | 120 | 160 | 140 | 130 |
| 0.26 | 140 | 120 | 120 | 150 | 130 | 120 |
| 0.28 | 130 | 110 | 110 | 140 | 120 | 110 |
| 0.30 | 120 | 100 | 100 | 130 | 110 | 100 |
| 0.35 | 100 | 80 | 80 | 110 | 90 | 90 |

(1) Wall construction inclusive of 13 mm plaster ($\lambda = 0.57\ W \cdot m^{-1} \cdot K^{-1}$), brickwork (protected) with 17.1% mortar or dense blockwork with 6.7% mortar ($\lambda = 0.88\ W \cdot m^{-1} \cdot K^{-1}$). Declared thermal conductivity ($\lambda_D$) values of insulation is as shown in Table 3. A 6 mm thick adhesive layer with $\lambda = 0.43\ W \cdot m^{-1} \cdot K^{-1}$ covering 40% of the area is also included and a board emissivity of 0.9, together with an external render thickness of 7 mm with $\lambda = 1\ W \cdot m^{-1} \cdot K^{-1}$.

(2) Calculations based on a mechanically fixed system that included 8 fixings (with galvanized steel pin) per metre square with a point thermal transmittance ($\chi_p$) of $0.004\ W \cdot K^{-1}$ per pin. Use of other types of fixings should be calculated in accordance with BS EN ISO 6946 : 2017. A gap correction ($\Delta U''$) of zero is assumed.

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

(4) When applying the maximum available insulation thickness, these walls can achieve U values from 0.17 to 0.21 $W \cdot m^{-2} \cdot K^{-1}$ depending on insulation and wall type

(5) See section 4.2.

*Table 5 Insulation thickness required to achieve U value[1][2] — using stainless steel fixings (60-year durability)*

| U value[4] ($W \cdot m^{-2} \cdot K^{-1}$) | Insulation thickness[3] (mm) | | | | | |
|---|---|---|---|---|---|---|
| | 215 mm brickwork, $\lambda = 0.56\ W \cdot m^{-1} \cdot K^{-1}$ | | | 200 mm dense blockwork, $\lambda = 1.75\ W \cdot m^{-1} \cdot K^{-1}$ | | |
| | EPS K70 White 038 | EPS K70 Grey 032 | EPS K90 Grey 030 | EPS K70 White 038 | EPS K70 Grey 032 | EPS K90 Grey 030 |
| 0.18 | 200 | 170 | 160 | —[5] | 170 | 160 |
| 0.19 | 190 | 160 | 150 | 190 | 160 | 150 |
| 0.25 | 140 | 120 | 110 | 140 | 120 | 120 |
| 0.26 | 130 | 110 | 100 | 140 | 120 | 110 |
| 0.28 | 120 | 100 | 90 | 120 | 110 | 100 |
| 0.30 | 110 | 90 | 90 | 120 | 100 | 90 |
| 0.35 | 90 | 80 | 80 | 100 | 80 | 80 |

(1) Wall construction inclusive of 13 mm plaster ($\lambda = 0.57\ W \cdot m^{-1} \cdot K^{-1}$), brickwork (protected) with 17.1% mortar or dense blockwork with 6.7% mortar ($\lambda = 0.88\ W \cdot m^{-1} \cdot K^{-1}$). Declared thermal conductivity ($\lambda_D$) values of insulation is as shown in Table 3. A 6 mm thick adhesive layer with $\lambda = 0.43\ W \cdot m^{-1} \cdot K^{-1}$ covering 40% of the area is also included and a board emissivity of 0.9, together with an external render thickness of 7 mm with $\lambda = 1\ W \cdot m^{-1} \cdot K^{-1}$.

(2) Calculations based on a mechanically fixed system that included 8 fixings (with stainless steel pin) per metre square with a point thermal transmittance ($\chi_p$) of $0.002\ W \cdot K^{-1}$ per pin. Use of other types of fixings should be calculated in accordance with BS EN ISO 6946 : 2017. A gap correction ($\Delta U''$) of zero is assumed.

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

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

(5) See section 4.2.

6.3 Care must be taken in the overall design and construction of junctions with other elements and openings to minimise thermal bridges and air infiltration. Detailed guidance can be found in the documents supporting the national Building Regulations.

# 7 Strength and stability

**General**

7.1 The Certificate holder is ultimately responsible for the design of the systems and it is the responsibility of the company installing the systems to accurately follow the installation instructions (see also section 5). The Certificate holder must also verify that a suitably experienced and qualified individual (with adequate professional indemnity) establishes that:

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

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

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

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

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

7.6 Negative wind load is transferred to the substrate wall via[1][2]:

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

(1) For mechanically fixed systems with supplementary adhesive, the contribution of the adhesive is not considered when calculating resistance to wind load.
(2) Further guidance is available from BBA Guidance Note 1, available on the BBA website (www.bbacerts.co.uk).

7.7 The characteristic bond resistance between the insulation and render interface derived from test results was 80 $kN \cdot m^{-2}$. The design resistance of the bond between the insulation and render ($N_{RD1}$) should be taken as the characteristic bond resistance divided by a partial factor of 9.

7.8 Typical characteristic pull-out resistances for the fixings taken from the corresponding European Technical Assessment (ETA) are given in Table 6; the values are dependent on the fixing type and must be selected to suit the specific loads and substrate concerned. In situations where suitable data does not exist[1], the characteristic pull-out resistance must be established from site-specific pull-out tests conducted on the substrate of the building to ascertain the minimum resistance to pull-out failure of the fixings, and determined in accordance with the guidance given in EOTA TR051 : 2016 (minimum test characteristic value = 0.6 x mean of 5 lowest test results). To obtain the design pull-out resistance of the fixings ($N_{RD2}$), this characteristic pull-out resistance should then be divided by the partial factor given in Table 6.

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

*Table 6 Fixings — Typical characteristic pull-out resistances*

| Fixing type[1] | ETA number | Substrates | Drill diameter (mm) | Effective anchorage depth (mm) | Characteristic pull-out resistance (kN)[2] | Partial factor |
|---|---|---|---|---|---|---|
| Ejot H1 eco | 11/0192 | Concrete C12/15<br>Clay brickwork | 8 | 25 | 0.9 | 2 |
| Ejot STR U / U 2G[3] | 04/0023 | Concrete C12/15<br>Clay brickwork | 8 | 25 | 1.5 | 2 |

(1) The minimum values for plate stiffness of fixings is 0.6 kN·mm and the load resistance is 1.4 kN.
(2) Values are determined in accordance with EAD 330196-00-0604 : 2016 and are dependent on the substrate. The Use Categories are defined in the corresponding ETA.
(3) Fixings suitable for 60-year durability as they are available with stainless steel pin.

7.9 The characteristic pull-through resistance of the fixings was determined from tests using a 60 and 90 mm diameter fixing plate and minimum insulation thickness of 60 mm. The design resistance per metre square ($N_{RD3}$) is obtained by applying an appropriate partial factor as shown in Table 7.

