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Agrément Certificate
14/5101
Product Sheet 3

JOHNSTONE'S STORMSHIELD EXTERNAL WALL INSULATION SYSTEMS

JOHNSTONE'S STORMSHIELD MINERAL WOOL EXTERNAL WALL INSULATION SYSTEM

This Agrément Certificate Product Sheet(1) relates to Johnstone's Stormshield Mineral Wool External Wall Insulation System, mechanically fixed with supplementary adhesive, comprising mineral wool (MW) fibre insulation slabs, with reinforced basecoat, primer and render finishes. The system is suitable for use on the outside of external masonry walls in new and existing domestic and non-domestic buildings, without height restriction.

(1) Hereinafter referred to as 'Certificate'.

CERTIFICATION INCLUDES:

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

KEY FACTORS ASSESSED

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

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

Behaviour in relation to fire — the system has an A2-s1, d0 reaction to fire classification in accordance with BS EN 13501-1 : 2007 (see section 8).

Risk of condensation — the system 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 system will remain effective for at least 30 years (see section 13).

The BBA has awarded this Certificate to the company named above for the system described herein. This system has been assessed by the BBA as being fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of Second issue: 25 April 2019

Originally certificated on 27 February 2014

John Albon
Chief Scientific Officer

Claire Curtis-Thomas
Chief Executive

The BBA is a UKAS accredited certification body – Number 113.

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

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

Any photographs are for illustrative purposes only, do not constitute advice and should not be relied upon.

Regulations

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

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

Requirement:	**A1**	**Loading**
Comment:		The system can sustain and transmit wind loads to the substrate wall. See sections 7.1 to 7.14 of this Certificate.
Requirement:	**B4(1)**	**External fire spread**
Comment:		The system can satisfy this Requirement. See sections 8.1 to 8.4 of this Certificate.
Requirement:	**C2(b)**	**Resistance to moisture**
Comment:		The system provides a degree of protection against rain ingress. See section 10.1 of this Certificate.
Requirement:	**C2(c)**	**Resistance to moisture**
Comment:		The system 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 system can contribute to satisfying this Requirement. See sections 6.2 and 6.3 of this Certificate.
Regulation:	**7**	**Materials and workmanship (applicable to Wales only)**
Regulation:	**7(1)**	**Materials and workmanship (applicable to England only)**
Comment:		The system is acceptable. See section 13.1 and the *Installation* part of this Certificate.
Regulation:	**7(2)**	**Materials and workmanship (applicable to England only)**
Comment:		The system is unrestricted by this Regulation. See sections 8.1 to 8.4 of this Certificate.
Regulation:	**26**	**CO_2 emission rates 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 energy efficiency rates for new dwellings (applicable to Wales only)**
Comment:		The system can contribute to satisfying these Regulations. See sections 6.2 and 6.3 of this Certificate.

The Building (Scotland) Regulations 2004 (as amended)

Regulation:	**8(1)(2)**	**Durability, workmanship and fitness of materials**
Comment:		The system can contribute to a construction satisfying this Regulation. See sections 12 and 13.1 and the *Installation* part of this Certificate.
Regulation:	**9**	**Building standards applicable to construction**
Standard:	1.1	Structure
Comment:		The system can sustain and transmit wind loads to the substrate wall. See sections 7.1 to 7.14 of this Certificate.
Standard:	2.6	Spread to neighbouring buildings
Comment:		The system can satisfy this Standard, with reference to clauses 2.6.4[(1)(2)], 2.6.5[(1)] and 2.6.6[(2)]. See sections 8.1 to 8.4 of this Certificate.
Standard:	2.7	Spread on external walls
Comment:		The system can satisfy this Standard, and is acceptable for use more than one metre

		from boundary, with reference to clauses 2.7.1[(1)(2)] and 2.7.2[(2)] and Annex 2B[(1)]. See sections 8.1 to 8.4 of this Certificate.
Standard:	3.10	Precipitation
Comment:		The system can 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 system 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	Buildings insulation envelope
Comment:		The system can contribute to satisfying these Standards, with reference to clauses (or parts of) 6.1.1[(1)], 6.1.2[(1)(2)], 6.1.3[(1)(2)], 6.1.6[(1)], 6.1.10[(2)], 6.2.1[(1)(2)], 6.2.3[(1)], 6.2.4[(2)], 6.2.5[(2)], 6.2.6[(1)], 6.2.7[(1)], 6.2.8[(2)], 6.2.9[(1)(2)], 6.2.10[(1)], 6.2.11[(1)], 6.2.12[(2)] and 6.2.13[(1)(2)]. See sections 6.2 and 6.3 of this Certificate.
Standard:	7.1(a)(b)	Statement of sustainability
Comment:		The system can contribute to satisfying the relevant requirements of Regulation 9, Standards 1 to 6, and therefore will contribute to a construction meeting the bronze level of sustainability as defined in this Standard. In addition, the system can contribute to a construction meeting a higher level of sustainability as defined in this Standard with reference to clauses 7.1.4[(1)(2)] [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 section 6.2 of this Certificate.
Regulation:	**12**	**Building standards applicable to conversions**
Comment:		All comments given for the system under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to clause 0.12.1[(1)(2)] and Schedule 6[(1)(2)].

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

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

Regulation:	**23**	**Fitness of materials and workmanship**
Comment:		The system is acceptable. See section 13.1 and the *Installation* part of this Certificate.
Regulation:	**28(b)**	**Resistance to moisture and weather**
Comment:		Walls insulated with the system will satisfy this Regulation. See section 10.1 of this Certificate.
Regulation:	**29**	**Condensation**
Comment:		Walls insulated with the system can satisfy this Regulation. See section 11.4 of this Certificate.
Regulation:	**30**	**Stability**
Comment:		The system can sustain and transmit wind loads to the substrate wall. See sections 7.1 to 7.14 of this Certificate.
Regulation:	**36(a)**	**External fire spread**
Comment:		The system can satisfy this Regulation. See sections 8.1 to 8.4 of this Certificate.
Regulation:	**39(a)(i)**	**Conservation measures**
Regulation:	**40**	**Target carbon dioxide emission rate**
Comment:		The system 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* (3.2) of this Certificate.

Additional Information

NHBC Standards 2019

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

Technical Specification

1 Description

1.1 The Johnstone's Stormshield Mineral Wool External Wall Insulation System comprises mineral wool insulation slabs, mechanically fixed with supplementary adhesive to the substrate wall, and reinforced basecoat, primer and render finishes (see Figure 1). The system can be mechanically fixed through the insulation only or through the mesh/insulation.

1.2 For systems fixed through the insulation only, the insulation slabs are primarily fixed with a minimum of five mechanical fixings and supplementary insulation adhesive (ensuring a minimum of 40% coverage). The basecoat is prepared and is trowel-applied to the slab face in two passes. The reinforcement mesh is immediately positioned into the first layer of basecoat and trowelled into position. The second layer of basecoat is applied to fully embed the mesh and to ensure the total thickness of basecoat of approximately 6 mm is achieved.

1.3 For systems fixed through the mesh/insulation, initially two mechanical fixing are applied through the insulation slab (across the middle) with supplementary insulation adhesive applied (100% coverage), before the basecoat and reinforcement mesh is applied as described in section 1.2. While the basecoat is wet, an additional four mechanical fixings are applied through the mesh/insulation, followed by the application of mesh patches (minimum 200 x 200 mm) over the fixing heads (with additional basecoat, to ensure they are fully encapsulated).

1.4 After the basecoat has fully cured, the primer is applied, if required for the finish being applied, followed by the application of the finish coat.

1.5 The system is made up of the following components:

Adhesive (supplementary)

- Johnstone's Stormshield Adhesive — polymer-modified cementitious adhesive containing limestone aggregate and fillers, produced in powder form.

Insulation(1)

- Mineral Wool Dual Density (MWDD) slabs —1200 by 600 mm, in a range of thicknesses between 90(2) and 250 mm in increments of 10 mm, with nominal densities of 160/100 kg·m^{-3} (outer/inner layer), a minimum compressive strength of 20 kPa and a tensile resistance perpendicular to the faces of 10 kPa. Slabs comply with BS EN 13162 : 2012.

