Mapei (UK) Ltd
Mapei House
Steel Park Road
Halesowen
West Midlands B62 8HD

Tel: 0121 508 6970 Fax: 0121 508 6960
e-mail: technical@mapei.co.uk
website: www.mapei.co.uk

Agrément Certificate
13/4977
Product Sheet 4

MAPEI UK EXTERNAL WALL INSULATION SYSTEMS

MAPETHERM EPS EXTERNAL WALL INSULATION SYSTEM (TF)

This Agrément Certificate Product Sheet(1) relates to the Mapetherm EPS External Wall Insulation System (TF), comprising grey expanded polystyrene (EPS) insulation boards, mechanically fixed to sheathed substrates using spacer rails, with a reinforced basecoat and either render finishes or acrylic brick-slip finishes. The system is suitable for use, with height restrictions, on sheathed timber-framed wall substrates of new and existing domestic or non-domestic buildings.

(1) Hereinafter referred to as 'Certificate'.

CERTIFICATION INCLUDES:

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

KEY FACTORS ASSESSED

Thermal performance — the 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 resistance to impact is dependent on the system used (see section 7).

Behaviour in relation to fire — the system has a B-s1, d0 reaction to fire classification in accordance with BS EN 13501-1 : 2007 and its use is restricted (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 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.

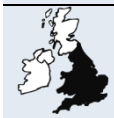
On behalf of the British Board of Agrément

Date of First issue: 5 February 2021

Hardy Giesler
Chief Executive Officer

Regulations

In the opinion of the BBA, the Mapetherm EPS External Wall Insulation System (TF), if installed, used and maintained in accordance with the provisions of 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 structural frame. See sections 7.1 to 7.12 of this Certificate.
Requirement:	**B3(4)**	**Internal fire spread**
Comment:		The system is restricted by this Requirement. See sections 8.1 to 8.3 and 8.5 of this Certificate.
Requirement:	**B4(1)**	**External fire spread**
Comment:		The system is restricted by 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 6.1 and 6.2 of this Certificate.
Regulation:	**7(1)**	**Materials and workmanship**
Comment:		The system is acceptable. See section 13.1 and the *Installation* part of this Certificate.
Regulation:	**7(2)**	**Materials and workmanship**
Comment:		The system is restricted by this Regulation. See sections 8.1 to 8.3 and 8.5 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; however, compensating fabric/services measures may be required. See sections 6.1 and 6.2 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

Standard:	2.4	Cavities
Comment:		The system is restricted by this Standard, with reference to clauses 2.4.2[(1)(2)]. See sections 8.1 to 8.4 of this Certificate.
Standard:	2.6	Spread to neighbouring buildings
Comment:		The system is restricted, with reference to clauses 2.6.4[(1)(2)], 2.6.5[(2)] and 2.6.6[(2)]. See sections 8.1 to 8.3, 8.6 and 8.7 of this Certificate.
Standard:	2.7	Spread on external walls
Comment:		The system is restricted, with reference to clauses 2.7.1[(1)(2)] and 2.7.2[(2)], and Annex 2B[(1)]. See sections 8.1 to 8.3, 8.6 and 8.7 of this Certificate.
Standard:	3.10	Precipitation
Comment:		The system can satisfy 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 satisfy this Standard, with reference to clauses 3.15.1[(1)], 3.15.4[(1)] and 3.15.5[(1)]. 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 6.1.1[(1)(2)], 6.1.2[(1)(2)], 6.1.3[(1)], 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 6.1 and 6.2 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 a 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)] [Aspects 1[(1)(2)] and 2[(1)]], 7.1.6[(1)(2)] [Aspects 1[(1)(2)] and 2[(1)]] and 7.1.7[(1)(2)] [Aspect 1[(1)(2)]]. See sections 6.1 and 6.2 of this Certificate.
Regulation:	**12**	**Building standards applicable to conversions**
Comment:		All comments given for this 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:		The system provides a degree of protection against rain ingress. See section 10.1 of this Certificate.
Regulation:	**29**	**Condensation**
Comment:		The system contributes to minimising the risk of interstitial condensation. 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 7.12 of this Certificate.

Regulation:	**35(4)**	**Internal fire spread**
Comment:		The system is restricted by this Regulation. See sections 8.1 to 8.4 of this Certificate.
Regulation:	**36(a)**	**External fire spread**
Comment:		The system is restricted by this Regulation. See sections 8.1 to 8.3 and 8.5 of this Certificate.
Regulation:	**39(a)(i)**	**Conservation measures**
Regulation:	**40**	**Target carbon dioxide emission rate**
Comment:		The system can enable a construction to satisfy the requirements of these Regulations. See sections 6.1 and 6.2 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 sections: 3 *Delivery and site handling* (3.1 and 3.3) and 12 *Maintenance and repair* of this Certificate.

Additional Information

NHBC Standards 2021

In the opinion of the BBA, the Mapetherm EPS External Wall Insulation System (TF), 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),* Chapters 6.2 *External timber framed walls* and 6.9 *Curtain walling and cladding*.

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

Technical Specification

1 Description

1.1 The Mapetherm EPS External Wall Insulation System (TF) (see Figure 1) comprises EPS insulation boards, mechanically fixed at maximum 600 mm centres to the sheathed timber-framed structure using steel spacer rails (top hat profile) attached to the external surface of a minimum of 12 mm thickness cement particle boards(1) (CPB) or orientated strand boards (OSB), creating a minimum 15 mm drained and slightly ventilated cavity. The insulation boards are covered with a polymer-modified reinforcement basecoat, glass-fibre-reinforcement-mesh, primer (if required) and render finishes or acrylic brick slip finish (see sections 1.3 and 16).

(1) See section 4.7, and Table 3.

1.2 The system is available in the options shown in Table 1, as follows:

Table 1 Mapetherm EPS External Wall Insulation System (TF) – system options

Insulation	Mapetherm grey EPS 70 031				
Basecoat	Mapetherm AR1 GG				
Reinforcement mesh	Mapetherm Net				
Primer	Quarzolite Base Coat Primer	Silancolor Base Coat Primer	Silexcolor Base Coat Primer	—	—
Finishing coat	Quarzolite Tonachino Quarzolite Graffiato	Silancolor Tonachino Silancolor Graffiato Silancolor AC Tonachino	Silexcolor Tonachino Silexcolor Graffiato	Mapetherm AR1 GG (dash receiver)	Mapetherm AR1 GG (brick slip adhesive)
Decorative finish	—			Spar Dash Chippings	Mapetherm Acrylic Slips

1.3 The system comprises the following components:

Base profile

- Mapetherm BA VT Timber — an aluminium base profile with a minimum thickness of 0.8 mm, in 2500 mm lengths with drainage openings, creating a drained and slightly ventilated cavity (with a ventilation rate between 500 and 1500 mm^2 per metre length of wall in the horizontal direction), which is fixed to the sheathing board at 300 mm centres using self-drilling Ejot Saphir LS Range Screws. Figure 3 shows the opening details which is maintained at 105 mm intervals, except the openings at each end, which are positioned at a distance of 42 mm.

Spacer rails

- Mapetherm Tophat — minimum 48 mm wide galvanized steel top-hat rail profiles vertically attached to the sheathing board at 600 mm centres in the horizontal direction using self-drilling Ejot Saphir LS Range Screws. The screws are fixed at 300 mm intervals on each flange, but staggered by 150 mm on each side. Available in 2.3 and 4 m lengths. Wider top hat sections can be used provided they have similar or better characteristics and have been approved by the Certificate holder.

Mechanical fixings

- Mapetherm base rail/top hat fixings – self-drilling Ejot Saphir LS Range Screws, 5.5 mm diameter by 25 mm length, made of carbon steel with organic corrosion-resistant finish and used for fastening the base or spacer rails to the sheathing board
- Mapetherm Insulation Fixings – self-drilling Ejot TKR Range Screws, 4.8 mm diameter, available in various lengths. High quality grade case-hardened carbon steel with corrosion-resistant Climadur organic coat, and used with a 65 mm diameter polyethylene fixing plate (Ejot SBH-T 65/25) with a central hole to accommodate the TKR Range screw, and of adequate length to suit the insulation thickness. The screw fixing is applied through the insulation into the spacer rails.

Insulation(1)

- Mapetherm EPS 70 031 — a grey EPS insulation board, 1200 by 600 mm, in a range of thicknesses between 60(2) and 150 mm in increments of 10 mm, with a nominal density of 15 to 17 $kg \cdot m^{-3}$, a minimum compressive strength of 70 $kN \cdot m^{-2}$ and a minimum tensile strength perpendicular to the faces of 100 kPa. Boards are manufactured to comply with BS EN 13163 : 2012, and are classified as Euroclass E in accordance with BS EN 13501-1 : 2007.

(1) For declared thermal conductivity (λ_D) values, see Table 4.
(2) Thicknesses less than 60 mm would generally be used in reveals.

Basecoat

- Mapetherm AR1 GG — polymer-modified, cementitious mortar comprising limestone sand, cement, synthetic resins and other additives, supplied as a powder which is prepared by mixing each bag with 5 to 6 litres of clean water. Available in white and grey and used as a reinforcement basecoat. For application as a basecoat, it is applied to a thickness of 4 to 7 mm, which results in a coverage rate of 4 to 6 kg·m^{-2}.

Reinforcement

- Mapetherm Net — 1 m wide multi-stranded, woven, alkali-resisting glass-fibre-reinforcement-mesh with a nominal weight of 155 g·m^{-2} and an aperture size of 3.8 to 4.2 mm, supplied in 50 m lengths.

Primer(1)

- Quarzolite Base Coat Primer — a coloured, acrylic-resin-based emulsion containing fine quartz particles and binders, for use as a bonding agent and pre-coat treatment, with a coverage rate of 0.3 to 0.5 kg·m^{-2}
- Silancolor Base Coat Primer — a silicone-resin-based emulsion, for use as a bonding-agent and pre-coat treatment, with a coverage rate of 0.1 to 0.15 kg·m^{-2}
- Silexcolor Base Coat Primer — a transparent, ready to use modified potassium silicate solution, for use as a bonding-agent and a pre-coat treatment, with a coverage rate of 0.3 to 0.5 kg·m^{-2}

(1) All Mapetherm liquid primers can be applied by brush, roller or spray.