*Table 7 Design pull-through resistances*

| Factor (unit) | EPS Insulation (1000 x 500 mm) | | | |
|---|---|---|---|---|
| | Pull-through + Static Foam Block[6] (SFB) | | Pull-through + Static Foam Block[7] (SFB) | |
| | 30- and 60-year durability systems | | | |
| Tensile resistance of the insulation (kN·m$^{-2}$) | 100 | | 100 | |
| Fixing type[1] | Ejot STR U | | Ejot STR U | |
| Fixing plate diameter (mm) | 60 | | 90 | |
| Insulation thickness (mm) | ≥ 60 | | ≥ 60 | |
| Characteristic pull-through resistance[2] per fixing (kN) | At panel[8] | 0.51 | At panel[8] | 0.72 |
| | Panel joints[9] | 0.40 | Panel joints[9] | 0.43 |
| Partial factor[3] | 2.5 | | 2.5 | |
| Design pull-through resistance per fixing ($N_{RD3}$) (kN) | At panel | 0.20 | At panel | 0.29 |
| | Panel joints | 0.16 | Panel joints | 0.17 |
| Design pull-through resistance per board (kN) (based on minimum number of fixings)[4] | 0.72 | | 0.92 | |
| Design pull-through resistance per board (kN) (based on maximum number of fixings)[5] | 1.12 | | 1.5 | |

(1) See Table 6 for typical characteristic pull-out resistance of the fixings.
(2) Characteristic pull-through resistance of insulation over the head of the fixing, in accordance with BS EN 1990 : 2002, Annex D7.2 and its UK National Annex.
(3) The partial factor is based on the assumption that all insulation boards are quality controlled and tested to establish tensile strength perpendicular to the face of the board.
(4) The minimum design pull-through resistance per board is based on a minimum of four fixings per board (1000 x 500 mm), which equates to eight fixings per m$^2$. The design resistance for the minimum number of fixings is based on the fixing pattern provided in Figure 3 and minimum insulation thickness specified in this Table. The fixing pattern and interaction of the fixings should be considered when calculating the design resistance per board.
(5) The maximum design pull-through resistance per board is based on a maximum of six fixings per board (1000 x 500 mm), which equates to 12 fixings per m$^2$. The design resistance for the maximum number of fixings is only applicable to the minimum insulation thickness tested and as specified in this Table. The fixing pattern, insulation thickness and interaction of the fixings should be considered when calculating the design resistance per board.
(6) Only applicable for the system configuration tested (EPS board, 60 mm thickness, Ejot STR U fixing, 60 mm diameter plate, two fixings within the insulation board and two fixings at the board joints).
(7) Only applicable for the system configuration tested (EPS board, 60 mm thickness, Ejot STR U fixing, 90 mm diameter plate, two fixings within the insulation board and two fixings at the board joints).
(8) Results obtained by conducting pull-through test of one fixing.
(9) Results obtained by conducting Static Foam Block (SFB) test.

7.10 The number and spacing of the fixings should be determined by the Certificate holder. The number of fixings must not be less than the minimum specified for the systems and the fixings should be symmetrically positioned and evenly distributed about the centre of the board both vertically and horizontally, except at openings and building corners.

7.11 The data obtained from sections 7.7 to 7.9 must be assessed against the design wind load and the following expression must be satisfied:

For safe design:

$Rd \geq W_e$

$Rd_{b.ins/rend} = A_r * N_{RD1}$
$Rd_{pull\text{-}out} = n * N_{RD2}$
$Rd_{pull\text{-}through} = (N_{RD3panel} * n_{panel}) + (N_{RD3joint} * n_{joint})/A_{board}$

Where:

| | |
|---|---|
| Rd | is the design ultimate resistance ($kN \cdot m^{-2}$) taken as the minimum of $Rd_{b.ins/rend}$, $Rd_{pull\text{-}out}$ and $Rd_{pull\text{-}through}$ |
| $W_e$ | is the maximum design wind load ($kN \cdot m^{-2}$) |
| $Rd_{b.ins/rend}$ | is the design bond resistance between the insulation and render ($kN \cdot m^{-2}$) |
| $Rd_{pull\text{-}out}$ | is the design pull-out resistance of the insulation fixings per metre square ($kN \cdot m^{-2}$) |
| $Rd_{pull\text{-}through}$ | is the design pull-through resistance of the insulation fixings per metre square ($kN \cdot m^{-2}$) |
| $A_r$ | is the reinforced basecoat bond area (based on % area covered) |
| $N_{RD1}$ | is the design adhesive bond resistance between the insulation and render, based on test ($kN \cdot m^{-2}$) |
| n | is the number of anchor fixings per $m^2$ |
| $N_{RD2}$ | is the design pull-out resistance per fixing based on test (kN) |
| $N_{Rd3panel}$ | is the design pull-through resistance per anchor not placed at the panel joint, based on test (kN) |
| $N_{Rd3joint}$ | is the design pull-through resistance per anchor placed at the panel joint, based on test (kN) |
| $n_{panel}$ | is the number of internal anchors in a panel |
| $n_{joint}$ | is the number of joint anchors in a panel |
| $A_{board}$ | is the area of the board ($m^2$). |

7.12 The insulation systems are mechanically fixed to the substrate wall with a minimum of six fixings per board or approximately eight fixings per metre square, as per the fixing patterns shown in Figure 5, and in conjunction with a minimum 40% coverage of supplementary adhesive (see section 16). Additional fixings may be required, depending on the results of the calculations detailed above for the specific site.

**Impact resistance**

7.13 Hard body impact tests were carried out in accordance with ETAG 004 : 2013. The systems are suitable for use in the Use Categories up to and including those specified in Table 8 of this Certificate.

*Table 8 Systems impact resistance*

| **Render systems: Basecoat + primer + finishing coats indicated below:** | **Category[(1)]** | |
|---|---|---|
| | **Standard mesh (Insta Reinforcement Mesh)** | **High impact (Insta Reinforcement Mesh + Armour Mesh)** |
| Insta Silcarend | Category II | |
| Sto Miral Dry Dash receiver + Spar Dash aggregate ICR Adhesive/Pointing Mortar + Sto Acrylic brick-slips | Category I | |

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

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

## 8 Behaviour in relation to fire

8.1 The Certificate holder has not declared a reaction to fire classification for the systems to BS EN 13501-1 : 2018.

8.2 In England, Wales and Northern Ireland, the systems may only be used on buildings with no storey more than 18 m above ground level and which are one metre or more from a boundary. Additional restrictions apply for assembly and recreation buildings. With minor exceptions, the systems should be included in calculations of unprotected area.

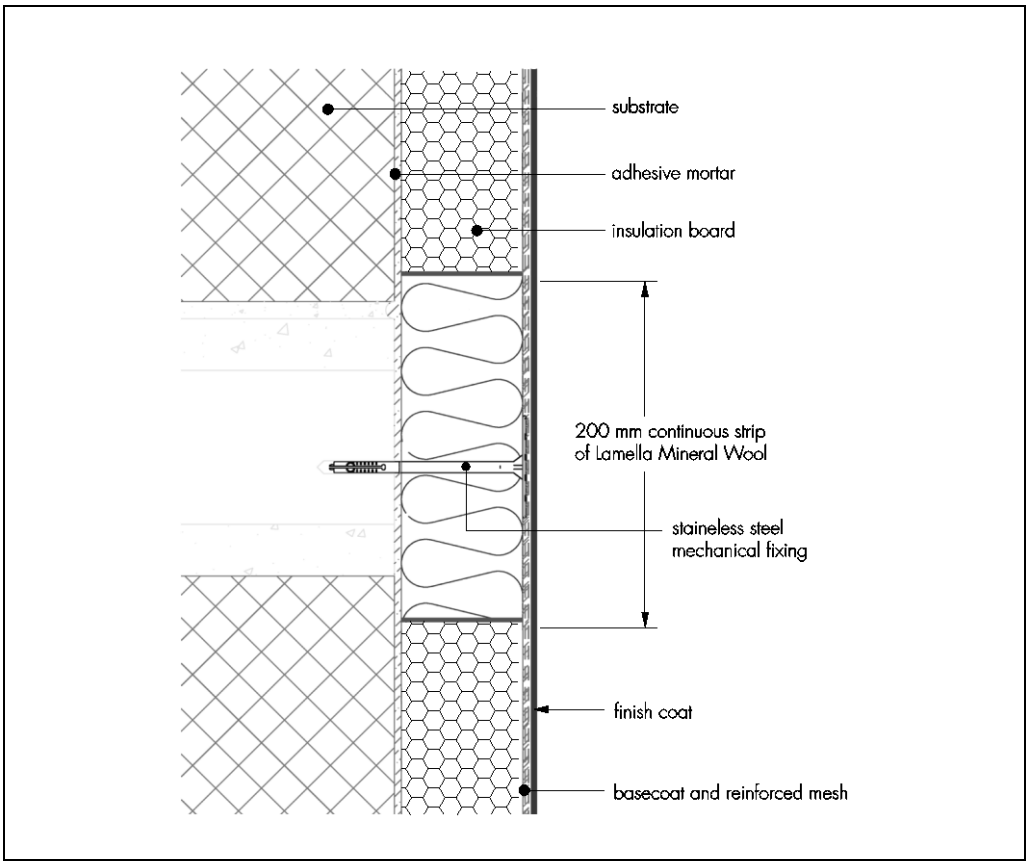
8.3 For all buildings in Scotland, the systems are only suitable for use more than one metre from the boundary. With minor exceptions, the systems should be included in calculations of unprotected area.