(1) For declared thermal conductivity values (λ_D), see section 6.1 of this Certificate.
(2) Minimum insulation thickness is 100 mm (see section 7.9 and Table 4) where fixings are applied through the insulation only, and 90 mm (see section 7.13) where fixings are applied through reinforcement mesh/insulation. Lower insulation thicknesses are available, which can be applied on reveals.

Mechanical fixings

- mechanical fixings[(1)] — proprietary external wall insulation fixings of adequate length to suit the substrate and insulation thickness, and supplied by the Certificate holder:

— Ejot H1 Eco[(2)] — polyethylene, PE-HD with steel or electro-galvanized nails
— Ejot STR U — polyethylene, PE-HD with stainless steel or electro-galvanized screws

(1) Other fixings may be used provided they can be demonstrated to have equal or higher pull-out, plate diameter and plate stiffness characteristics.
(2) When fixed through insulation, for enhanced pull-through values, a 140 mm extender washer can be used.

Basecoat

- Johnstone's Stormshield Basecoat — polymer-modified cementitious basecoat in powder form containing limestone aggregate and fillers, and mixed with clean water at a rate of approximately 4.5 to 5.5 litres per 25 kg bag, with a coverage rate of 10 $kg \cdot m^{-2}$ and applied to a thickness of 6 mm.

Reinforcement

- Standard Reinforcement Mesh — a 1.1 m wide alkali-resisting glassfibre mesh with a nominal weight of 160 $g \cdot m^{-2}$, and with an aperture size of approximately 4 by 4 mm.

Primer

- Johnstone's Stormshield Full Silicone Render Primer — polymer-based primer applied over the basecoat to produce a textured finish and used in conjunction with Stormshield Full Silicone Render finish, with a coverage rate of 0.13 litre per metre square. The product is available in 150 colours and can be applied using a trowel
- Johnstone's Stormshield Silicone Enhanced Render Primer — polymer-based primer applied over the basecoat to produce a textured finish and used in conjunction with Stormshield Silicone Enhanced Render finish, with a coverage rate of 0.13 litre per metre square. The product is available in 200 colours and can be spray applied or applied with a trowel.

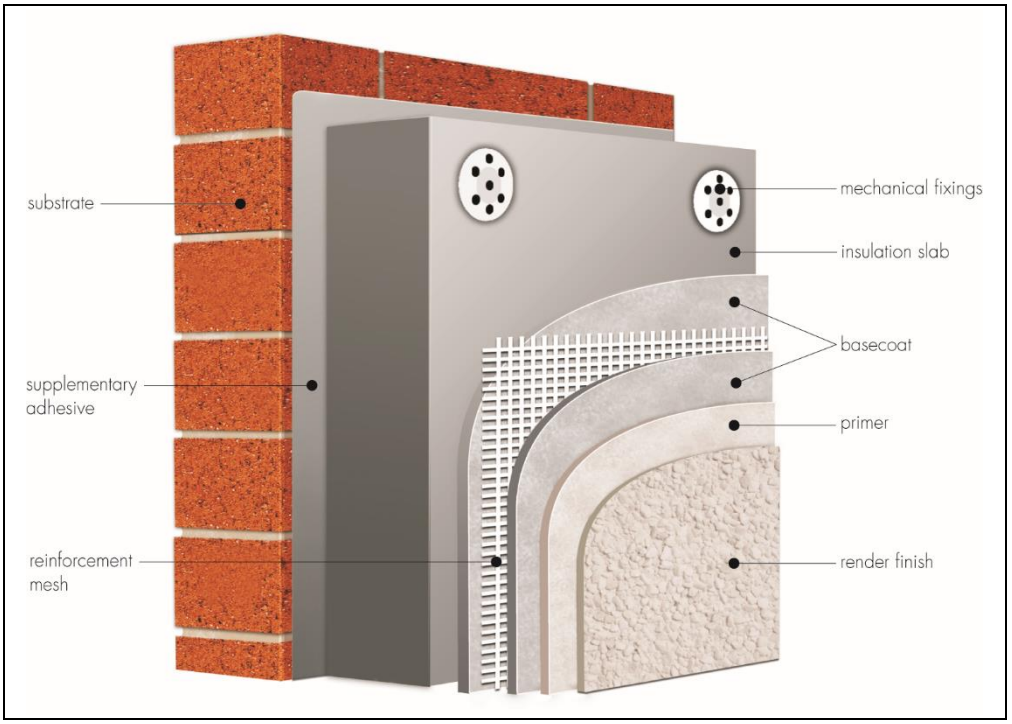
Finish coats

- Johnstone's Stormshield Full Silicone Render — polymer-modified, silicone coating, supplied as a paste with 1 and 1.5 mm particle sizes, with coverage rates of 2 and 2.5 $kg \cdot m^{-2}$ respectively. Thickness is regulated by particle size
- Johnstone's Stormshield Silicone Enhanced Render — polymer-modified, silicone coating, supplied as a paste with 1 and 1.5 mm particle sizes, with coverage rates of 2 and 2.5 $kg \cdot m^{-2}$ respectively. Thickness is regulated by particle size
- Johnstone's Stormshield Brick Effect Render (mortar layer) — grey polymer-modified cement binder containing fillers, supplied in powder form, mixed with approximately 5 to 6 litres of clean water per 25 kg bag, with a coverage rate of 12 $kg \cdot m^{-2}$. Applied to a 5 to 6 mm thickness
- Johnstone's Stormshield Brick Effect Render (brick face layer) — red polymer-modified cement binder containing fillers, supplied in powder form, mixed with approximately 4 to 5 litres of clean water per 25 kg bag, with a coverage rate of 12 $kg \cdot m^{-2}$. Applied to a 2 to 3 mm thickness
- Johnstone's Stormshield Dash Receiver — polymer-modified cementitious containing fillers, supplied in powder form, mixed with clean water at a rate of approximately 4.5 to 5.5 litres per 25 kg bag, with a coverage rate of 10 $kg \cdot m^{-2}$. Applied to a minimum thickness of 6 mm. The product is dashed with aggregates while the Dash Receiver is still wet.

Decorative finish

- Johnstone's Stormshield Spar Dash Aggregate — 3 to 8 mm aggregates sizes, available in a range of colours.

Figure 1 Johnstone's Stormshield Mineral Wool External Wall Insulation System



1.6 Ancillary materials used with the system are:

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

1.7 Ancillary materials also used with the system, but outside the scope of this Certificate:

- range of aluminium, PVC-U or stainless steel profiles, comprising:
  — movement joint
  — expansion joint
- specialist profiles including parapet capping and flashing section
- profile connectors and fixings
- fungicidal wash
- silicone sealants
- expansion foam — polyurethane foam used for filling gaps between insulation slabs.

2 Manufacture

2.1 The system 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 being operated by the manufacturer are being maintained.

3 Delivery and site handling

3.1 The insulation slabs are delivered to site shrink-wrapped in polythene. Each pack carries the product identification and batch numbers.

3.2 Components are delivered in the quantities and packages listed in Table 1 of this Certificate. Each package carries the manufacturer's and product identification and batch number.

Table 1 Component supply details

Component	Quantity and package
Johnstone's Stormshield Adhesive/Johnstone's Stormshield Basecoat	25 kg bags
Standard Reinforcement Mesh	1.1 m x 50 m rolls
Johnstone's Stormshield Full Silicone Render Primer	15 litre or 25 kg buckets
Johnstone's Stormshield Silicone Enhanced Render Primer	15 litre buckets
Johnstone's Stormshield Full Silicone Render Johnstone's Stormshield Silicone Enhanced Render	25 kg buckets
Johnstone's Stormshield Brick Effect Render (mortar layer) Johnstone's Stormshield Brick Effect Render (brick face layer)	25 kg bags
Johnstone's Stormshield Dash Receiver	25 kg bags
Johnstone's Stormshield Spar Dash Aggregate	25 kg bags
Mechanical fixings	Boxed by manufacturer

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

3.4 The insulation slabs must be protected from prolonged exposure to sunlight, either by storing opened packs under cover or re-covering with opaque polythene sheeting.

3.5 The adhesive, basecoat and finish coats must be stored in dry conditions within 5 and 30°C, off the ground and protected from moisture. Contaminated material must be discarded.