Render finishing coats (1)

- Quarzolite Tonachino — a ready to use acrylic-resin-based render available in particle sizes of 0.7, 1.2, 1.5 and 2 mm, to give coverage rates of 1.7 to 2, 2.3, 2.2 to 2.6 and 2.6 to 3 kg·m^{-2} respectively
- Quarzolite Graffiato — a ready to use acrylic-resin-based render available in particle sizes of 1.2 and 1.8 mm, to give coverage rates of 1.9 to 2.3 and 2.4 to 2.8 kg·m^{-2} respectively
- Silancolor Tonachino — a ready to use silicone-resin-based render available in particle sizes of 0.7, 1.2, 1.5 and 2 mm, to give coverage rates of 1.7 to 2, 1.9 to 2.3, 2.2 to 2.6 and 2.6 to 3 kg·m^{-2} respectively
- Silancolor Graffiato — a ready to use silicone-resin-based render available in particle sizes of 1.2 and 1.8 mm, to give coverage rates of 1.9 to 2.3 and 2.4 to 2.8 kg·m^{-2} respectively
- Silexcolor Tonachino — a ready to use modified potassium-silicate-mineral-based render available in particle sizes of 0.7, 1.2, 1.5 and 2 mm, to give coverage rates of 1.7 to 2, 1.9 to 2.3, 2.2 to 2.6 and 2.6 to 3 kg·m^{-2} respectively
- Silexcolor Graffiato — a ready to use modified potassium-silicate-mineral-based render available in particle sizes of 1.2 and 1.8 mm, to give coverage rates of 1.9 to 2.3 and 2.4 to 2.8 kg·m^{-2} respectively
- Silancolor AC Tonachino — a ready to use fibre-reinforced acrylic-silicone-resin-based render available with a particle size of 1.2 mm, to give coverage rates of 1.9 to 2.3 kg·m^{-2}

(1) The applied thickness is regulated by the particle size.

Spar Dash aggregate finish

- Mapetherm AR1 GG dash receiver — a polymer-modified cementitious dash receiver applied to a thickness of 6 to 8 mm, requiring the addition of 5 to 6 litres of water per 25 kg bag. Available in white and grey, with a coverage rate of 5 to 7 kg·m^{-2}

- Spar Dash Chippings — washed dry-dashing aggregate available in 24 colours, with aggregate sizes of either 6 mm, or 3 to 8 mm. Full details are available from the Certificate holder.

Acrylic brick slip finish

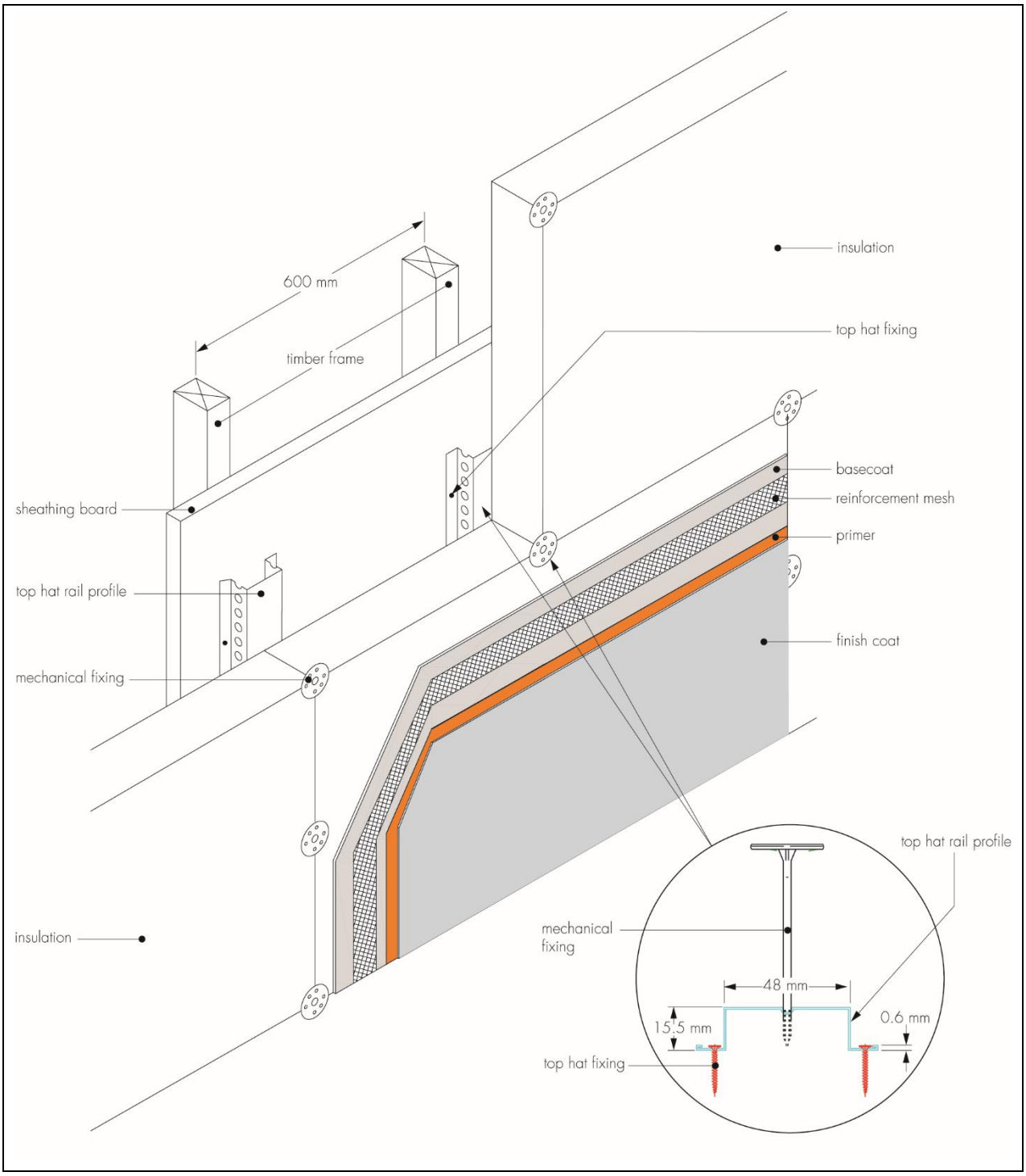
- Mapetherm AR1 GG brick slip adhesive — a polymer-modified, cementitious mortar comprising limestone sand, cement, synthetic resins and other additives, supplied as a powder which is prepared by mixing each bag with 5 to 6 litres of clean water. Available in white and grey and applied to a nominal thickness of 5 mm, which provides a coverage rate of approximately 5 kg·m^{-2}

- Mapetherm Acrylic Slip — lightweight, pre-coloured and flexible brick slips, available in a range of sizes, 4 to 6 mm thicknesses and with a coverage rate of approximately 3.5 to 5.3 kg·m^{-2}. Available as straight brick-slips (size 215 by

65 mm), corner full size brick-slips (size 215 by 65 mm facing with 102.5 by 65 return) and corner three-quarter size brick-slips (size 175 by 65 mm facing, with 115 by 65 return) in 12 standard colours(1).

(1) In relation to fire performace, the following colours are covered: Off-white, Antique, Brandenburg, Dithmarschen, Friesland, Juist, Mecklenburg, Oldenburg, Rotbunt, Sandstein, Sylt and Westerwald.

Figure 1 Mapetherm EPS External Wall Insulation System (TF)



1.4 Ancillary materials used with this system:

- a range of profiles comprising:
  — stainless steel, powder-coated galvanized steel or PVC-U, corner, bell cast and render stop profiles
  — profile connectors and fixings
  — water drainage deflector channels for use above openings.

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

- timber-frame construction with sheathing board
- fixings for sheathing boards into timber-frame construction
- breather membrane
- insect mesh
- cavity fire stops (intumescent strips)
- joint sealant and silicone mastic
- polyurethane foam filler
- aluminium or PVC-U movement joint
- aluminium or PVC-U expansion joint
- water drainage deflector channels (for use above openings)
- flashing
- sills.

2 Manufacture

2.1 The system components are either 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 Mapei (UK) Ltd has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2015 and BS EN ISO 14001 : 2015 by Certiquality (Certificates 15835 and 15837 respectively).

3 Delivery and site handling

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

Table 2 Component supply details

Component	Quantity and package
Base profile – Mapetherm BA VT Timber	2.5 m lengths
Spacer rails – Mapetherm Tophat	2.3 and 4 m lengths
Base profile and spacer rail fixings (Ejot Saphir LS Range)	boxed by manufacturer
Insulation – Mapetherm Grey EPS	polythene wrapped
Insulation fixings – Ejot SBH-T 65/25 fixing plate and Ejot Self-Drilling TKR Range Screws	boxed by manufacturer
Mapetherm AR1 GG (basecoat, dash receiver and brick slip adhesive)	25 kg bags
Reinforcement mesh – Mapetherm Net	50 m rolls, 1 m wide
Primer: Quarzolite Base Coat primer Silancolor Base Coat primer Silexcolor Base Coat primer	 20 kg tubs 20 kg tubs 20 kg tubs
Finishing coats: Quarzolite Tonachino Quarzolite Graffiato Silancolor Tonachino Silancolor Graffiato Silexcolor Tonachino Silexcolor Graffiato Silancolor AC Tonachino	 20 kg plastic buckets 20 kg plastic buckets 20 kg plastic buckets 20 kg plastic buckets 20 kg plastic buckets 20 kg plastic buckets 20 kg plastic drum
Mapetherm Acrylic Slip	boxed by manufacturer to cover area of 3 m^2
Spar Dash Chippings	25 kg bags

3.2 The insulation must be stored off the ground on a firm, clean, level base, protected from weather/frost, dry and under cover until required for use. Care must be taken during handling to avoid damage.

3.3 Additionally, the insulation should be protected from prolonged exposure to sunlight and any contact with solvents and bitumen or any materials containing volatile organic components. They must not be exposed to open flame or other ignition sources. Insulation boards that become damaged, soiled or wet should be discarded.

3.4 The basecoat must be stored in dry conditions within 5 and 30° C, off the ground and protected from moisture.

3.5 The primers, topcoats and cementitious materials must be stored in dry conditions within 5°C and 30°C, off the ground and protected from moisture, direct sunlight and frost at all times. Contaminated material must be discarded.

3.6 The primer and finish coats should be stored in a safe area, under cover and protected from excessive heat and frost.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on the Mapetherm EPS External Wall Insulation System (TF).