8.4 In Scotland, the systems should not be used on any building with a storey more than 11 m above the ground, or on any entertainment or assembly building with a total storey area more than 500 $m^2$, or on any hospital or residential care building with a total storey area more than 200 $m^2$.

8.5 For application to second storey walls and above, it is recommended that the designer considers at least one stainless steel fixing per square metre and fire barriers in line with compartment walls and floors as advised in BRE Report BR 135 : 2013 (see Figure 2 of this Certificate).

8.6 Designers should refer to the relevant national Building Regulations and guidance for detailed conditions of use, particularly in respect of requirements for substrate fire performance, cavity barriers, service penetrations and combustibility limitations for other materials and components used in the overall wall construction.

*Figure 2 Fire barrier details*




## 9 Proximity of flues and appliances

When the systems are installed in close proximity to certain flue pipes, the relevant provisions of the national Building Regulations should be satisfied:

***England and Wales*** — Approved Document J
***Scotland*** — Mandatory Standard 3.19, clause 3.19.4(1)(2)

(1) Technical Handbook (Domestic).
(2) Technical Handbook (Non-Domestic).

***Northern Ireland*** — Technical Booklet L.

## 10 Water resistance

10.1 The systems will provide a degree of protection against rain ingress. However, care should be taken to ensure that walls are adequately watertight prior to their application. The systems must only be installed where there are no signs of dampness on the inner surface of the substrate other than those caused solely by condensation.

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

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

10.4 At the top of walls, the systems should be protected by an adequate coping, overhang or other detail designed for use with these types of systems (see section 16).

## 11 Risk of condensation

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

**Surface condensation**

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

11.3 Walls will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed 1.2 $W \cdot m^{-2} \cdot K^{-1}$ at any point. Guidance may be obtained from BS 5250 : 2011 Section 4, and BRE Report BR 262 : 2002.

**Interstitial condensation**

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

11.5 The water vapour resistance factor ($\mu$) for the insulation and the equivalent air layer thickness ($S_d$) of the reinforced basecoats with finish coat may be taken from Table 9. Where primer is used, the relevant $S_d$ values shown in Table 10 should be added to the relevant value from Table 9.

*Table 9 Equivalent air layer thickness ($S_d$) — reinforced basecoats and finish coats*

| Components | Thickness (mm) | Water vapour resistance ($\mu$) | Equivalent air layer Thickness $S_d$ (m) |
|---|---|---|---|
| EPS K70 White 038<br>EPS K70 Grey 032 | 60 to 200 | 20 to 40(1) | — |
| EPS K90 Grey 030 | 80 to 200 | 30 to 70(1) | — |
| **Render system:**<br>**Basecoat (6 mm thickness) and finish coats without the primer indicated below:** | | | |
| Sto Miral Dry Dash receiver + Spar Dash aggregate | 11 | — | 0.4 |
| ICR Adhesive/Pointing Mortar + Sto Acrylic brick-slips | 11 | — | 0.6 |
| Insta Silcarend(2) | 8.5 | — | 0.21 |

(1) The value is taken from BS EN 12524: 2000, Table 2. It is recommended that the lower figures are used when assessing the interstitial condensation risk.
(2) Particle size of 2.5 mm.

*Table 10 Equivalent air layer thickness ($S_d$) — primer coat*

| Primer | $S_d$ (m) |
|---|---|
| Insta Primer | 1.02 |

## 12 Maintenance and repair

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

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

12.2 For a 60-year durability, a detailed maintenance plan must be prepared and provided to the building manager/owner on completion. As a minimum, this should include an inspection for evidence of defects twelve months after the application and subsequently every five years. This plan should include full details of the required inspection regime and a record of these inspections should be retained.

12.3 Damaged areas must be repaired using the appropriate components and procedures detailed in the Certificate holder's installation instructions and in accordance with BS EN 13914-1 : 2016.

## 13 Durability

13.1 The systems will have a service life of at least 30 years, provided any damage to the surface finish is repaired immediately and regular maintenance is undertaken, as described in section 12.

13.2 The systems' service life can be extended to 60 years provided a planned inspection and maintenance programme is introduced in accordance with section 12. An extended 60 years' service life requires the use of stainless steel base and corner profiles, stainless steel fixings or centre pin Grade 1.4301 and plastic anchor sleeve material such as polyamide (PA6 and PA6.6), polyethylene (PE) or polypropylene (PP) and the following of an appropriate repair and maintenance schedule as covered by the Certificate holder's Repair and Maintenance Manual. In order to achieve this, and depending on the building's location, degree of exposure and detailing, it may be necessary to repair or replace isolated areas. Any damage to the surface finish must be repaired within a time period agreed in the Certificate holder's Maintenance Manual.

13.3 Any render containing Portland cement may be subject to lime bloom. The occurrence of this may be reduced by avoiding application in adverse weather conditions. The effect is transient and less noticeable on lighter colours.

13.4 The render may become discoloured with time, the rate depending on the initial colour, the degree of exposure and atmospheric pollution, as well as the design and detailing of the wall. In common with traditional renders, discoloration by algae and lichens may occur in wet areas. The appearance may be restored by a suitable power wash or, if required, by over coating.

13.5 To maintain a high quality aesthetic appearance, it may be necessary to periodically overcoat the building using a suitable masonry coating. Care should be taken not to adversely affect the water vapour transmission or fire characteristics of the systems. The advice of the Certificate holder should be sought as to the suitability of a particular product.

# Installation

## 14 Site survey and preliminary work

14.1 A pre-installation survey of the property must be carried out to determine suitability for treatment and the need for any necessary repairs to the building structure before application of the systems. A specification is prepared for each elevation of the building indicating:

- the position of beads
- detailing around windows and doors and at eaves
- damp-proof course (dpc) level
- exact position of expansion joints, if required
- areas where flexible seal must be used
- any alterations to external plumbing
- the position of fire barriers.

14.2 The survey should include tests conducted on the walls of the building by the Certificate holder or their approved installers (see section 15) to determine the pull-out resistance of the proposed mechanical fixings for the appropriate substrate. An assessment and recommendation is made on the type and number of fixings required to withstand the building's expected wind loading based on calculations using the test data and pull-out resistance (see section 7).

14.3 All modifications, such as alterations to the external plumbing and necessary repairs to the building structure, must be completed before installation of the systems commences.

14.4 Surfaces should be sound, clean and free from loose material. The flatness of surfaces must be checked; this may be achieved using a straight-edge tool spanning the storey height. Any excessive irregularities, ie greater than 10 mm in one metre, 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 render, it is essential that the bond between the background and the render is adequate. All loose areas should be hacked off and reinstated.

14.6 On existing buildings, purpose-made window sills must be fitted to extend beyond the finished face of the systems. New buildings should incorporate suitably deep sills (see Figure 9).

14.7 In new buildings, internal wet work (eg screed or plastering) should be completed and allowed to dry prior to the application of the systems.

## 15 Approved installers

Application of the systems, within the context of this Certificate, must be carried out by approved installers recommended or recognised by the Certificate holder. Such an installer is a company:

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

## 16 Procedure

**General**

16.1 Installation of the systems must be carried out in accordance with this Certificate and the Certificate holder's current installation instructions and this Certificate.