3.6 The primer 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 the Johnstone's Stormshield Mineral Wool External Wall Insulation System.

Design Considerations

4 General

4.1 The Johnstone's Stormshield Mineral Wool External Wall Insulation System, when installed in accordance with this Certificate, is satisfactory for use in reducing the thermal transmittance (U value) of the 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 system (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 system is for application to the outside of external walls of masonry, normal weight concrete, lightweight concrete, autoclaved concrete and no-fines concrete construction or new or existing domestic or non-domestic buildings (with or without existing render) with no height restriction. Prior to installation of the system, wall surfaces should comply with section 14 of this Certificate.

4.4 New walls subject to 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 of this Certificate.

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

4.7 The system will improve the weather resistance of a wall and provide a decorative finish. However, for existing buildings, it 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 system 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 system 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 system. 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 this system is installed and maintained in accordance with the conditions set out in this Certificate.

5 Practicability of installation

The system should only be installed by specialist contractors who have successfully undergone training and registration by the Certificate holder (see section 15).

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 declared thermal conductivity (λ_D) value of 0.036 $W \cdot m^{-1} \cdot K^{-1}$.

6.2 The U value of a completed wall will depend on the selected insulation 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 Table 2 and are based on the thermal conductivity specified in section 6.1.

Table 2 Insulation thickness required to achieve U values[(1)(2)(3)] given in the national Building Regulations

U value[(4)] ($W \cdot m^{-2} \cdot K^{-1}$)	Insulation thickness[(3)] requirement (mm)	
	215 mm brickwork, $\lambda = 0.56\ W \cdot m^{-1} \cdot K^{-1}$	200 mm dense blockwork, $\lambda = 1.75\ W \cdot m^{-1} \cdot K^{-1}$
0.18	190	190
0.19	170	180
0.25	120	130
0.26	120	130
0.28	110	120
0.30	100	110
0.35	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 (λ_D) of insulation is specified in section 6.1. 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 slab emissivity of 0.9, together with an external render thickness of 7 mm with $\lambda = 1.0\ W \cdot m^{-1} \cdot K^{-1}$.

(2) Calculations based on a mechanically fixed system that included 7 fixings (with galvanized steel pin) per m^2 with a point thermal transmittance (x_p) of 0.001 $W \cdot K^{-1}$ per pin (Ejot H1 Eco). 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 of 0.14 $W \cdot m^{-2} \cdot K^{-1}$.

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 system and it is the responsibility of the company installing the system to accurately follow the installation instructions (see also section 5 of this Certificate). 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 7.7).

7.2 The substrate and supporting structure must be capable of transferring all additional loading due to the installation of the system 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 system is applied. Any defects should be made good prior to the system 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 the factors affecting wind load on each elevation and specific zone 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 system.

7.4 Installations correctly designed in accordance with this Certificate will safely accommodate the applied loads due to the self-weight of the system, 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 transfer to the substrate wall depends on the application of mechanical fixings and primary resistance mechanisms (shown below).

Primary resistance mechanisms of mechanically fixed EWIS with supplementary adhesive, through insulation[(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) fixed through the insulation, 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 10 $kN \cdot m^{-2}$. 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 3; 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 (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 3.

(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 3 Fixings — typical characteristic pull-out resistances

Fixing type[(1)]	ETA number	Substrate	Drill diameter (mm)	Effective anchorage depth (mm)	Characteristic pull-out resistance (kN)[(2)]	Partial safety factor
Ejot H1 Eco	11/0192	Concrete C12/15 Clay brickwork	8	25	0.9	2
Ejot STR U	04/0023	Concrete C12/15 Clay brickwork	8	25	1.5	2

(1) The minimum values for plate stiffness of fixings is 0.6 $kN \cdot mm^{-2}$ 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.

7.9 The characteristic pull-through resistance of the fixings was determined from tests using a 60 mm diameter fixing plate (and with the option of a 140 mm extender washer) and minimum insulation thickness of 100 mm for mineral wool. The design resistance per fixing (N_{RD3}) is obtained by applying an appropriate partial factor as shown in Table 4.

Table 4 Design pull-through resistances

Factor (unit)	**Mineral wool Insulation 1200 mm x 600 mm**			
	Pull through data			
Tensile resistance of the insulation ($kN \cdot m^{-2}$)	≥ 10			
Fixing type(1)	Ejot H1 Eco			
Fixing plate diameter (mm)	≥ 60		≥ 140 (60 + 140 washer)	
Insulation thickness (mm)	≥ 100		≥ 100	
Characteristic pull-through resistance(2) per fixing kN	At panel	0.308	At panel	0.626
Partial factor(3)	2.5		2.5	
Design pull-through resistance per fixing (N_{RD3}) kN	At panel	0.123	At panel	0.250
Design pull-through resistance per slab kN (based on the minimum number of fixings)(4)	0.615		1.25	
Design pull-through resistance per slab kN (based on maximum number of fixings)(5)	0.984		2.0	

(1) See Table 3 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 slabs are quality controlled and tested to establish tensile strength perpendicular to the face of the slab.
(4) The minimum design pull through resistance per slab is based on a minimum of 5 fixings per slab (1200 x 600 mm), which equates to approximately 7 fixings per m^2. The design resistance for the minimum number of fixings is based on the fixing pattern provided in Figure 4a of this Certificate and minimum insulation thickness specified in above Table. The fixing pattern and interaction of the fixings should be considered when calculating the design resistance per slab.
(5) The maximum design pull through resistance per slab is based on a maximum of 8 fixings per slab (1200 x 600 mm), which equates to approximately 11 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 above Table. The fixing pattern and interaction of the fixings should be considered when calculating the design resistance per slab.

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 system and the fixings should be symmetrically positioned and evenly distributed about the centre of the slab 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:
$Rd \geq W_e$

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

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_{slab} is the area of the slab (m^2)

7.12 The insulation system is mechanically fixed to the substrate wall with a minimum of five fixings per slab or approximately seven fixings per square metre, as per the fixing patterns shown in Figure 4a, and in conjunction with a minimum 40% coverage of supplementary adhesive (see section 16 of this Certificate). Additional fixings may be required, depending on the results of the calculations detailed above for the specific site.

Primary resistance mechanisms of mechanically fixed EWIS with supplementary adhesive, through mesh/insulation(1)(2)

- the cohesion resistance of the rendering system
- the pull-out resistance of the fixing from the substrate wall (see section 7.8)
- the resistance of the anchor plate to breakdown or detachment
- the resistance of mesh fabric to tearing around the anchor plate

(1) For mechanically fixed systems with supplementary adhesive fixed through the mesh/insulation, the resistance of the system to negative wind load is obtained from the Dynamic Wind Uplift (DWU) test.
(2) Further guidance is available from BBA Guidance Note 1, available on the BBA website (www.bbacerts.co.uk).

7.13 The DWU test was carried out on the Johnstone's Stormshield Mineral Wool EWI System, mechanically fixed onto a masonry substrate. Mineral wool insulation slabs (90 mm thickness) were initially installed with 100% coverage of insulation adhesive, followed by two mechanical fixings through the insulation (Ejot H1 Eco with 60 mm diameter plate 300 mm from each edge along the horizontal centre of the slab). This was followed by the application of basecoat/mesh and an additional four fixings (equidistantly positioned at the corners of each slab, ie not at slab joints) applied through the mesh/insulation while the basecoat was still wet (see Figure 4b for fixing configuration). Mesh patches were applied (with basecoat) over the fixing plate, followed by the application of the brick-effect render finish, which was done in two stages; the first layer (mortar) was applied, followed by the second layer (brick face) – both applied evenly. The brick face layer was cut through horizontally and vertically to reveal the mortar layer. As determined from this DWU test, the maximum characteristic negative wind load resistance that can be sustained by the Johnstone's Stormshield Mineral Wool EWI System is 5.445 $kN \cdot m^{-2}$. The maximum design wind load resistance (Rd_{Test}) is derived by dividing the maximum characteristic wind load resistance by a partial safety factor of 1.5, and is equal to 3.63 $kN \cdot m^{-2}$(1)(2)(3).