Design Considerations

4 General

4.1 The Mapetherm EPS External Wall Insulation System (TF), when installed in accordance with the Certificate holder's instructions and this Certificate, is satisfactory for use in reducing the thermal transmittance (U value) of external sheathed timber frame 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, the designer should consider additional/alternative fabric and/or services measures.

4.3 The system is for application to the outside of sheathed timber frame buildings, on new or existing domestic and non-domestic buildings up to 18 m in height in England, Wales and Northern Ireland and with no storey more than 11 m in height in Scotland. For further details, see section 8 of this Certificate. Prior to installation of the system, wall surfaces should comply with section 14 of this Certificate.

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

- BS EN 1995-1-1 : 2004 and its UK National Annex
- BS EN 1995-1-2 : 2004
- BS 8000-0 : 2014
- BS EN 338 : 2016
- BS EN 14081-1 : 2016
- BS EN 300 : 2006.

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 and in accordance with the Certificate holder's recommendations for the specific installation. The designer should make provision for cumulative vertical shrinkage and/or creep deformation within the timber substrate. This aspect of performance is outside the scope of the Certificate and guidance should be sought from the Certificate holder on such requirements for each application. Horizontal and vertical movement joints must be designed by a suitably qualified and experienced individual to accommodate any movements in the system or the substrate. Due consideration must be given to timber frame substrate movements.

4.7 The system must provide a minimum 15 mm wide drained and slightly ventilated cavity[(1)(2)] between the sheathing board and the insulation boards, in accordance with BS EN ISO 6946 : 2017. The openings in the base profile (see Figure 3) should provide a ventilation rate between 500 and 1500 mm^2 per metre length of wall (in the horizontal direction) for vertical air layers, which will therefore affect the thermal performance of the insulation system. The openings must be kept clean and free of obstructions and must be capable of draining freely.

(1) Horizontal deflection channels which are placed in the cavity must not be used to support the insulating render system.
(2) Cavities must not contain electrical cables other than meter tails.

4.8 The design of the structural frame of the building, including the sheathing boards, is the responsibility of the building designer and is outside the scope of this Certificate. However, the structural frame (and sheathing-associated fixings) should be structurally adequate and must be designed to resist all permanent and variable load actions applied to the system (see Table 3 for the non-exhaustive minimum specifications for system installations relating to the timber frame and sheathing). It is essential that appropriate movement joints are incorporated into the system (see section 4.6 of this Certificate).

Table 3 Minimum timber-framed construction requirements

Item	Characteristic	Specifications
Timber-framed structure(1)	The timber structure should be at least 37 mm wide with a minimum depth of 72 mm or 0.026 times the panel height in mm, whichever is greater	In accordance with BS EN 338 and BS EN 14081-1 and dry graded and marked in accordance with BS 4978 : 2007
Sheathing board(1)(2)	CPB 12 mm thickness minimum	Nominal density: 1300 kg·m^{-3} Modulus of elasticity in bending > 4500 N·mm^{-2} Bending strength: 9 N·mm^{-2} Manufactured to BS EN 634-2 Class 1 Fire classification B-s1 d0 to BS EN 13501-1
	OSB 12 mm thickness minimum	Minimum density 600 kg·m^{-3} Modulus of elasticity in bending > 3500 N·mm^{-2} Bending strength > 20 N·mm^{-2} Manufactured to BS EN 300 : 2006 with minimum Service Class 2 and fire classification of D-s2, d0 to BS EN 13501-1 : 2007

(1) These components are outside the scope of this Certificate.
(2) The board must be of an exterior grade, with the minimum acceptable specification as indicated in the above Table.

4.9 The system will improve the weather resistance of a wall and provide a decorative finish.

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

4.11 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.

4.12 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 can advise on suitable fixing methods.

4.13 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. The sheathing board must be of a suitable exterior grade with appropriately sealed joints, sealed penetrations, breather membrane and vapour control layers (VCL) where required.

4.14 The designer should make sure that windows, doors, flashings and other similar items have been specifically designed for use with this type of system – particular attention should be paid to the prevention of water ingress into the system. For example, junctions between the system and window and door openings must avoid creating a direct path that could facilitate the transfer of water from the external surface of the wall into the wall construction or to the internal surface. In addition, opening and penetration details should be designed to deflect water away from the insulation and onto the external face of the wall.

4.15 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 approved contractors who have successfully undergone training and registration by the Certificate holder (see section 15 of this Certificate).

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 website (www.bbacerts.co.uk).

6 Thermal performance

6.1 Calculations of the 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) given in Table 4.

Table 4 Declared thermal conductivity of the insulation (λ_D)

Insulation type	Thickness (mm)	Thermal conductivity ($W \cdot m^{-1} \cdot K^{-1}$)
Mapetherm EPS 70 031	60 to 150	0.031

6.2 The U value of a wall construction will depend on the selected insulation thickness, the degree of ventilation to the cavity, fixing method and type of fixing, and the insulating value of the substrate and its internal finish. Example U values for a timber-framed construction with a drained cavity in accordance with the national Building Regulations are given in Table 5 and are based on the thermal conductivity given in Table 4.

Table 5 Insulation thickness required to achieve typical design U values[1][2][3]

U value ($W \cdot m^{-2} \cdot K^{-1}$)[4]	Thickness of insulation (mm)
	Timber frame[5][6][7]
	Mapetherm EPS 70 031
0.18	—[8]
0.19	—[8]
0.25	—[8]
0.26	150
0.28	140
0.30	130
0.35	110

(1) Wall construction inclusive of 12.5 mm plasterboard (λ = 0.25 $W \cdot m^{-1} \cdot K^{-1}$), 12 mm CPB or OSB ($\lambda$ = 0.13 $W \cdot m^{-1} \cdot K^{-1}$) and with an external render thickness of 8 mm (λ = 1.0 $W \cdot m^{-1} \cdot K^{-1}$).
(2) Timber frame – 89 mm uninsulated timber frame (15% timber) has been included in the calculation.
(3) Declared thermal conductivity (λ_D) of insulation is as shown in Table 4. Assumes an air gap correction (ΔU) of 0.01 and based upon incremental insulation thicknesses of 10 mm.
(4) When applying the maximum available insulation thickness, timber-frame substrate walls can achieve a U value of 0.26 $W \cdot m^{-1} \cdot K^{-1}$.
(5) Spacer rail (top hat profiles) within the cavity with resistance of 0.17 $m^2 \cdot K \cdot W^{-1}$ assumed.
(6) Slightly ventilated cavity, with a ventilation rate of 735.07 mm^2 per linear metre.
(7) Calculations based on a mechanically fixed system that included 7 galvanized steel fixings per m^2 with cross-sectional area of 18.1 mm^2.
(8) 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 system and it is the responsibility of the company installing the system to accurately follow the installation instructions (also see 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 characteristic values determined from BS EN 1991-1-4 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 The system has been tested in accordance with the BBA method for combined self-weight and wind actions, to confirm its suitability when using the maximum insulation thickness of 150 mm of minimum stiffness, heaviest insulation and render system and by adopting the fixing pattern shown in Figure 6 (minimum number of fixings) using insulation fixing type Ejot TKR Range Screw with a 65 mm diameter polyethylene plate (Ejot SBH-T 65/25). It is essential that movement joints, seals and interfaces with the render system are designed and detailed to accommodate all vertical displacements including the movements of the primary structure and the cladding system.

7.6 Positive wind load is transferred to the substrate wall directly via compression through the render, insulation and profiles.

7.7 Negative wind load is transferred to the substrate wall via(1):

- the bond between the insulation and the render system or acrylic brick slip finish
- the pull-out resistance of the insulation fixing from the profiles
- the pull-through resistance of the insulation fixing
- the pull-through resistance of the profile fixing from the profiles
- the pull-out resistance of the profile fixing from the substrate (see sections 7.8 and 7.9)

(1) Further guidance is given in BBA Guidance Note 1, available on the BBA website (www.bbacerts.co.uk).

7.8 The design pull-out resistance of the profile fixings from the substrate obtained from site tests (N_{RD1}) must not be less than the maximum design wind load (W_e). The characteristic pull-out resistance based on site tests is determined in accordance with the guidance given in EOTA TR051 (characteristic pull-out resistance (N_{RK1}) = 0.6 x mean of 5 lowest test results). To obtain the site design pull-out resistance of the fixings, the characteristic site pull-out resistance should be divided by the partial factor given in Table 6 for a similar substrate.

7.9 The typical characteristic pull-out resistance for the fixing tested on a similar substrate is as per Table 6, and can be used as a reference guide.

Table 6 Typical characteristic pull-out resistances of profile fixings from the substrate

Fixing type	Substrate facing	Characteristic pull-out resistance(1) (kN)	Partial factor(2)
Ejot Saphir LS Range self-drilling screws, 5.5 mm diameter	12 mm thick cement particle board (CPB)	0.842	2
	12 mm thick oriented strand boards (OSB)	0.7	
Ejot TKR Range self-drilling screws, 4.8 mm diameter	Steel spacer rails (top hat profile)	1.06	1.5

(1) Values obtained from tests or from the fixing's datasheet.
(2) To obtain the typical design pull-out resistance (N_{RDTyp}) of the fixing, the characteristic pull-out resistance should be divided by the partial factor given.

7.10 The dynamic wind uplift test was carried out on a sheathed framed structure and the system installed with vertical steel spacer rails at 600 mm horizontal spacing; the spacer rails were fastened to 12 mm thick cement particle board (providing a minimum 15 mm cavity between the sheathing and insulation boards), with screws at 300 mm vertical centres in both flanges (staggered on each flange). Insulation boards were fastened to the vertical steel spacers with insulation fixings (Ejot TKR Range Screw with a 65 mm diameter polyethylene plate [Ejot SBH-T 65/25]), with the layout and spacing as shown in Figure 6. The maximum design negative wind load that can be resisted by the system as determined from the dynamic wind uplift test (Rd_{Test}) is equal to 1.14 $kN \cdot m^{-2}$.(1)(2)

(1) The maximum design wind load that can be resisted by the system corresponds to the maximum allowed spacing and centres of fixings and profiles and as described in 7.10. This fixing and profile configuration, with appropriately selected fixings, will also adequately transfer the system's self-weight, wind and impact loads to a suitable substrate wall.