16.2 Weather conditions should be monitored to ensure correct application and curing conditions. Application of coating materials must not be carried out at temperatures below 5°C or above 30°C, or if exposure to frost is likely, and the coating must be protected from rapid drying. Installation should not take place during rainfall or if rain is anticipated. In addition, cementitious-based renders must not be applied if the temperature is likely to fall below 0°C.

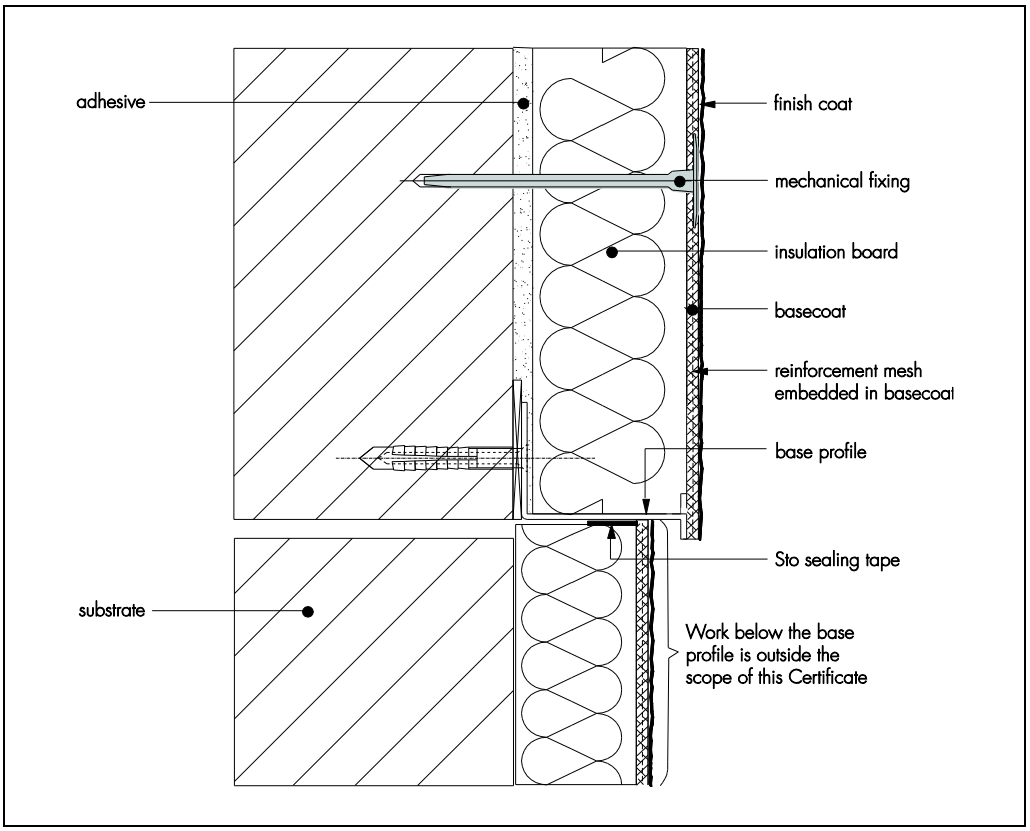
16.3 All rendering should be in accordance with the relevant recommendations of BS EN 13914-1 : 2016. The render must be protected from rapid drying and should not be applied on elevations in direct sunlight or where the substrate is hot.

16.4 The difference between 30- and 60-year durability systems is briefly described in section 1. The general procedures that follow (sections 16.5 to 16.18) are common to both types of systems (with the exception in the selection of the material specification of the systems components, see sections 4.14 and 13.2).

**Installation procedures common to both 30- and 60-year systems**

16.5 The base profile is secured to the external wall above the dpc using the approved profile fixings at approximately 300 mm centres (see Figure 3). Base rail connectors are installed at all rail joints. Extension profiles are fixed to the front lip of the base profile.

*Figure 3 Typical section of base profile*

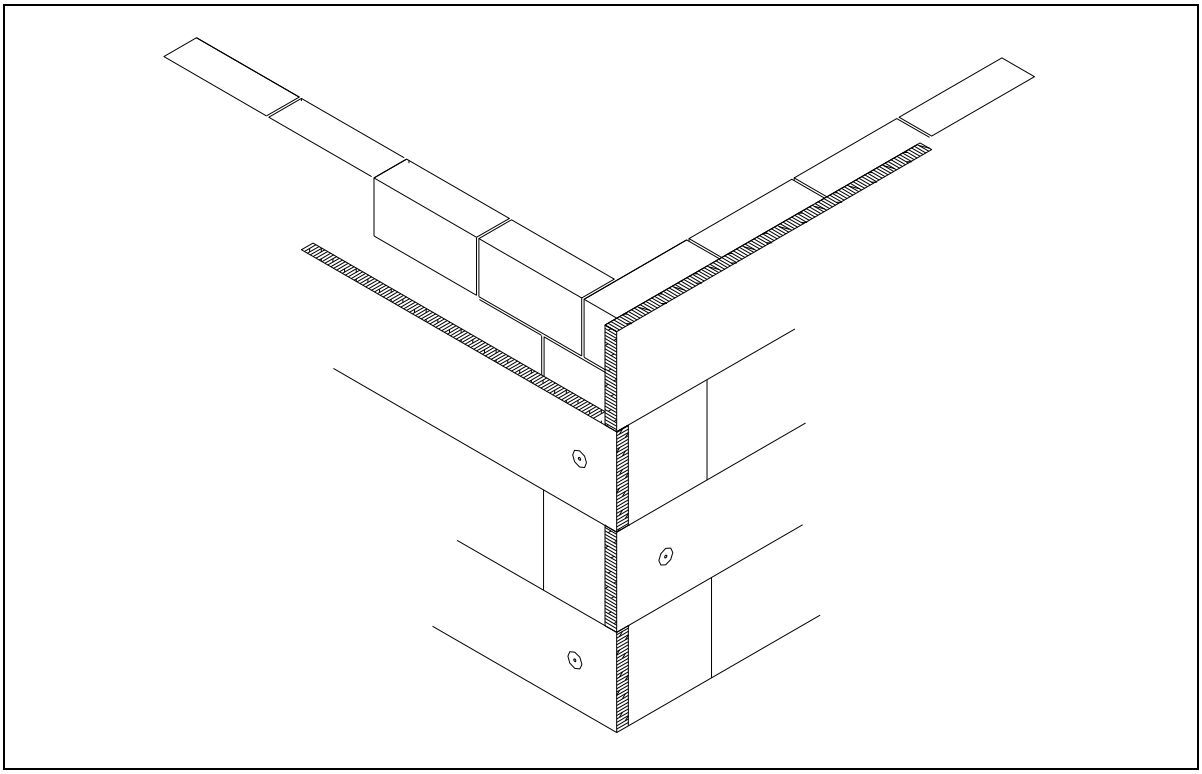



16.6 The supplementary adhesive is prepared by mixing each bag with the required amount of clean water in accordance with the Certificate holder's instructions. The adhesive is applied in a continuous line around the perimeter of the insulation board (at least 30 mm wide) with six additional dabs of adhesive (approximately 120 mm in diameter) distributed uniformly over the remaining surface. The amount of supplementary adhesive applied should cover at least 40% of the surface after the boards have been pressed against the wall. The thickness of the adhesive layer when pressed should not exceed 10 mm. Alternatively, the cement-based adhesives can be applied over the entire face of the insulation board using a notched trowel.

16.7 When applying Sto Turbofix adhesive, a bead of bonding foam should be applied all around the edge of the boards, enclosing additional foam in the shape of a W or M. At least 40% of the board surface should be covered after the board is pressed against the substrate.

16.8 The first run of insulation boards is positioned on the base profile, pressed firmly against the wall (so the adhesive is evenly distributed) and butted tightly together, with the vertical joints staggered by at least 200 mm (see Figure 4). Joints between boards greater than 2 mm should be filled with expansion foam and gaps greater than 10 mm should be closed by repositioning or, where appropriate, by cutting slivers of insulation board to fit. Alignment should be checked as work proceeds.