(1) The maximum design wind load that can be resisted by the system corresponds to the maximum allowed spacing, centres and layout of fixings and as described in 7.13. This fixing and profile configuration, with appropriately selected fixings, will also adequately transfer the system's self-weight, and wind and impact loads to a suitable substrate wall.
(2) The partial factor for the DWU test is based on the mode of failure obtained in the test.
(3) The design resistance is determined by dividing the characteristic resistance value obtained from the DWU test by a partial safety factor of 1.5. The characteristic resistance value obtained from the DWU test was 5.445 $kN \cdot m^{-2}$.

7.14 The data derived from sections 7.8 and 7.13 must be assessed against the design wind load, and the following expressions must be satisfied:

For safe design:
$R_{dTest} \geq W_e$ and $n_{RD2} \geq W_e$

where
R_{dTest} is the design negative wind load resistance of the system based on test ($kN.m^{-2}$)
W_e is the maximum design wind load ($kN \cdot m^{-2}$)
n_{RD2} is the design pull-out resistance of the system and is based on characteristic values from site tests; the number of fixings per unit area must be ≥ as tested in the DWU test.

7.15 The insulation system is mechanically fixed through the insulation and through the mesh/insulation to the substrate wall with a minimum of six fixings (two fixings applied through insulation and four fixings through mesh/insulation) per slab or 8.3 fixings per square metre, as per the fixing pattern shown in Figure 4b, and in conjunction with 100% coverage of insulation adhesive (see section 16.6 of this Certificate). The design wind load resistance is only applicable to the system tested and is as described in 7.13. Additional fixings may be required, depending on the design and installation conditions. However, any resulting additional wind load resistance cannot be quantified by the results of the test and, as such, enhancements are outside the scope of this Certificate.

Impact resistance

7.16 Hard body impact tests were carried out in accordance with ETAG 004 : 2013. The system is suitable for use in the categories up to and including those specified in Table 5 of this Certificate.

Table 5 System impact resistance

Render systems: **Basecoat (Johnstone's Stormshield Basecoat), + primer (if required) + finishing coats as indicated below:**	**Category(1)**
Johnstone's Stormshield Full Silicone Render Primer + Johnstone's Stormshield Full Silicone Render	I
Johnstone's Stormshield Silicone Enhanced Render Primer + Johnstone's Stormshield Silicone Enhanced Render	I
Johnstone's Stormshield Brick Effect Render Mortar (mortar layer) + Brick Effect Render (brick face layer)	II
Johnstone's Stormshield Dash Receiver + Spar Dash Aggregate	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 systems will limit the size of the impact; or at lower levels where access to the building is primarily to those with some incentive to exercise care
- Category III — a zone not likely to be damaged by normal impacts caused by people or by thrown or kicked objects.

8 Behaviour in relation to fire

8.1 The reaction to fire classification(1) for the system in accordance with BS EN 13501-1 : 2007 is given in Table 6, below.

(1) In accordance with BRE Global Test Report number 292858B. A copy is available from the Certificate holder on request.

Table 6 System fire classifications

Rendering System: **Basecoat (Johnstone's Stormshield Basecoat), + primer (if required) + finishing coats as indicated below:**	**Fire classification**
Johnstone's Stormshield Full Silicone Render (1.0 or 1.5 mm)	A2-s1, d0
Johnstone's Stormshield Silicone Enhanced Render (1.0 or 1.5 mm)	
Johnstone's Stormshield Brick Effect Render (mortar and brick face layers)	
Johnstone's Stormshield Dash Receiver	

8.2 The fire classifications apply to the full range colours of finish coats and insulation thicknesses covered by the Certificate (see section 1.5).

8.3 The mineral wool insulation material in isolation is classified as non-combustible as defined by the national Building Regulations.

8.4 The system is not subject to any restriction on building height or proximity to boundaries.

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, as advised in BRE Report BR 135 : 2013.

9 Proximity of flues

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

England and Wales — Approved Document J

Scotland — Mandatory Standard 3.19, clause 3.19.4(1)(2)

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

Northern Ireland — Technical Booklet L.

10 Water resistance

10.1 The system will provide a degree of protection against rain ingress. However, care should be taken to ensure that walls are adequately watertight prior to the application of the system. The system 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 water 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 system should be protected by a coping, adequate overhang or other detail designed for use with this type of system (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 system 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 of this Certificate.

11.3 Walls will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed 1.2 $W \cdot m^{-2} \cdot K^{-1}$ at any point. Guidance may be obtained from BS 5250 : 2011, Section 4 and Annex G, and BRE Report 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 (μ) and equivalent air layer thickness (s_d) are shown in Table 7.

Table 7 Water vapour resistance factor and equivalent air layer thickness

Layer	Thickness (mm)	S_d (m)	(μ)
Insulation – MWDD	90 to 250	-	1(1)
Rendering System: Basecoat (Johnstone's Stormshield Basecoat) + primer + finishing coats indicated below:			
Johnstone's Stormshield Full Silicone Render	7.5(2)	2.18	-
Johnstone's Stormshield Silicone Enhanced Render	7.5(2)	1.00	-
Johnstone's Stormshield Dash Receiver	12(2)	0.86	-
Johnstone's Stormshield Brick Effect Render Mortar (mortar layer) + Johnstone's Stormshield Brick Effect Render (brick face layer)	15(2)	0.99	-

(1) The water vapour resistance factor (μ) for insulation is taken from BS EN ISO 10456 : 2007, Table 4.
(2) Includes reinforcement basecoat (applied to thickness of 6 mm), primer (if relevant) and indicated finish coats.

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 the sealant joints at window and door frames replaced at regular intervals
- maintenance schedules, which should include the replacement and resealing of joints (for example, between the insulation systems and window and door frame).

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

13 Durability

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

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

13.3 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.

13.4 To maintain a high quality aesthetic appearance, it may be necessary to periodically overcoat the building using a suitable masonry coating (ie one covered by a valid BBA Certificate for this purpose). Care should be taken not to adversely affect the water vapour transmission or fire characteristics of the system. The advice of the Certificate holder should be sought as to the suitability of a particular product.

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 system. A specification is prepared for each elevation of the building indicating:

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

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. 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 alteration to external plumbing and necessary repairs to the building structure, must be completed before installation of the system 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 slabs 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.

14.6 On existing buildings, purpose-made window sills must be fitted to extend beyond the finished face of the system. New buildings should incorporate suitably deep sills (see Figure 7).

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 system.

15 Approved installers

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

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

16 Procedure

General

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

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 or above 30°C, nor 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.

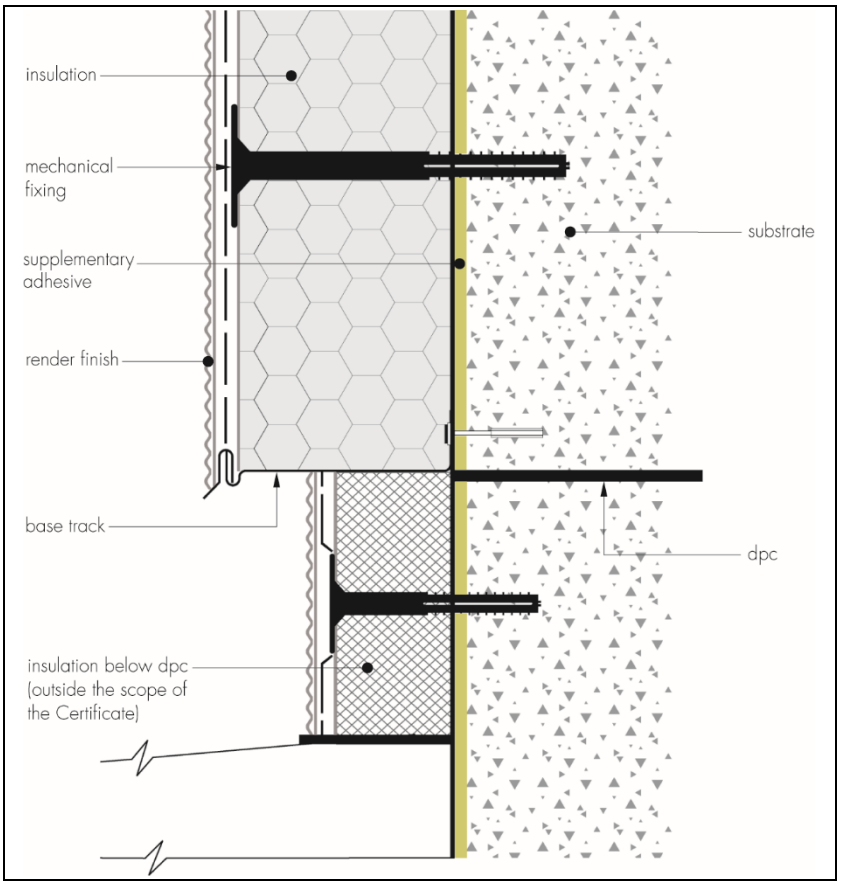
16.3 The planarity and condition of the substrate must be checked, and any protrusions exceeding 10 mm removed. Where required, a fungicidal wash is applied to the entire surface of the external wall by brush, roller or spray.