(2) The characteristic resistance value (N_{RK2}) determined from dynamic wind uplift test is 2.85 $kN \cdot m^{-2}$. The design wind load resistance is determined by dividing this characteristic resistance value by a partial safety factor of 2.5.

7.11 The horizontal local deflection of the supporting structure due to variable loads should be within acceptable limits. The suggested limit for the maximum horizontal local deflection is the height of the storey/500, in accordance with BS EN 1993-1-1 : 2005. The Certificate holder may advise on the limiting deflection for the system.

7.12 The data derived from sections 7.8 to 7.11 must be assessed against the design wind load, and the following expressions must be satisfied:

For safe design:

$Rd_{Test} \geq W_e$ and $N_{RD1} \geq W_e$

Calculated using

$N_{RD1} = N_{RK1}/\gamma_m$
$Rd_{Test} = N_{RK2}/\gamma_m$

where

Rd_{Test} is the negative wind load design resistance of the system based on test ($kN \cdot m^{-2}$)
W_e is the maximum design wind load ($kN \cdot m^{-2}$)
N_{RD1} is the design pull-out resistance based on site tests (kN)
N_{RK1} is the characteristic resistance obtained from the pull-out test
N_{RK2} is the characteristic resistance obtained from the wind uplift test
γ_m is the partial safety factor (determined by the mode of failure).

Impact resistance

7.13 Hard body impact tests were carried out in accordance with ETAG 004 : 2013. The system is suitable for use in all Use Categories(1) up to and including those specified in Table 7 of this Certificate.

Table 7 System hard body impact resistance

Rendering system: Basecoat (Mapetherm AR1 GG) + Mapetherm primers and finishing coats as indicated below:	**Use Category**(1)	
	Mapetherm Net (see section 1.3 – Reinforcement)	
	Single layer	**Double layer**
Quarzolite Base Coat primer + Quarzolite Tonachino Quarzolite Base Coat primer + Quarzolite Graffiato	II	II
Silancolor Base Coat primer + Silancolor Tonachino Silancolor Base Coat primer + Silancolor Graffiato	II	II
Silexcolor Base Coat primer + Silexcolor Tonachino Silexcolor Base Coat primer + Silexcolor Graffiato	II	II
Silancolor Base Coat primer + Silancolor AC Tonachino	II	—
Mapetherm AR1 GG (dash receiver) + Spar Dash Chippings	I	—
Mapetherm AR1 GG (brick slip adhesive) + Mapetherm Acrylic Slip	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.

7.14 Soft body impact tests were carried out in accordance with ETAG 017 : 2005. The system is suitable for use in all Use Categories as defined in Categorisation Table 6 of ETAG 017 : 2005(1).

(1) System tested at 100, 300 and 500 Nm with no visible damage.

8 Behaviour in relation to fire

8.1 The system has a reaction to fire classification(1) of class B-s1, d0 in accordance with BS EN 13501-1 : 2007.

(1) In accordance with Warrington Fire test reports; WF 346175 Issue 3 dated 30 April 2015, WF 370577 Issue 7 dated 17 February 2017 and system level assessment report WF 383299 dated 9 May 2017.

8.2 The fire classification applies to the full range of insulation thicknesses and full range of colours on finish coats covered by this Certificate.

8.3 The EPS insulation material in isolation is classified Euroclass E to BS EN 13501-1: 2007.

8.4 The reverse side of the system (insulation facing into the cavity) has a reaction to fire classification of E to BS EN 13501-1 : 2007.

8.5 In England, Wales and Northern Ireland, the system may be used on buildings at any proximity to a boundary. The system is restricted for use in buildings up to 18 m in height.

8.6 In Scotland, the system may be used on buildings more than 1 m from a boundary and, on houses, 1 m or less from a boundary. With minor exceptions, the system should be included in calculations of unprotected area, except on houses where the external wall behind has the appropriate fire resistance.

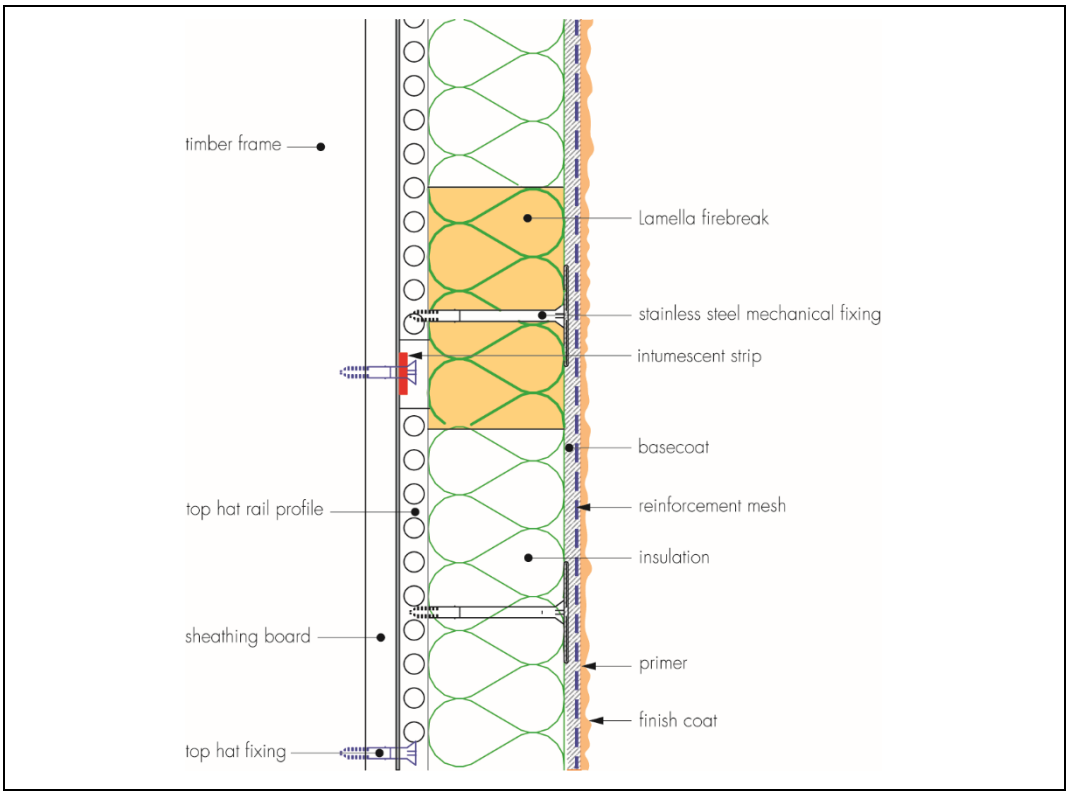
8.7 In Scotland, the system should not be used on any building with a storey more than 11 m above the ground, or on any entertainment or assembly building with a total storey area more than 500 m^2, or on any hospital or residential care building with a total storey area more than 200 m^2.

8.8 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). Fire stopping or fire barriers should be incorporated into a construction where required by the relevant national Building Regulations.

8.9 NHBC Standards require in all cases that a minimum of one non-combustible fixing through the reinforcement mesh, per square metre or per insulation board, whichever provides the greater number, should be provided, in addition to the other fixings.

8.10 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

Detailed guidance can be found in the documents supporting the national Building Regulations for the provisions that are applicable when the system is installed in close proximity to certain flue pipes and/or heat-producing appliances.

10 Water resistance

10.1 The system will provide a degree of protection against rain ingress. Designers and installers must take particular care in detailing around openings, penetrations and movement joints, to minimise the risk of water ingress.

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

10.3 At the top of walls, the system must be protected by an adequate coping, overhang or other detail designed for use with this type of system (see section 16). On flat roofs and parapet walls, waterproofing and drainage must be adequate and in good condition.

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 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 BRE Report BR 262 : 2002.

Interstitial condensation

11.4 Walls incorporating the system 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) and section 11.5 of this Certificate.

11.5 The water vapour resistance factor (μ) and equivalent air layer thickness (S_d) are shown in Table 8.

Table 8 Water vapour resistance factor and equivalent air layer thickness

Components/systems	Thickness (mm)	μ	S_d (m)
EPS grey (EPS 70) insulation	60 to 150	20 to 40(1)	—
Rendering system: Basecoat (Mapetherm AR1 GG) + Mapetherm primers and finishing coats indicated below:			
Quarzolite Base Coat primer + Quarzolite Tonachino (2 mm) or Quarzolite Graffiato (1.8 mm particle size)	8(2)	—	0.35
Silancolor Base Coat primer + Silancolor Tonachino (2 mm) or Silancolor Graffiato (1.8 mm particle size)	8(2)	—	0.41
Silexcolor Base Coat primer + Silexcolor Tonachino (2 mm) or Silexcolor Graffiato (1.8 mm particle size)	8(2)	—	0.16
Silancolor AC Tonachino (1.2 mm particle size)	7.2(2)	—	0.28
Mapetherm AR1 GG (dash receiver) + Spar Dash Chippings	13(3)	—	0.41
Mapetherm AR1 GG (brick slip adhesive) + Mapetherm Acrylic Slip	12.5(4)	—	0.41

(1) The factor (μ value) of the insulation is taken from BS EN 13163 : 2012; it is recommended that the lower of these values should be used for condensation risk analysis calculations.
(2) Includes reinforcement mesh embedded in Mapetherm AR1 GG basecoat (applied to a thickness of 6 mm), relevant primer and indicated finish coat with stated particle size.
(3) Primer is not used with dash receiver finish (Mapetherm AR1 GG). Based on basecoat thickness of 6 mm and Mapetherm AR1 GG (dash receiver) thickness of 7 mm.
(4) Includes reinforcement mesh embedded in Mapetherm AR1 GG basecoat (applied to a thickness of 5 mm), followed by brick slip adhesive (5 mm thick layer) and 5 mm thick brick slips embedded into adhesive (approximately 2.5 mm exposed).

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
- visual inspection of the brick-slips for signs of dislodge

- 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 system 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.

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 renders 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 as recommended by the Certificate holder and in accordance with BS EN 1062-1 : 2004. 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 installation and 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
- the position of fire barriers and cavity fire stops.

14.2 The survey should include tests conducted on the sheathed structural timber-framed walls of the building by the Certificate holder or their approved installers (see section 15) to determine the pull-out resistance of the specified mechanical fixings to withstand the building's expected wind loading, based on calculations using the fixing's pull-out resistance test data. In addition, the type and minimum number of fixings are selected as per section 7. The advice of the Certificate holder should be sought to ensure the proposed fixing pattern is sufficient.