*Figure 4 Typical arrangement of insulation boards*



16.9 A mechanical fixing is applied through each insulation board to initially secure them to the wall whilst the adhesive is curing.

16.10 To fit around details such as doors and windows, insulation boards may be cut with a sharp knife or a fine-tooth saw. If required, purpose-made window sills are fitted, which are designed to prevent water ingress and incorporate drips to shed water clear of the systems (see Figure 12). However, their performance is outside the scope of this Certificate.

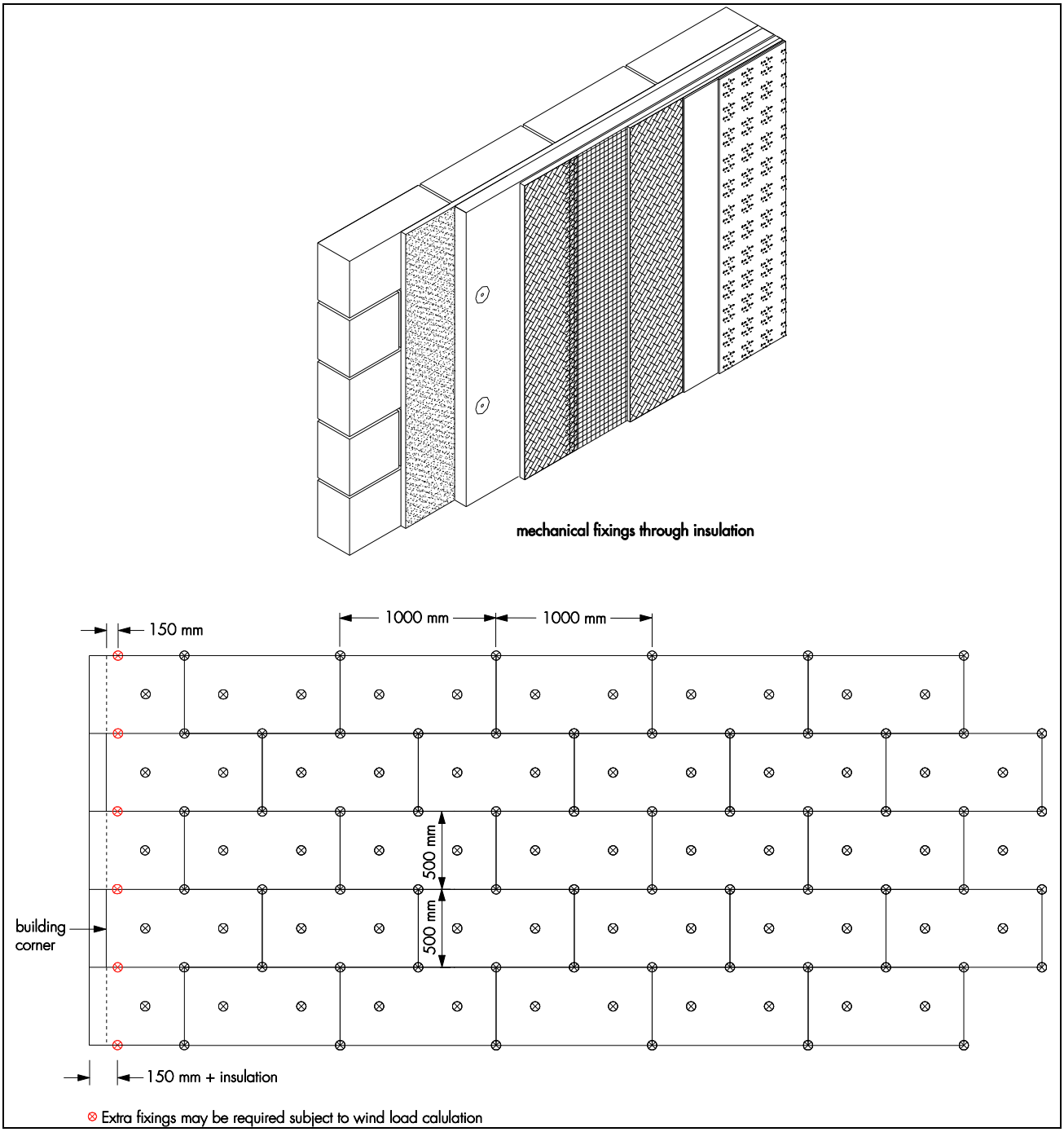
16.11 Installation continues until the whole wall is completely covered including, where appropriate, into the building soffits. Window and door reveals should be insulated to minimise the effects of cold bridging in accordance with the recommendations given in the Accredited Construction Details. Where clearance is limited, strips of insulation should be installed to suit available margins and details (see Figure 10).

16.12 Periodic checks should be carried out as work proceeds. Where existing render is on the wall or dubbing out render has been used, care should be taken when aligning the boards as the effective embedment will be reduced.

16.13 Corner profiles are fixed to all building corners. For a 60-year durability, the corner profiles should be constructed from stainless steel material unless they are fully embedded in the render and so protected from atmospheric exposure (see section 4.14).

16.14 Prior to the application of the reinforcement coat, Sto Seal Tape is applied at window and door frames, overhanging eaves, gas and electric meter boxes, and wall vents, or where the render abuts any other building material or surface, to provide a weatherproof seal.

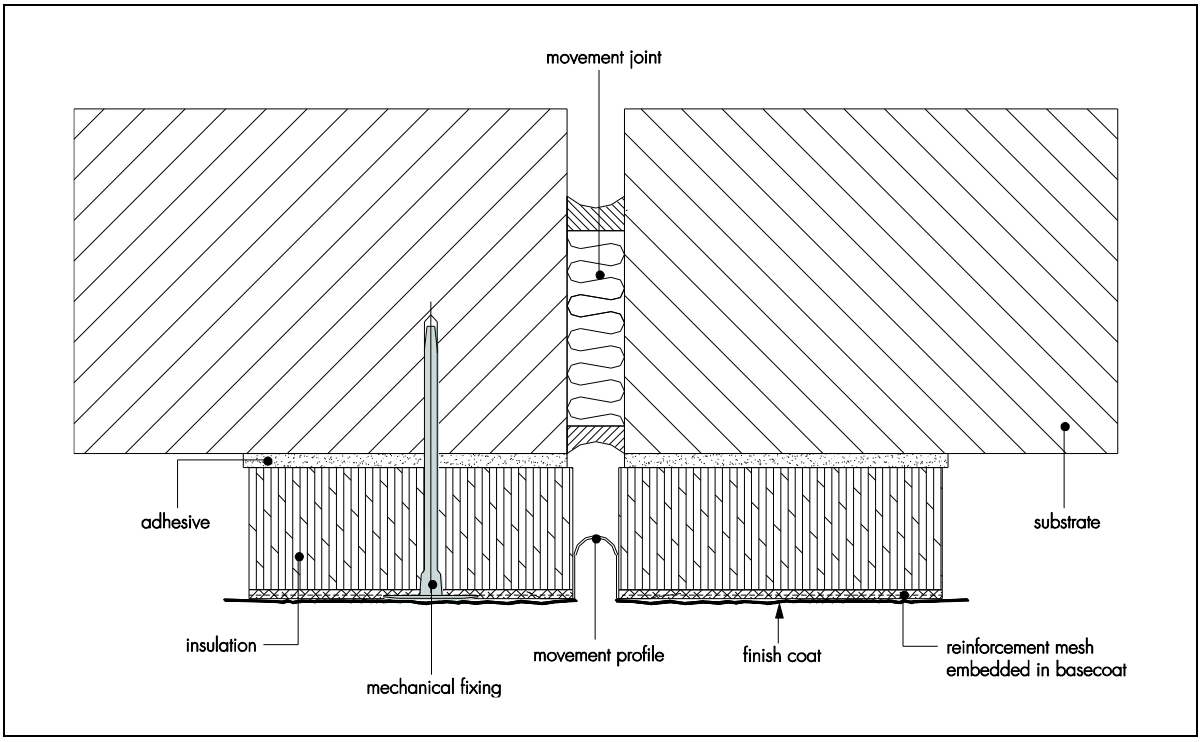
*Figure 5 Typical fixing pattern – through the insulation board*




**Movement joints**

16.15 Generally, movement joints are not required in the systems but, if such a joint is incorporated in the substrate, then movement joints must be carried through the insulation systems (see Figure 6).