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

Positioning and securing insulation slabs

16.5 The base profile is secured to the external wall above the dpc using the profile fixings at approximately 400 mm centres (See Figure 2). Base rail connectors are installed at all rail joints. Extension profiles are fixed to the front lip of the base profile or stop end channel where appropriate.

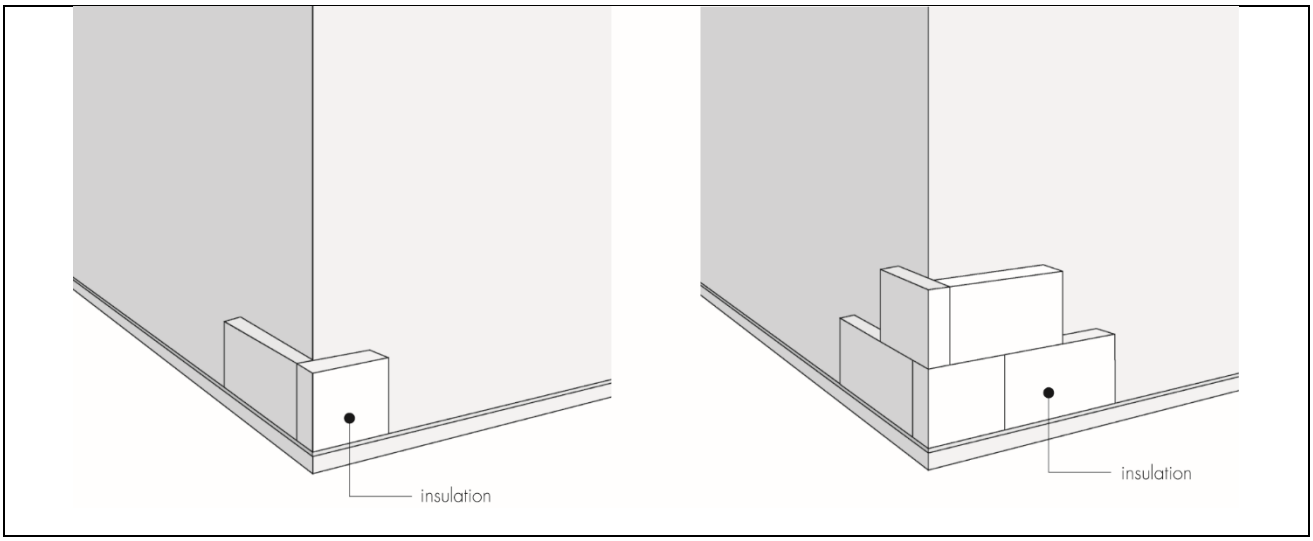
Figure 2 Typical section at base profile



16.6 The adhesive (supplementary) is prepared by mixing each bag with the required amount of clean water in a suitable container 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 1.5). After allowing the adhesive to rest for five minutes, it is stirred again and then applied in a continuous line around the perimeter of the insulation slab with three additional dabs of adhesive (approximately 120 mm in diameter) distributed uniformly over the remaining surface. Alternatively, a serrated edge trowel with 5 mm serrations can be used to apply the adhesive to the entire rear surface of the insulation slab. The amount of adhesive applied should cover at least 40% of the slab. However, if the system is mechanically fixed through mesh/insulation, 100% adhesive coverage must be applied (see section 16.21).

16.7 The first run of slabs, with adhesive applied, is positioned on the base profile. The slabs must be pressed firmly against the wall and butted tightly together and aligned to achieve a level finish. Subsequent rows of slab are positioned so that the vertical slab joints are staggered and overlapped at the building corners and so that the slab joints do not occur within 200 mm of the corners of openings (see Figure 3). Joints between the slabs up to 10 mm can be filled with foam filler approved by the Certificate holder. Gaps greater than this can be filled with slivers of insulation slab or can be closed by repositioning. Alignment should be checked as work proceeds.

Figure 3 Typical arrangement of insulation slabs



16.8 Once the insulation is in place, mechanical fixings are applied into the substrate wall either (a) through the insulation (see section 16.9 onwards) or (b) through the insulation (the initial two fixings) and, following the application of the reinforcement mesh, through the mesh/insulation (four fixings). This method is described in sections 16.21 to 16.23. The number of fixings should be increased as required (eg at the corner zones of the building), depending on the location of the building, wind load calculation and the installation height. Details of mechanical fixings (including the fixing layout on the insulation slabs) are based on pull-out test results, which are dependent upon substrate type.

16.9 Holes are drilled through the insulation slab into the substrate wall to a required depth, to allow for a minimum of five mechanical fixings per slab (seven fixings per square metre) as shown in Figure 4a. Around openings, additional fixings should be installed at 300 mm centres. The mechanical fixings are inserted and tapped or screwed firmly into place, securing the insulation to the substrate.