14.3 The flatness of surfaces must be checked; this may be achieved using a straight edge spanning the storey height. Any irregularities must be made good prior to installation to ensure that the insulation boards are installed with a smooth, in-plane finished surface.

14.4 On existing buildings, purpose-made window sills must be fitted to extend beyond the finished face of the system (see Figure 11). New buildings should incorporate suitably deep sills.

14.5 In new buildings, internal wet work, eg screed or plastering, should be completed and allowed to dry prior to the application of the system.

14.6 All modifications and necessary repairs to the building structure must be completed before installation commences.

15 Approved installers

Application of the system, within the context of this Certificate, must be carried out by approved and registered 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 installation instructions.

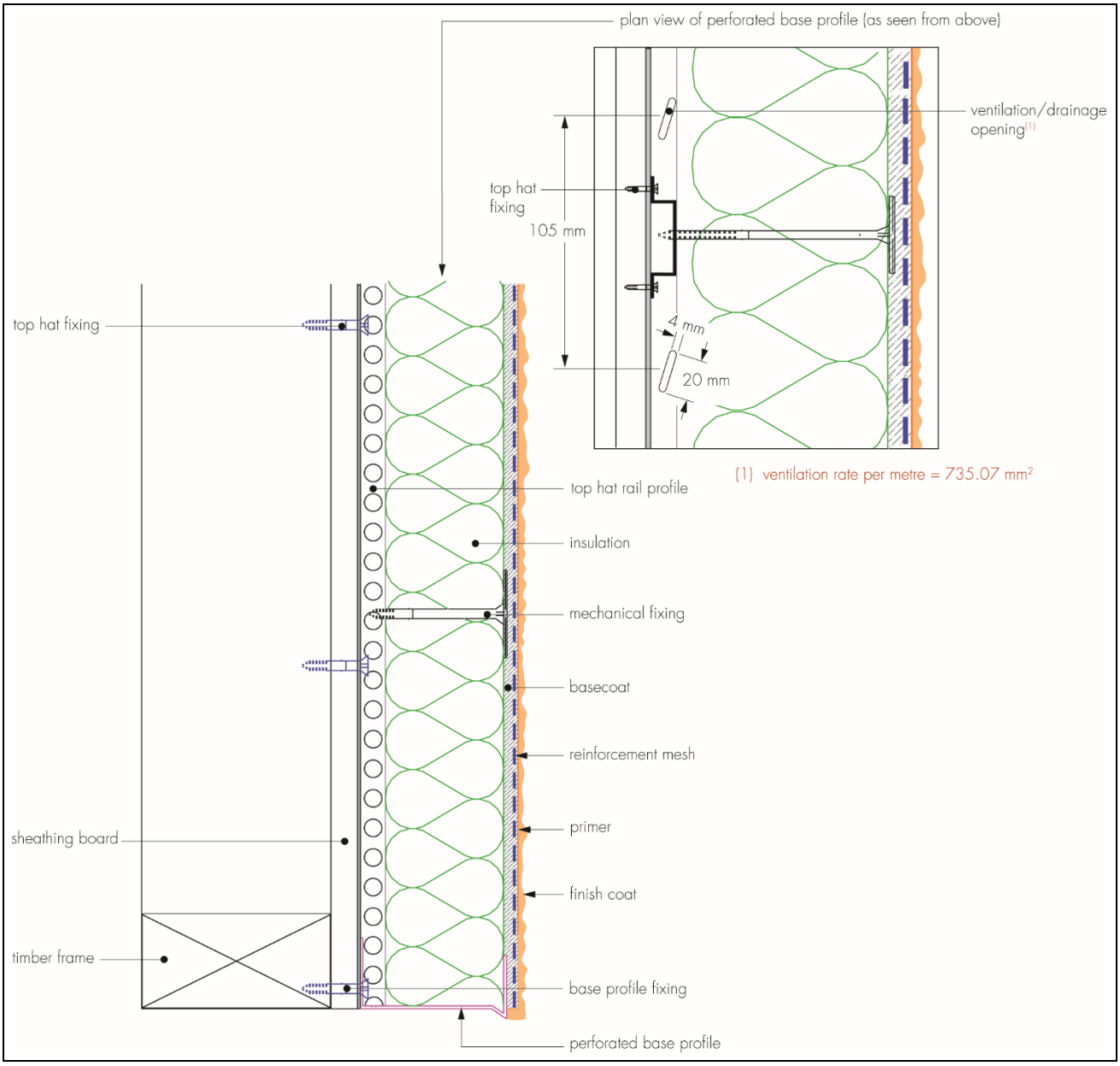
16.2 Weather conditions should be monitored to ensure correct application and curing conditions. Application of coating materials must not be carried out at temperatures below 5°C or above 30°C, or if exposure to frost is likely, and the coating must be protected from rapid drying. Installation should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

Positioning base profile and securing insulation boards

16.4 The Mapetherm BA VT Timber base profiles are secured to the sheathing board substrate above the dpc (see Figure 3) using approved profile fixings at approximately 300 mm centres. Base profile clips are fixed to the front lip at the base of the joints to aid system extensions. Different clips are used depending on the specified finish – details are available from the Certificate holder.

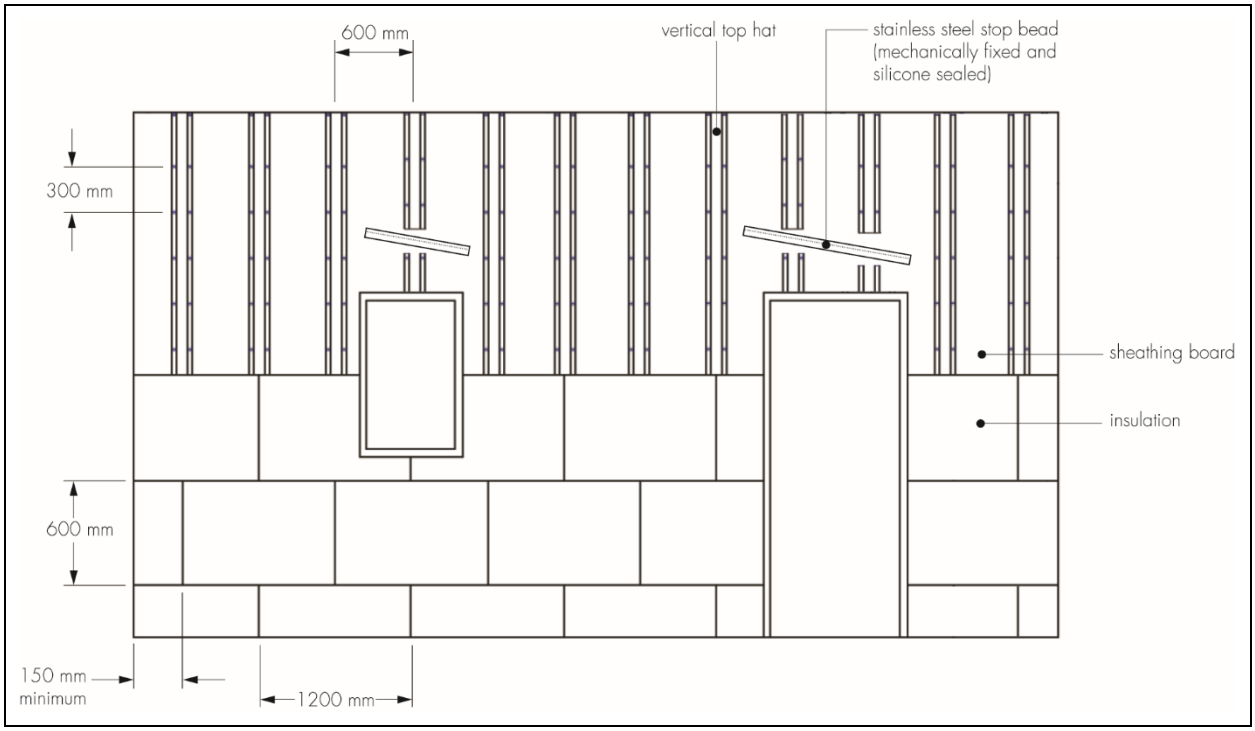
Figure 3 Typical section of base profile



16.5 Spacer rails (Mapetherm Tophat) are mounted vertically at maximum 600 mm centres in the horizontal direction and mechanically fixed to the sheathing board (substrate) with self-drilling screws (see section 1.3) into both sides of the rail flange. The fixings are staggered on each flange at a maximum spacing of 300 mm vertically. Spacer rails should be centred correctly and true to line and levelled. Deflection bead profiles(1) are mechanically fixed into sheathing boards above all window and door openings (see Figure 4). Intumescent strips(1) are installed following the Certificate holder's installation instructions. Care should be taken not to overdrive the fixings.

(1) Outside the scope of this Certificate.

Figure 4 Spacer rail fixing pattern and arrangement of insulation boards



16.6 The first and second insulation boards are positioned on the base profile and aligned with spacer rails before securing the insulation boards into the spacer rails to suit the required fixing pattern using insulation fixings (see section 1.3 for fixings). Subsequent courses of boards are positioned so that vertical board joints are staggered and overlapped at building corners. Insulation boards should be tightly abutted and, where required, any open joints in the insulation must be filled with slivers of insulation.

16.7 The fixings are installed at board joints and within the board as per the fixing pattern shown in Figure 6, which equates to five fixings per board and approximately seven fixings per square metre.

16.8 Care must be taken to ensure that fixings are not overdriven and that alignment is checked as work proceeds. The surface of the boards should be smooth without high spots or irregularities. Fire barriers must be installed where required by the national Building Regulations.

16.9 Gaps greater than 10 mm should be closed by repositioning the board or, where appropriate, by cutting boards to fit.

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. Purpose-made window-sills and seals should be installed to prevent water ingress and to ensure water is shed clear of items bridging the cavity. Corner profiles are fixed to all building corners and frame rails are fitted to door and window heads and jambs (see Figure 8).

16.11 Installation continues until the whole wall is completely covered including, where appropriate, the building soffits.

Movement joints

16.12 The system should incorporate provision for movement joints, where required (see Figure 5).

16.13 Expansion beads are fixed horizontally or vertically through the system in predetermined positions, according to the installation specification and the individual requirements of each project.