*Figure 6 Movement joint details*

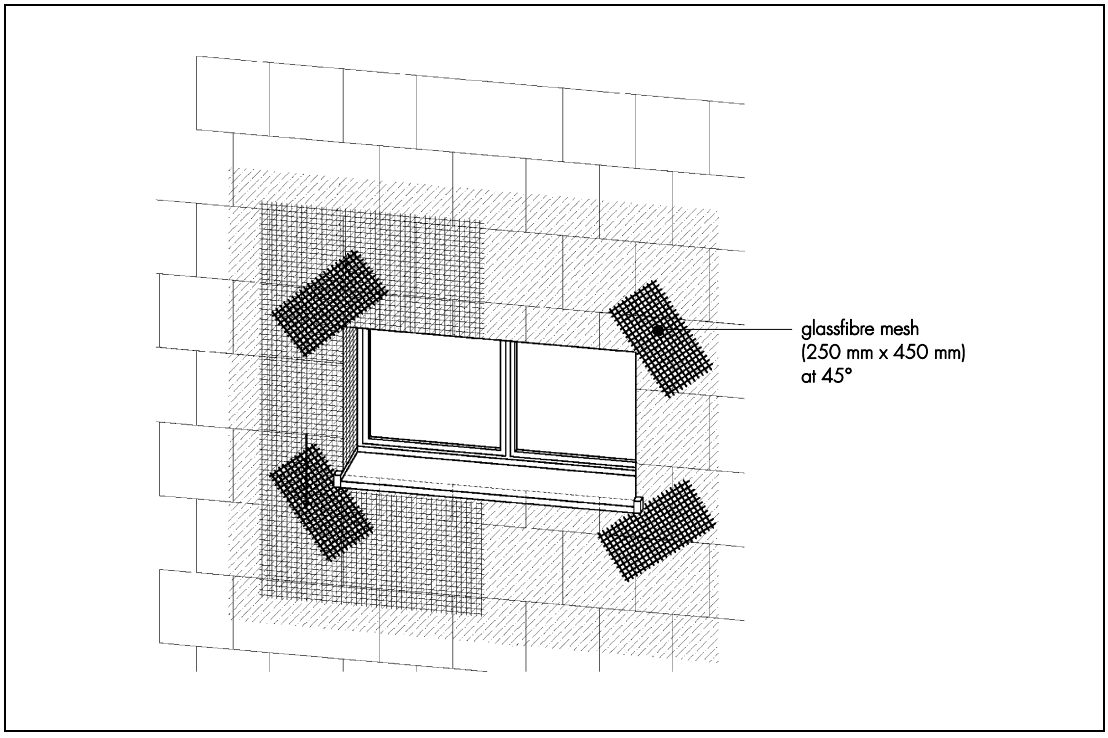



**Basecoat and reinforcement mesh**

16.16 Insta DP Mortar reinforcement basecoat is prepared by mixing each bag with the required amount of clean water in a suitable container and thoroughly mixing for at least five minutes using a paddle mixer to create a paste-like mortar in accordance with the Certificate holder's instructions (see section 1.6).

16.17 Stress patches of reinforcement mesh (approximate size 250 by 450 mm) are applied diagonally over the insulation at the corners of openings (see Figure 7).

*Figure 7 Additional reinforcement at openings*



16.18 Where additional impact resistance is required, two layers of reinforcement mesh are applied. This is achieved by using Armour Mesh (as the first layer) embedded into the wet basecoat, with adjacent mesh joints butted together, followed by Insta Reinforcement Mesh. This second layer of mesh is applied immediately over the first layer.

16.19 Further installation procedures specific to 30- and 60-year durability systems are described in sections 16.20 to 16.23 and 16.24 to 16.29 respectively.

**Application of 30-year durability system — mechanical fixings through the insulation boards**

16.20 After the insulation adhesive has set, holes are drilled through the insulation board into the substrate wall to the required depth at the specified frequency and pattern, but not less than eight fixings per metre square (eg four fixings per board) as shown in Figure 5. The mechanical fixings are inserted and tapped or screwed firmly into place, securing the insulation boards to the substrate.

16.21 The first layer of the basecoat is applied over the insulation boards using a stainless steel trowel, and floated with a Darby float to the required thickness (this is dependent on the basecoat applied, see section 1.5). Reinforcement mesh (with its concave surface to the wall) is applied and immediately embedded into the basecoat by trowelling from the centre to the edge and an additional light coat of basecoat is applied (whilst the initial coat is still wet) to ensure the mesh is free of wrinkles.

16.22 The reinforcement mesh should be overlapped at joints by at least 100 mm. Further basecoat is then applied as required, to ensure the mesh is completely covered and the required minimum thickness of basecoat is achieved whilst ensuring that the mesh is placed in the top one third of basecoat. The basecoat is applied progressively working in 1 metre sections, vertically and horizontally.

16.23 The basecoat is left to dry for at least 48 hours (this is dependent upon the type of basecoat applied and weather condition) before the primer is applied, where required. The primer applied must be suitable for the required finish coat for the system (see section 1.6) and left to dry for 12 hours before the application of the finish coat (see sections 16.30 to 16.37).

**Application of 60-year durability system — mechanical fixings through the reinforcement mesh**

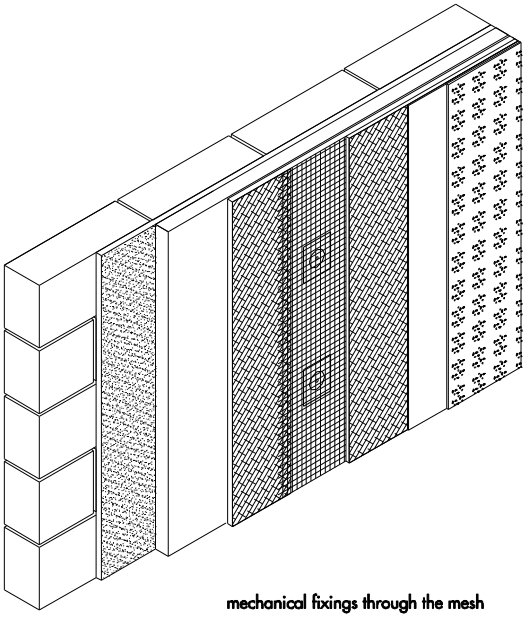
16.24 After the insulation adhesive has set, the system is ready for the application of basecoat.

16.25 The first layer of the basecoat is applied over the insulation boards using a stainless steel trowel, and floated with a Darby float to a required thickness (see section 1.6). Reinforcement mesh (with its concave surface to the wall) is applied immediately embedded into the basecoat by trowelling from the centre to the edge, and an additional light coat of basecoat is applied (whilst the initial coat is still wet) to ensure the mesh is free of wrinkles.

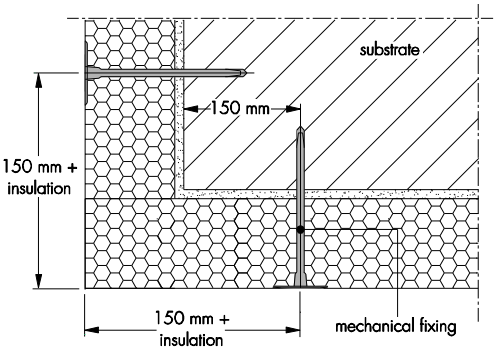
16.26 The reinforcement mesh should be overlapped at joints by at least 100 mm. Further basecoat is then applied as required, to ensure the mesh is completely covered and the required minimum thickness of basecoat is achieved whilst ensuring that the mesh is placed in the top one third of basecoat.