Figure 4a Typical mechanical fixing pattern – through the insulation slab

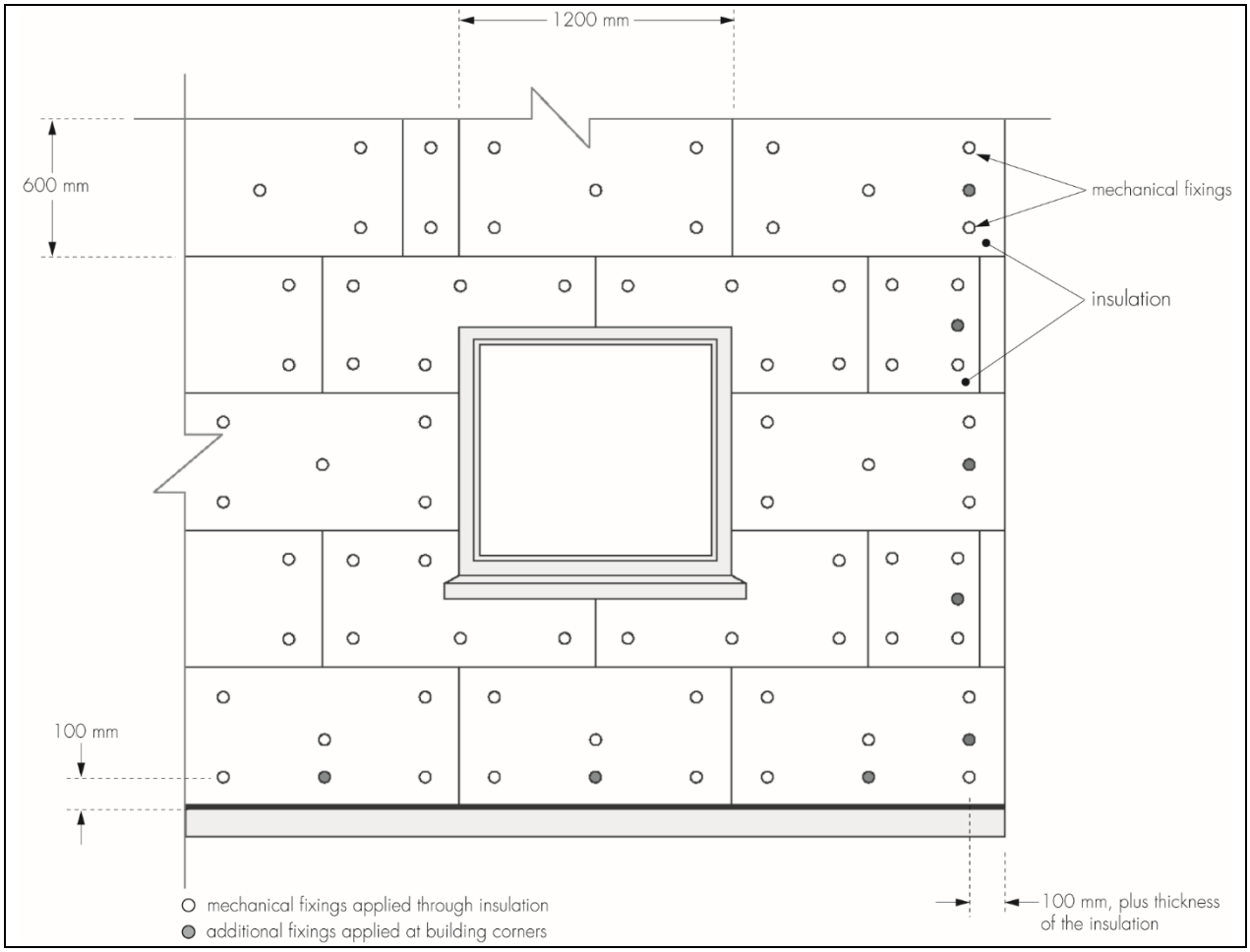
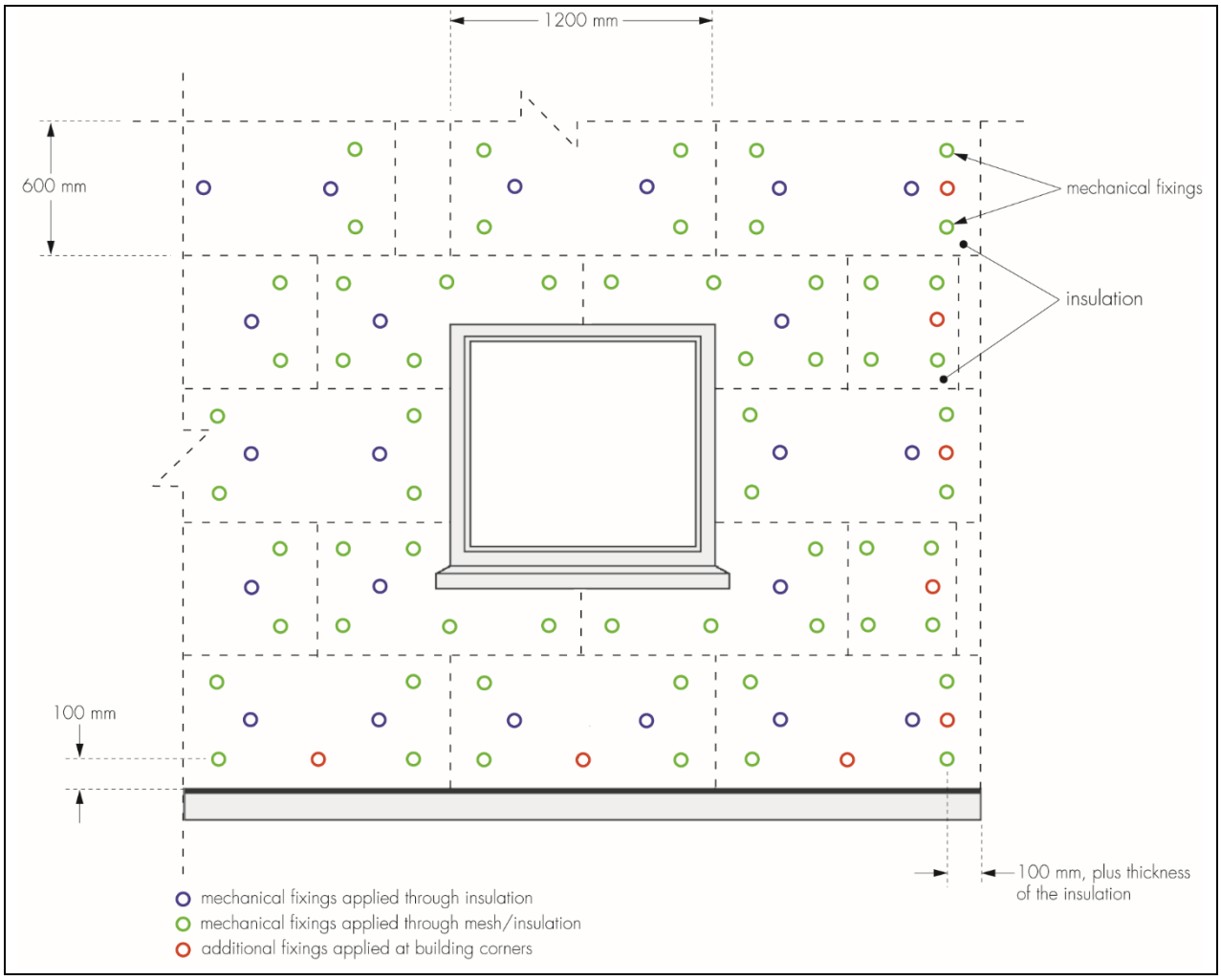


Figure 4b Typical mechanical fixing pattern – through the insulation slab and mesh/insulation



16.10 To fit around details such as doors and windows, insulation slabs may be cut with a sharp knife or a fine-tooth saw and positioned so that the slab joints do not occur within 250 mm of the corners of the opening. 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 7). 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. Where clearance is limited, strips of insulation should be installed to suit available margins and details (see Figure 8).

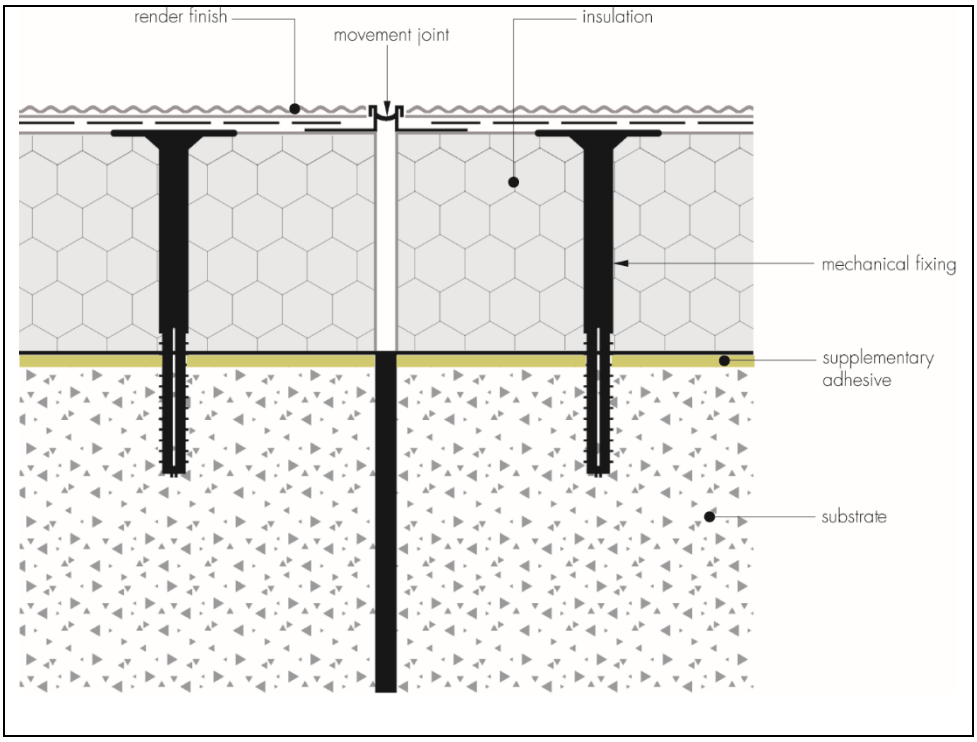
16.12 Stop beads are positioned vertically, eg at party wall positions where the adjoining house does not require treatment. Where required, angle beads are fixed to all building corners and to door and window heads and jambs.