Figure 5 Vertical movement joint

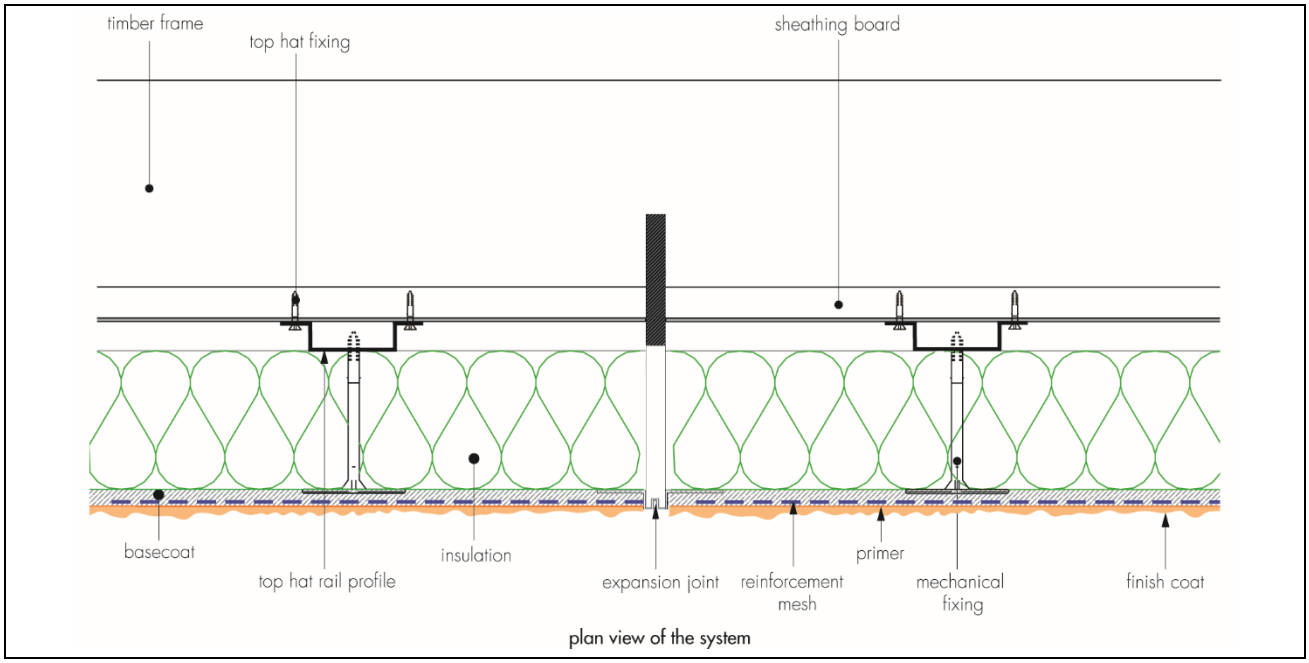
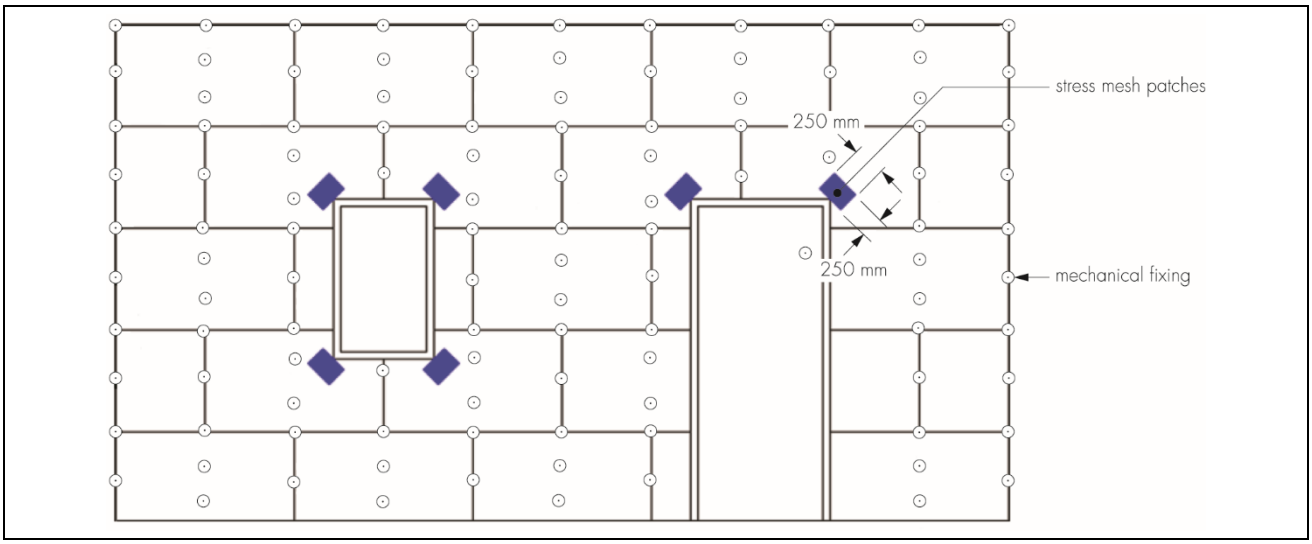


Figure 6 Mechanical fixing pattern and additional reinforcement around openings



Application of basecoat and reinforcement mesh

16.14 Prior to the application of the reinforcement mesh and basecoat, pre-compressed sealing tape is secured 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, with the addition of a silicone seal. Alternatively, proprietary sealing beads can be used in accordance with the Certificate holder's instructions.

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 1.3).

16.16 To provide the necessary reinforcement, stress patches of reinforcement mesh (approximate size 250 by 250 mm) are applied with basecoat, diagonally over the insulation boards at the corners of openings (see Figure 6), before the full layer of mesh is applied (as described in 16.17).

16.17 Basecoat is applied over the insulation boards 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 3 and 5 mm. The reinforcement mesh (with its concave surface to the wall) is applied and is 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 2 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 greater than 4 mm.

16.19 The basecoat is applied progressively, working in one metre sections horizontally or vertically. Overlapping at all mesh joints should not be less than 100 mm.

16.20 PVC meshed corner beads are bedded into the basecoat around openings and external corners, as required.

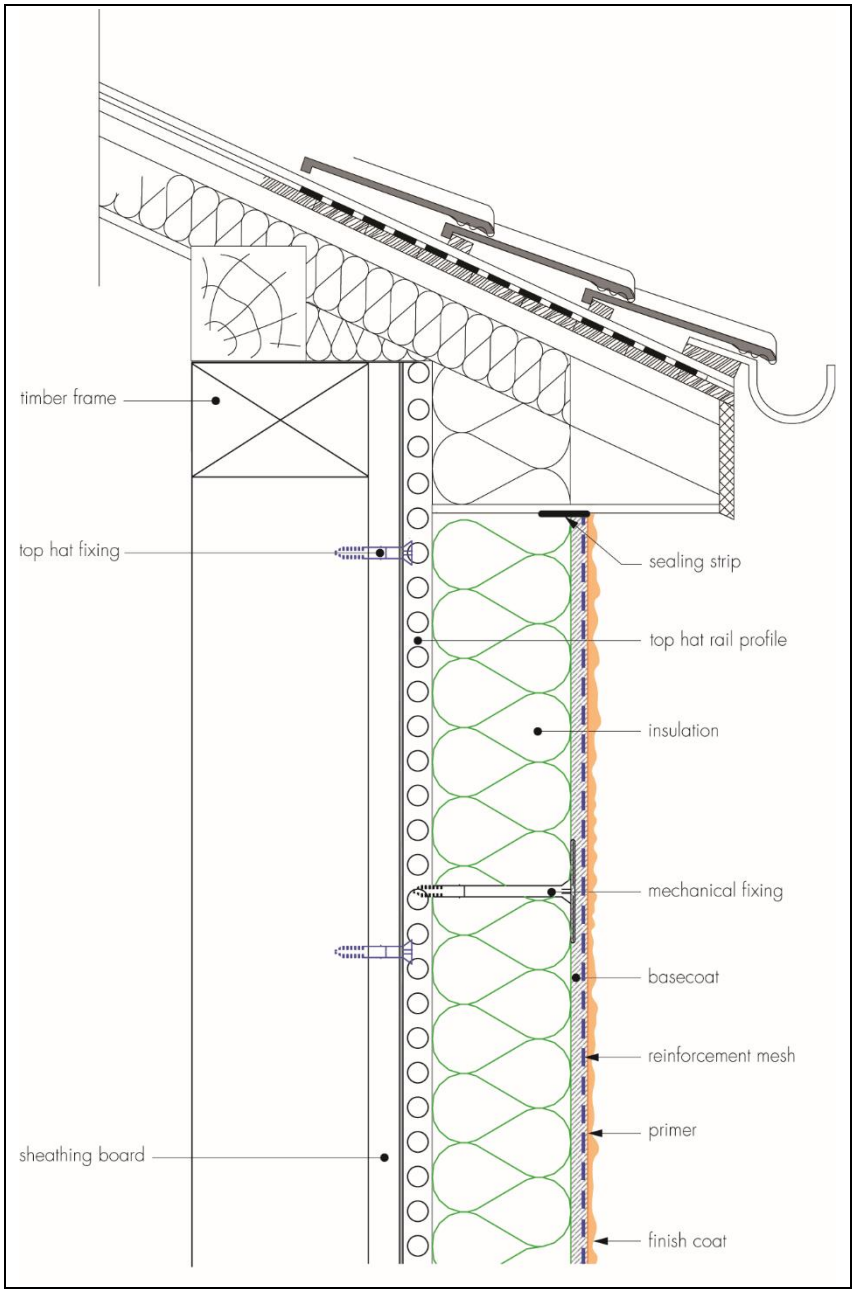
16.21 For areas requiring extra resistance to impact, two mesh layers are applied in two stages, in accordance with sections 16.17 to 16.19.

16.22 Continuous surfaces should be completed without a break. Once the whole wall is completed, the reinforced basecoat is left to dry thoroughly before the application of primer and the finish coat. The drying time will depend upon the conditions, but at least 48 hours should elapse.

Primer

16.23 After the basecoat has dried, the primer coat can be roller-applied, sprayed or applied with a long-hair brush, first making sure the basecoat is free from any irregularities (trowel-marks, exposed mesh, etc). It is recommended that the colour of the primer corresponds to the colour of the finish coat. The primer drying time will depend upon the conditions, but at least 12 hours should elapse.