16.27 While the basecoat is still wet, holes are drilled through the reinforcement mesh and insulation boards into the substrate wall to the required depth at the specified frequency and pattern, but not less than eight fixings per square metre (see Figure 8). The mechanical fixings are inserted and tapped or screwed firmly into place, securing the mesh and insulation boards to the substrate wall. The fixings are slightly overdriven into the substrate wall to allow the fixing plate to partially penetrate through into the face of the insulation boards.

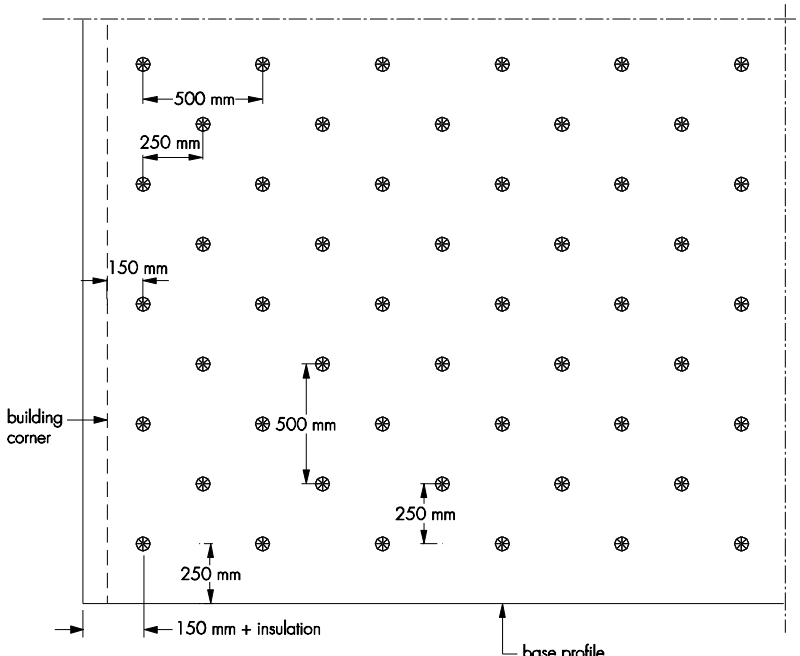
*Figure 8 Typical fixing pattern – through the mesh and insulation board*



mechanical fixings through the mesh




From external corner, fixings must be located minimum of 150 mm into sound substrate




Note: Minimum overlap of break bond is 200 mm square edged insulation boards

16.28 While the basecoat is still wet, 200 by 200 mm stress patches of reinforcement mesh are applied over the mechanical fixing heads and fully embedded within the basecoat (see Figure 1b). Additional basecoat is applied to maintain the required thickness from the surface of the fixing plate.

16.29 The basecoat is left to dry for at least 48 hours (this is dependent upon the type of basecoat applied and ambient conditions) before the primer is applied, where required. The primer applied must be suitable for the required finish coat for the system (see section 1.6) and left to dry for 12 hours before the application of the finish coat.

**Application of finish coats**

16.30 If the Sto Seal Tape has not been used, prior to the application of the finish coat, a bead of silicone sealant is gun-applied at window and door frames, overhanging eaves, gas and electric meter boxes, wall vents, or where the render abuts any other building material or surface.

16.31 Primer is required for certain finish coats and it should be applied by brush or roller and allowed to dry prior to application of the finish coat.

Note: Primer is not required when applying a dry dash finish (see section 1.6).

16.32 The acrylic or silicone based finish coats are applied in accordance with Certificate holder's current installation instructions, using a stainless steel trowel or with a spray gun.

16.33 Finish coats should be allowed to dry thoroughly before application of decorative paint in accordance with Certificate holder's current installation instructions.

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

16.35 The drying time is dependent on ambient conditions and should be adhered to in accordance with Certificate holder's current installation instructions.

**Sto Miral Dry Dash Receiver finish**

16.36 The dash receiver is applied over the basecoat to a minimum thickness of 6 mm. While the dash receiver is still soft, Spar Dash Aggregate is applied onto the receiver. On completion, the surface must be checked to ensure an even coverage of spar dash aggregate has been achieved. Where necessary the aggregate should be lightly tamped to ensure a good bond is achieved.

Note: When applying spar dash aggregate finish on a 60-year durability application, stainless steel corner profiles should be used.

**Sto Acrylic Brick-slips finish**

16.37 The ICR Adhesive/Pointing is applied over the basecoat to a minimum thickness of 3 mm. Sto Acrylic Brick-slips are applied onto the mortar, evenly spaced and levelled in accordance with the Certificate holder's current installation instructions.

16.38 At the top of walls, the systems should be protected by an adequate coping, overhang (see Figure 8), or by an adequately sealed purpose-made flashing. Care should be taken in the detailing of the systems around openings and projections (see Figures 10 and 11). To achieve a 60-year service life of an installation, the system is finished against a stainless steel stop bead at reveals, to allow for replacement of windows.