16.13 Prior to the application of the render system, sealing tape (or a bead of joint sealant) is applied at window and door frame reveals, overhanging eaves, gas and electric meter boxes, wall vents, or where the render abuts any other building material or surface.

Movement joints

16.14 Generally, movement joints are not required in the system but, if such a joint is incorporated in the substrate, then movement joints must be carried through the insulation system (see Figure 5).

Figure 5 Typical movement joint

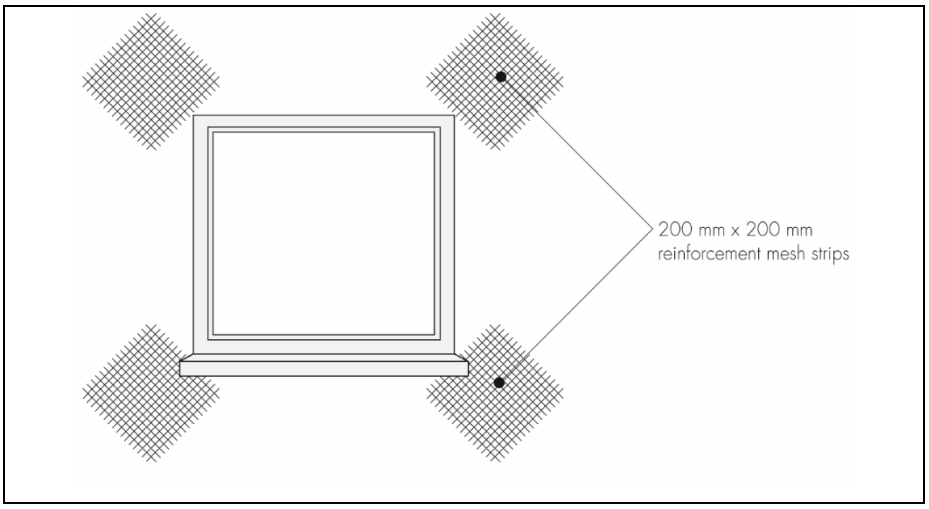


Application of basecoat and reinforcement mesh

16.15 The 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 1.5).

16.16 To provide the necessary reinforcement, stress patches of reinforcement mesh (approximate size 200 by 200 mm) are applied with basecoat, diagonally over the insulation slabs at the corners of openings (see Figure 6).

Figure 6 Additional reinforcement at openings



16.17 Basecoat is applied over the insulation slabs using a stainless steel trowel (use of a notched trowel is recommended to maintain the correct depth), and floated with a Darby float to a thickness of between 4 to 5 mm. The 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; an additional light coat of basecoat is applied (whilst the first coat is still wet) to ensure the mesh is free of wrinkles.

16.18 Further basecoat to a thickness of 1 to 3 mm is then applied, 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 overall thickness of the reinforced basecoat must be a minimum of 6 mm.

16.19 The basecoat is applied progressively, working in one-metre sections in a vertical or horizontal direction. Overlapping at all mesh joints should not be less than 100 mm.

16.20 For systems fixed through the insulation only, the installation instructions continue from section 16.24 onwards. Sections 16.21 to 16.23 specifically cover installation of fixings through the mesh/insulation.

16.21 For systems fixed through the mesh, initially two mechanical fixings are applied through each insulation slab (which must be 100% covered with adhesive) to secure the slabs to the substrate wall. The mechanical fixings are placed 300 mm from the edge along the horizontal centre of the slab (identified in blue in Figure 4b). This is followed by the application of basecoat and reinforcement mesh (as described in section 16.17). While the basecoat is still wet, mechanical fixings are applied through the mesh/insulation (described in 16.22).

16.22 An additional four fixings (equidistantly positioned at the corners of each slab, that is not at slab joints) are applied through the mesh/insulation while the basecoat is still wet. Holes are drilled through the mesh/insulation into the substrate wall to a required depth, using the fixing pattern shown in Figure 4b (identified in green). This fixing pattern results in a total of six fixings per slab (which equates to 8.3 fixings per square metre). The fixings are partially over-driven into the insulation, so the fixing plate is partially buried, reducing the protrusion of the fixing plate over the surface of the insulation. Extra fixings are applied around the openings and at building corners based on wind load calculations.

16.23 This is followed by the application of mesh patches (minimum 200 by 200 mm) over the fixing plate, applied with a light layer of basecoat. Further basecoat to a thickness of 1 to 2 mm is then applied, to ensure the mesh patches are completely covered and the required minimum thickness of basecoat is achieved. The overall thickness of the reinforced basecoat must be a minimum of 6 mm.

16.24 Once the whole wall is completed, the basecoat is left to dry thoroughly before the application of primer (where required) and the finish coat. The drying time will depend upon the conditions, but at least 24 hours should elapse before the primer and finishing coats are applied.

Primer – for silicone renders

16.25 Johnstone's Stormshield Full Silicone Primer or Silicone Enhanced Primer is applied by brush, roller or spray after the basecoat has dried, first making sure it is free from any irregularities (trowel-marks, exposed mesh, etc). The primer should be left to dry for at least 12 hours before application of the finish coat.

16.26 Prior to the application of the finish coat, a bead of clear silicone sealant is gun-applied at window and door frames, overhanging eaves, gas and electrical meter boxes, wall vents or where the render abuts other building materials or surfaces.

Johnstone's Stormshield Silicone Render finishes

16.27 When applying these finishes, it is important to note that the basecoat is prepared with a suitable sponge float to ensure a lightly textured flat finish.

16.28 Once the Silicone Primer has been allowed to dry for at least 12 hours, the silicone finishes can be applied.

16.29 Silicone render is supplied as a paste (in a 25 kg bucket), which must be thoroughly mixed before application. Multiple buckets should be mixed together to ensure consistency of colour when working on a continuous surface.

16.30 The render is applied by stainless steel float to the thickness of the chosen silicone particle size (see Table 8).

16.31 Once the application is finished, the surface is worked with a plastic float in small circular motions to remove excess material and create a natural finish.

16.32 The drying time is dependent on ambient conditions but will typically be 48 hours in accordance with the Certificate holder's instructions.

Johnstone's Stormshield Dash Receiver and Spar Dash Aggregate finish

16.33 Prior to the application of the dash receiver, the basecoat is lightly scratched with a spiked float or comb before it sets, to provide a key. The dash receiver is prepared by mixing each 25 kg bag with 4.5 to 5.5 litres of clean water and mixed thoroughly to the specified consistency.

16.34 The dash receiver is applied to a minimum thickness of 6 mm, to achieve an even coat using straight edges and spatulas if necessary. A thicker coat of dash receiver may be necessary when using a larger aggregate size to ensure it fully beds into the dash receiver.

16.35 While the dash receiver is still soft, spar dash aggregate is applied onto the surface. Aggregates should be cleaned and dampened before applying onto the dash receiver.

16.36 On completion, the surface must be checked to ensure an even coverage of the spar-dash has been achieved. Where necessary the aggregate should be lightly tamped to ensure that a good bond is achieved.

16.37 The drying time is dependent on ambient conditions but will typically be 48 hours in accordance with the Certificate holder's instructions.

Johnstone's Stormshield Brick Effect Render finish

16.38 Prior to the application of the brick effect render, the basecoat is lightly scratched with a spiked float or comb before it sets, to provide a key.

16.39 The mortar layer of brick effect render is prepared by thoroughly mixing each 25 kg bag with 5 to 6 litres of clean water, to the specified consistency, before applying to a 5 to 6 mm thickness, to achieve a flat, even coat.

16.40 The second layer (brick face) is then prepared (as described above). After the mortar layer has started to stiffen, the brick face coat is applied to a thickness of 2 to 3 mm, to achieve a flat, even coat.

16.41 After the brick face layer has started to stiffen, a brick effect pattern is achieved using a proprietary cutting tool, tamping block and soft bristled brush. The brick face layer should be cut out to the required pattern after the surface has been shaded and textured. It is cut through completely until it penetrates the mortar layer slightly. This reproduces recessed mortar coursing of the brickwork, as required.

16.42 After all brick joints have been formed, and when the surface is partially cured, all traces of cut out material should be removed with a brush.

All finish coats

16.43 The finish coats are applied to a thickness specified by the Certificate holder (notional thin-coat thicknesses as indicated by the particle size of specific finish coat), as shown in Table 8.