Figure 7 Roof eaves details



Finish coat

16.24 Once the primer is thoroughly dry, the finish coat can be applied.

16.25 The render finishes are applied to the required thicknesses as regulated by the particle size (see section 1.3), using a stainless steel trowel and finished with a plastic trowel to create a textured finish. The drying time depends on conditions, but at least 24 hours should elapse before a decorative coating is applied.

16.26 Prior to setting, the render is polished with a plastic float to give an even texture and to remove all trowel lines. Elevations should be completed in one application and finished to natural breaks in the render, ie beads or building corners. The texture should be checked to ensure the same batches are applied to each elevation; drums can be batch-mixed to ensure colour consistency and workability.

16.27 Once the render finish coat is dry, silicone sealant is installed at all openings (eg windows and doors), overhanging eaves and parapets, gas and electric meter boxes, wall vents or where the render abuts any other building material or surface.

Mapetherm AR1 GG dash aggregate finish

16.28 For application of Spar Dash aggregate finish, dash receiver (Mapetherm AR1 GG) is applied over the reinforced basecoat to a thickness between 6 and 8 mm (see section 1.3), to achieve a total thickness of 10 to 15 mm (prior to application of the aggregates). While the dash receiver is still soft, Spar Dash aggregate of an appropriate size is applied with a small hand-shovel or specific dash application tool onto the receiver coat. 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.

Mapetherm acrylic brick slip finish

16.29 Brick slip adhesive (Mapetherm AR1 GG) is applied over the basecoat vertically with a 5 mm notched trowel (to achieve an approximate thickness of 5 mm. A maximum of one-metre-square should be applied at any one time to ensure good adhesion and workability.

16.30 Acrylic brick slips are placed by hand (60 per m^2) on top of the adhesive, leaving an 8 to 12 mm wide joint between the brick-slips, and pressed into position. They should be fully encapsulated in adhesive, paying particular attention to external corners, reveals and edges (to prevent water ingress behind the brick-slips).

16.31 A suitably sized damp brush is used to smooth out the adhesive over the joints before the adhesive has set. The adhesive is left to dry.

General guidelines

16.32 Care should be taken in the detailing of the system around such features as openings, projections, eaves and parapets (see Figures 8 to 11), to ensure adequate protection against water ingress and to limit the risk of water penetration.

16.33 On completion of the installation, external fittings, eg rainwater goods, are securely fixed to steel grounds or extended fixings that have been built into the system during installation.