*Figure 9 Roof eaves details*

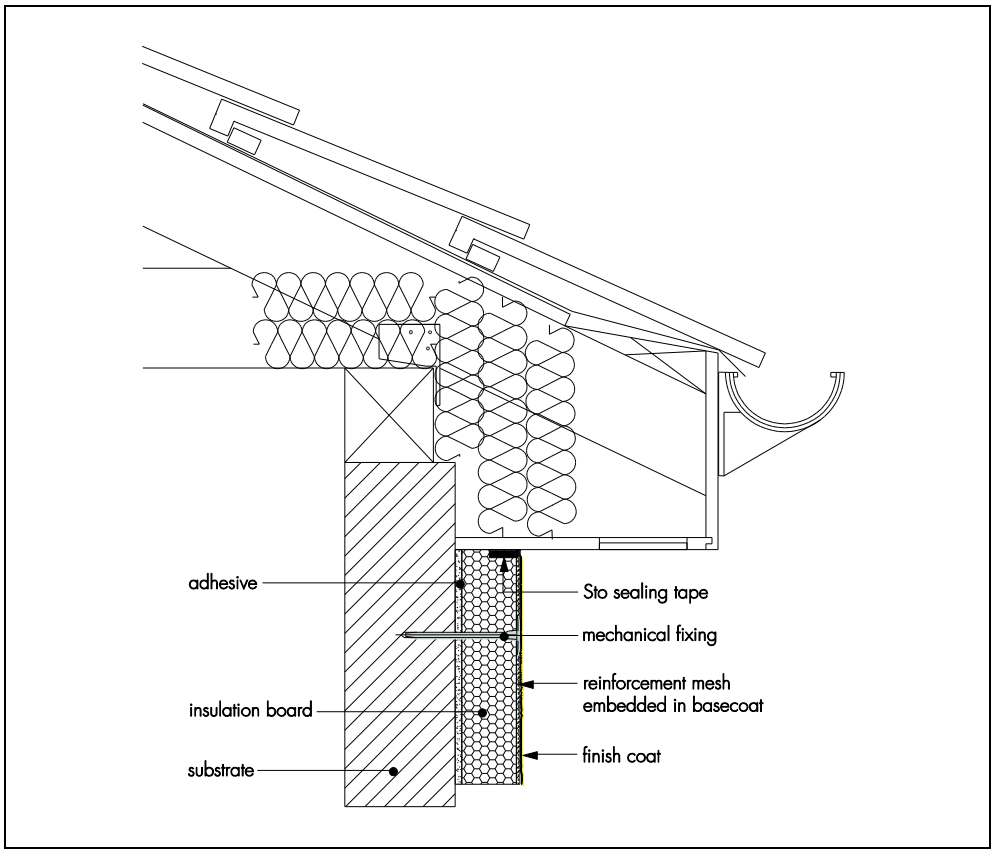



*Figure 10 Window reveal detail*

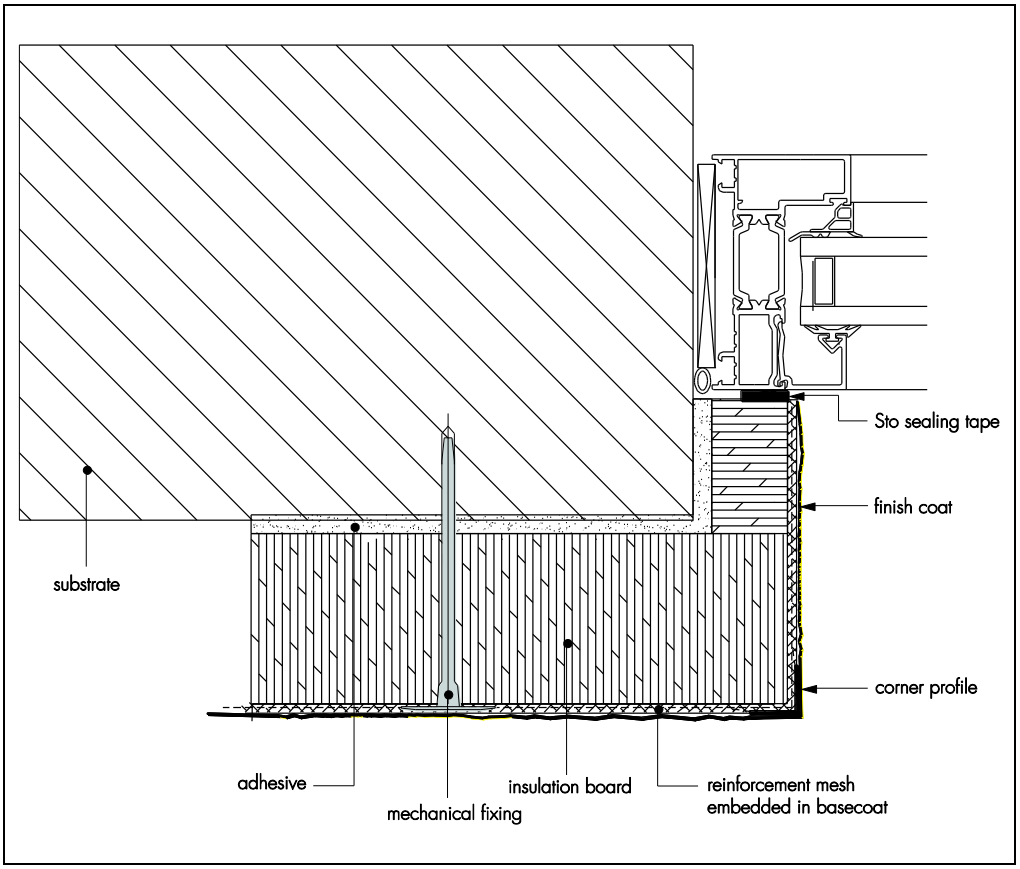


*Figure 11 Window head detail*

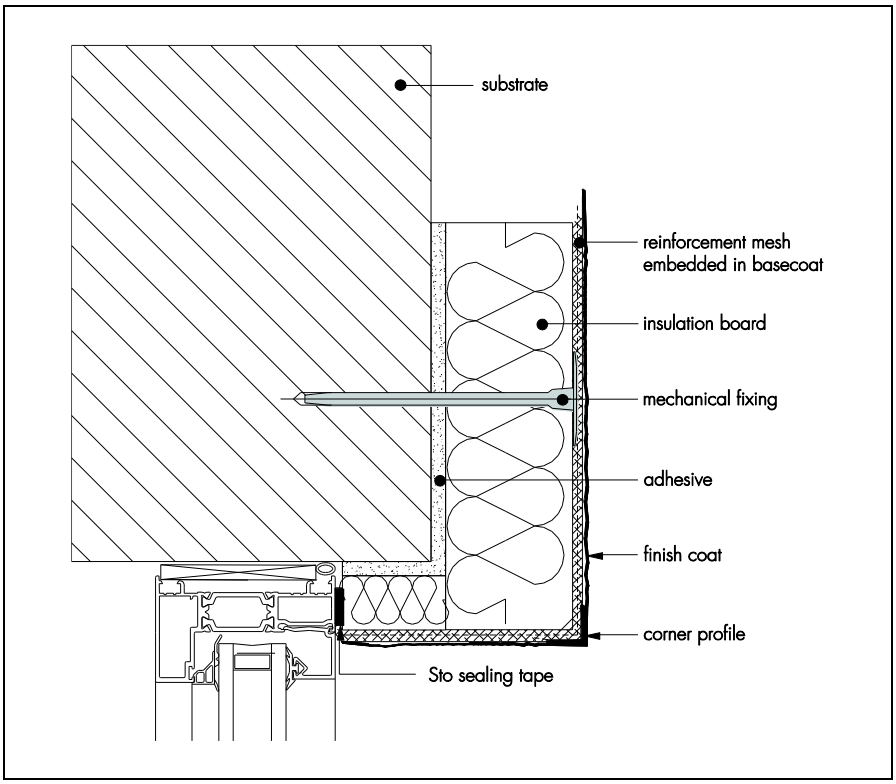
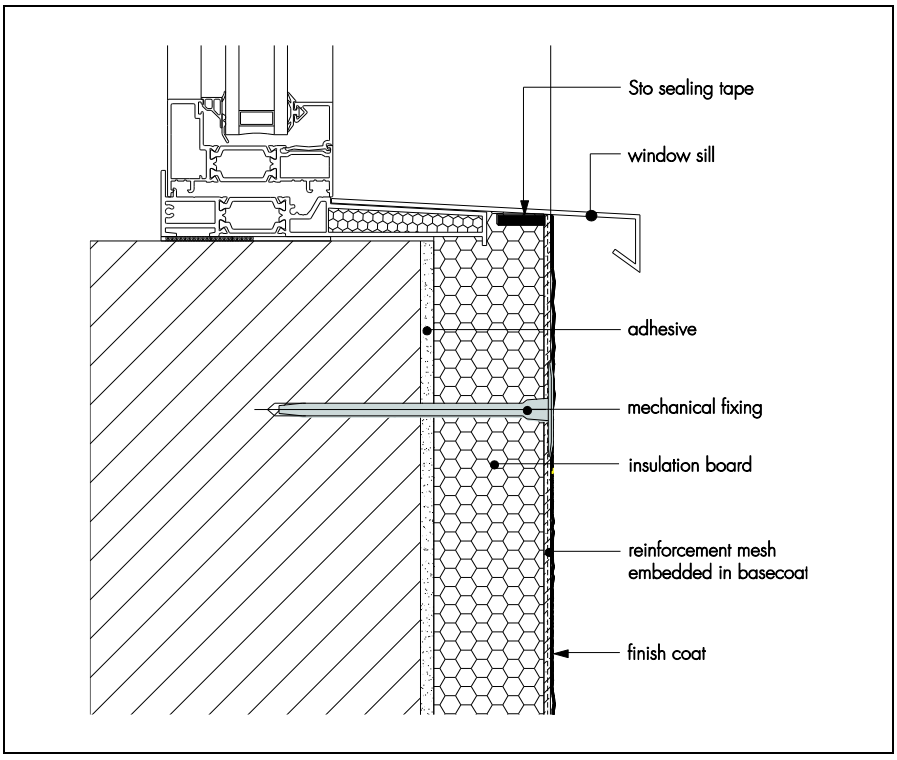



*Figure 12 Window sill details*



## Technical Investigations

### 17 Investigations

17.1 The systems were examined to determine:

- bond strength
- hygrothermal performance and resistance to freeze/thaw
- resistance to hard body impact
- pull-through of fixing over insulation
- water vapour permeability
- durability
- adequacy of mechanical fixing system
- risk of interstitial condensation
- thermal conductivity.

17.2 The practicability of installation and the effectiveness of detailing techniques were assessed.

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

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