Table 8 Thickness of finish coats

Finish coat	Thickness range (mm)
Johnstone's Stormshield Silicone Renders (Full and Enhanced)	1 to 2(1)
Johnstone's Stormshield Brick Effect Render	7 to 9
Johnstone's Stormshield Dash Receiver	Minimum 6 mm

(1) Thickness regulated by particle size.

16.44 To prevent the finish from drying too rapidly, it should not be applied in direct sunlight. The finished render surface must be protected from rain and frost until the material is dry. Continuous surfaces must be completed without a break, eg working to a wet edge.

16.45 Care should be taken in the detailing of the system around openings and projections (see Figures 7 and 8). At the top of walls, the systems should be protected by an adequate overhang (see Figure 9) or by an adequately sealed purpose-made flashing.

Figure 7 Window sill details

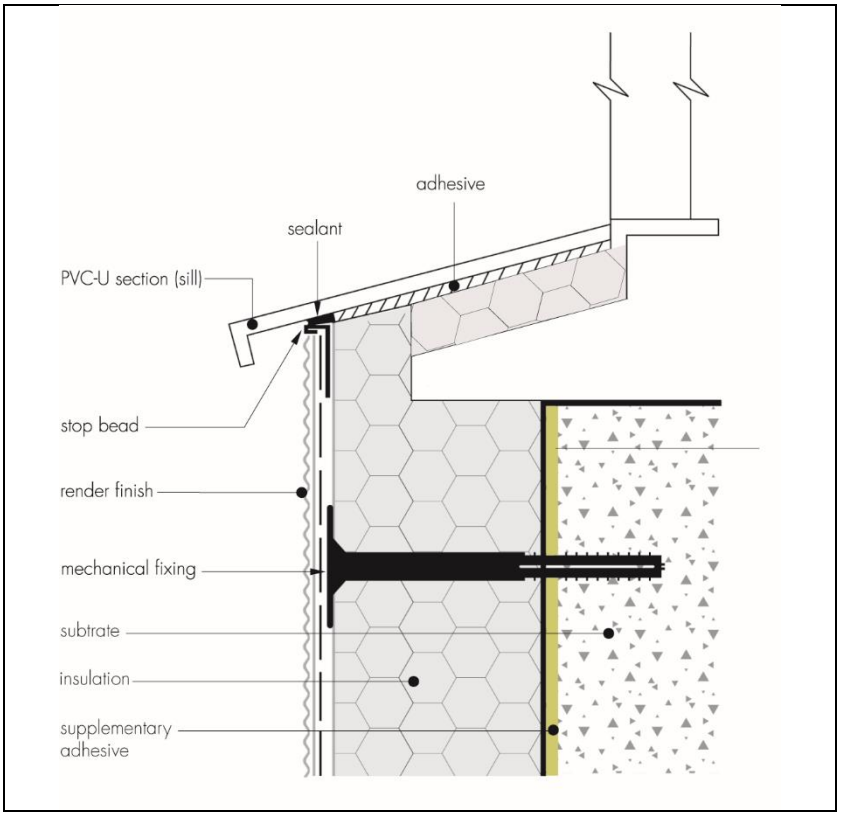


Figure 8 Typical detail at window head details

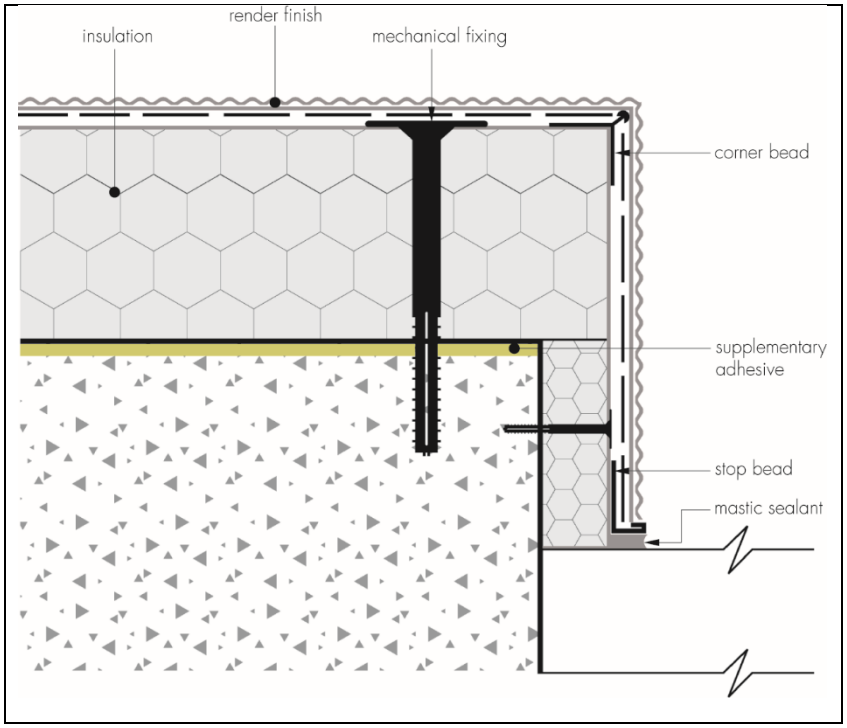
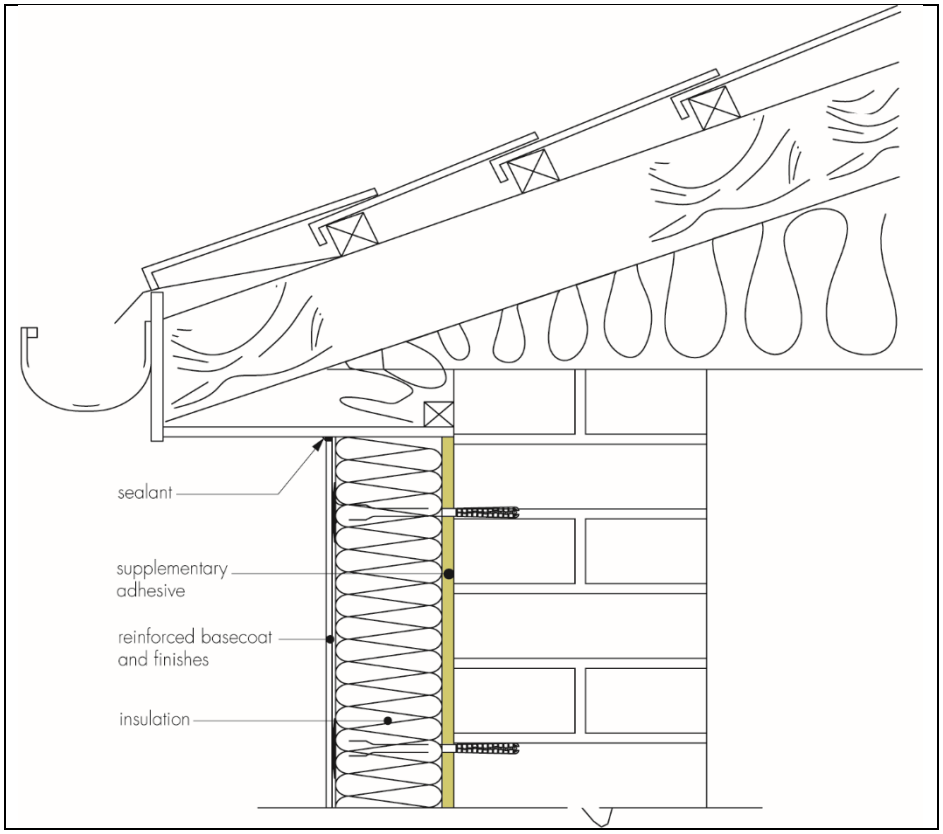


Figure 9 Roof eaves details



Technical Investigations

17 Investigations

17.1 The system was examined to determine:

- fire performance
- bond strength
- hygrothermal performance and resistance to freeze/thaw
- resistance to hard body impact
- water vapour permeability
- durability
- adequacy of mechanical fixing system
- the risk of interstitial condensation
- thermal conductivity
- DWU testing for fixings applied through mesh/insulation.

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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18 Conditions

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- 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
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- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
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