Figure 8 Corner details

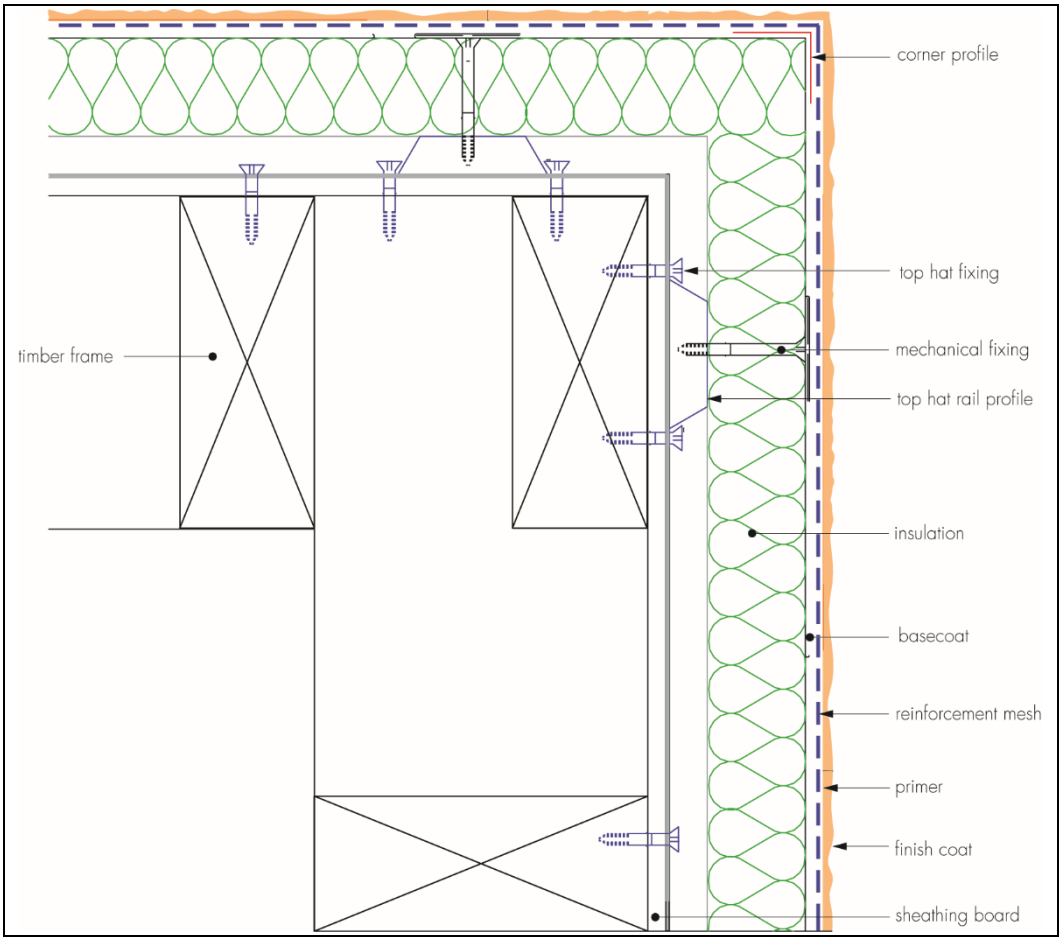


Figure 9 Typical detail at window head details

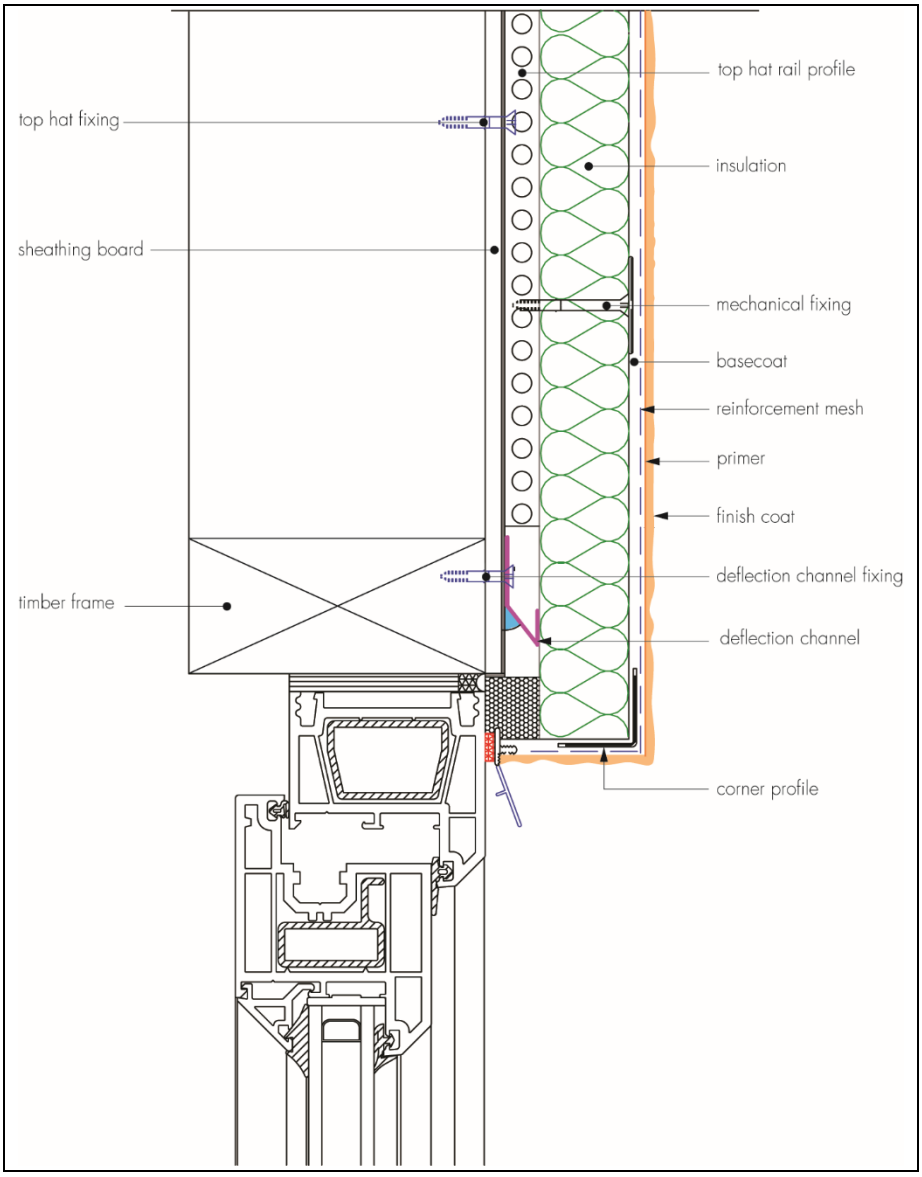


Figure 10 Typical window and door details

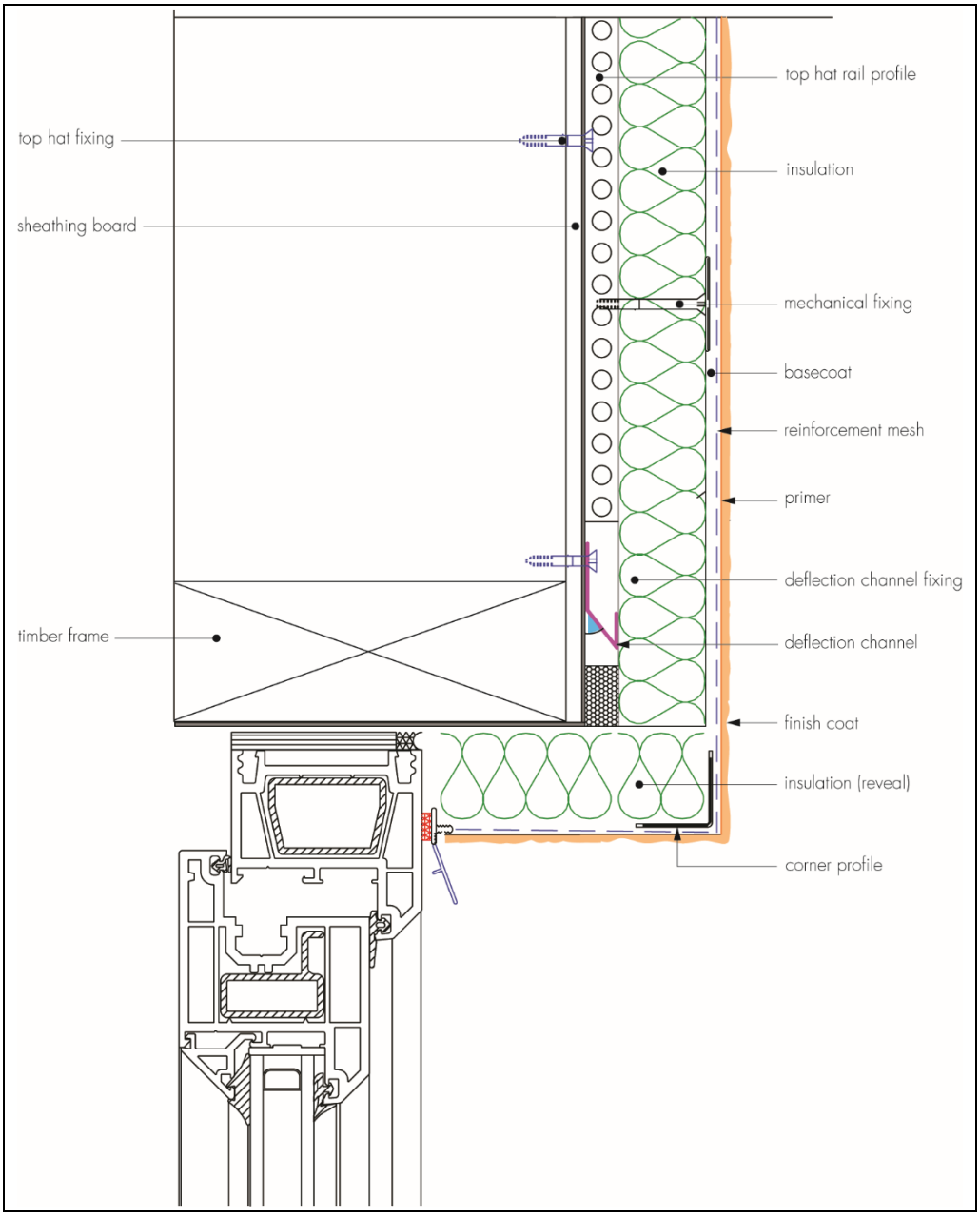
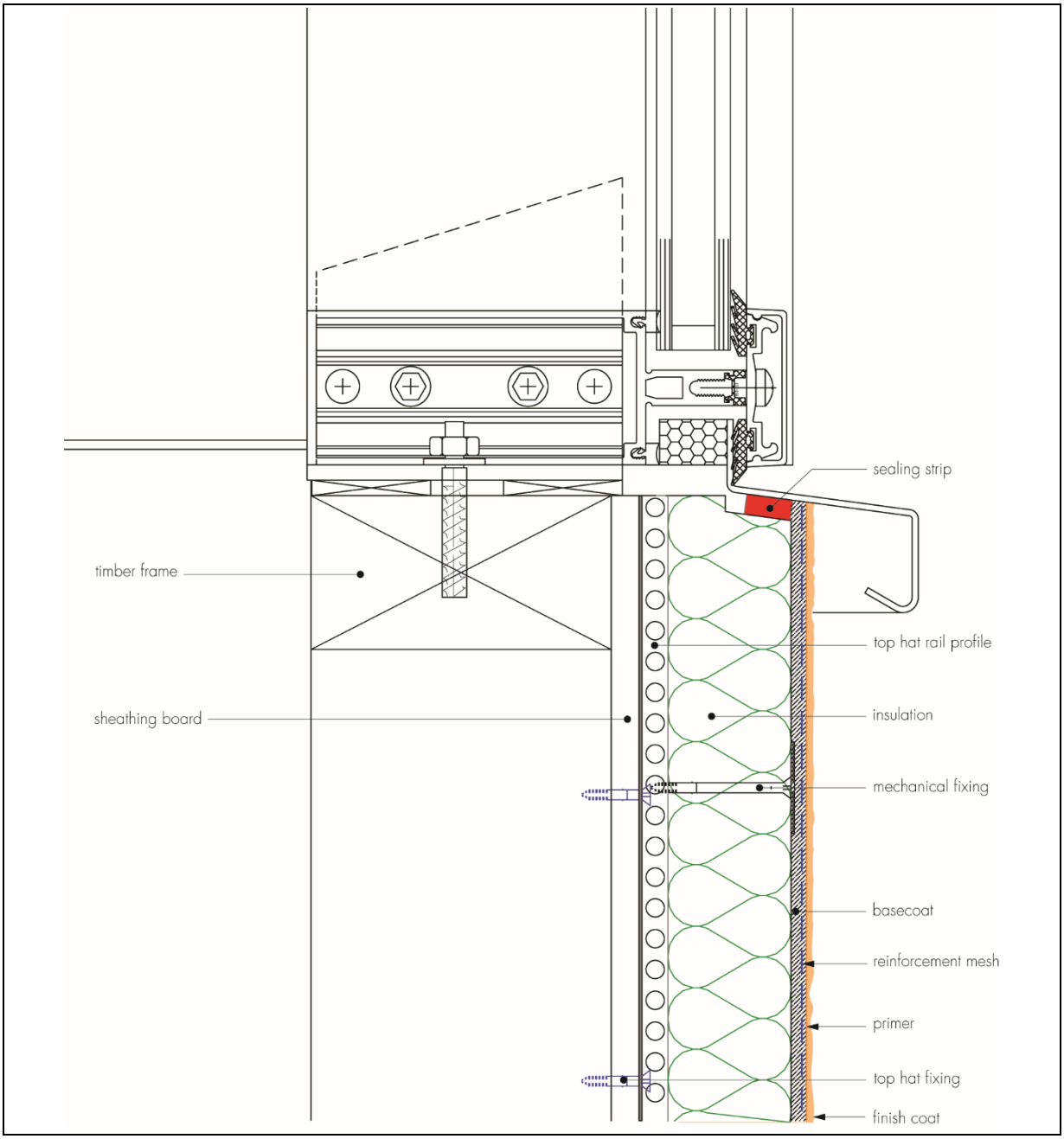


Figure 11 Window sill details



Technical Investigations

17 Tests

17.1 The system was examined to determine:

- fire performance
- adequacy of mechanical fixing system
- dynamic wind uplift test performance
- displacement/dead load test performance
- hygrothermal performance and resistance to freeze/thaw
- bond strength
- resistance to hard and soft body impact
- water vapour permeability
- durability

- the 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.

Bibliography

BS 4978 : 2007 + A2 : 2017 *Visual strength grading of softwood — Specification*
BS 5250 : 2011 + A1 : 2016 *Code of practice for control of condensation in buildings*

BS 8000-0 : 2014 *Workmanship on construction sites — Introduction and general principles*

BS EN 300 : 2006 *Oriented strand boards (OSB) — Definitions, classification and specifications*

BS EN 338 : 2016 *Structural timber — Strength classes*

BS EN 634-2 : 2007 *Cement bonded particleboards — Specification — Requirements for OPC bonded particleboards for use in dry, humid and exterior conditions*

BS EN 1062-1 : 2004 *Paints and varnishes — Coating materials and coating systems for exterior masonry and concrete — Classification*

BS EN 1990 : 2002 + A1 : 2005 *Eurocode — Basis of structural design*
NA to BS EN 1990 : 2002 + A1 : 2005 UK National Annex to *Eurocode — Basis of structural design*

BS EN 1991-1-4 : 2005 *Eurocode 1 — Actions on structures — General actions — Wind actions*
NA to BS EN 1991-1-4 : 2005 + A1 : 2010 *Eurocode 1 — Actions on structures — General actions — Wind actions*

BS EN 1993-1-1 : 2005 + A1 : 2014 *Eurocode 3 — Design of steel structures — General rules and rules for buildings*
NA + A1 : 2014 to BS EN 1993-1-1 : 2005 + A1 : 14 UK National Annex to *Eurocode 3 — Design of steel structures — General rules and rules for buildings*

BS EN 1995-1-1 : 2004 *Eurocode 5: Design of timber structures — General — Common rules and rules for buildings*
NA to BS EN 1995-1-1 : 2004 UK National Annex to *Eurocode 5: Design of timber structures — General — Common rules and rules for buildings*
BS EN 1995-1-2 : 2004 *Eurocode 5: Design of timber structures — General — Structural fire design*

BS EN 13163 : 2012 + A2 : 2016 *Thermal insulation products for buildings — Factory made expanded polystyrene (EPS) products — Specification*

BS EN 13501-1 : 2007 + A1 : 2009 *Fire classification of construction products and building elements — Classification using test data from reaction to fire tests*

BS EN 13914-1 : 2016 *Design, preparation and application of external rendering and internal plastering — External rendering*

BS EN 14081-1 : 2016 + A1 : 2019 *Timber structures — Strength graded structural timber with rectangular cross section — General requirements*

BS EN ISO 6946 : 2017 *Building components and building elements — Thermal resistance and thermal transmittance — Calculation method*

BS EN ISO 9001 : 2015 *Quality management systems — Requirements*

BS EN ISO 14001 : 2015 *Environmental management systems – Requirements*

BRE Report BR 135 : 2013 *Fire performance of external thermal insulation for walls of multistorey buildings*

BRE Report BR 262 : 2002 *Thermal insulation: avoiding risks*

BRE Report BR 443 : 2006 *Conventions for U-value calculations*

EOTA TR051 *Recommendations for job-site tests of plastic anchors and screws*

ETAG 004 : 2013 *Guideline for European Technical Approval of External Thermal Insulation Composite Systems with Rendering*

ETAG 017 : 2005 *Guideline for European Technical Approval of Veture Kits – Prefabricated Units for External Wall Insulation*

18 Conditions

18.1 This Certificate:

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

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

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

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

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

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

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

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