

Kiwa Ltd.
Unit 5 Prime Park Way
Prime Enterprise Park
Derby
DE1 3QB
T: +44 (0)1332 383333
W: www.kiwa.co.uk/bda

BAW-18-041-S-A-UK
BDA Agrément®
Cavity System 2 MW EWI
Render Cladding System

SPSEnvirowall Ltd.
Orchard House
Aire Valley Business Centre
Keighley, West Yorkshire
BD21 3DU
T: +44 (0)1535 661633
E: info@spsenvirowall.co.uk
W: www.spsenvirowall.co.uk

SCOPE

This Agrément relates to the Cavity System 2 (hereinafter 'CS2') MW EWI Render Cladding System (hereinafter the 'System'). The System is a mechanically fixed, external wall insulation (EWI), mineral wool (hereinafter 'MW') insulated, twin-sheathing board, render cladding system. The System is suitable for installation on external sheathed light gauge steel frame (hereinafter 'LGSF') supporting walls and has a drained cavity behind the outer, secondary sheathing boards. For use on existing or new, residential and non-residential high-rise buildings up to and over 18 m in height in the UK. The System can be designed for a 30 or 60-year service-life durability as required.

DESCRIPTION

CS2 fillet strips are vertically orientated and fixed into the primary sheathing boards, which are the outer face of the LGSF supporting walls. This forms a minimum 15 mm drained cavity between the primary and secondary sheathing boards (which are mechanically fixed through the CS2 fillet strips into the primary sheathing boards). MW insulation in slab form is mechanically fixed through the plastic-coated glass-fibre reinforcing mesh embedded in the basecoat layer, into the secondary sheathing boards. The System is completed with one of two available render finishes.

SYSTEM ILLUSTRATION



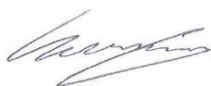
THIRD-PARTY ACCEPTANCE

NHBC - For detailed information see section 3.3 (Third-Party Acceptance).

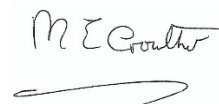
STATEMENT

It is the opinion of Kiwa Ltd. that the System is fit for its intended use, provided it is specified, installed and used in accordance with this Agrément.

Chris Vurley, CEng
Technical Manager, Building Products



Mark Crowther, M.A. (Oxon)
Kiwa Ltd. Technical Director



SUMMARY OF AGRÉMENT

This document provides independent information to specifiers, building control personnel, contractors, installers and other construction industry professionals considering the fitness for the intended use of the System. This Agrément covers the following:

- Conditions of use;
- Initial Factory Production Control, Quality Management System and the Annual Verification procedure;
- Points of attention for the Specifier and examples of details;
- Installation;
- Independently assessed System characteristics and other information;
- Compliance with national Building Regulations, other regulatory requirements and Third-Party Acceptance;
- Sources, including codes of practice, test and calculation reports.

MAJOR POINTS OF ASSESSMENT

Thermal performance - the System improves the thermal performance of external walls and can contribute to satisfying the requirements of the national Building Regulations (see section 2.1.10).

Strength - the System has adequate strength and is designed to adequately resist impact damage and wind loads encountered in the UK (see section 2.1.10).

Moisture control - the System (see section 2.1.10):

- can contribute to limiting the risk of interstitial and surface condensation;
- has adequate water vapour transmission resistance;
- will resist wind-driven rain penetration across the drained cavity between the primary and secondary sheathing boards;
- is resistant to moisture and humidity changes in normal occupation and use.

Behaviour in relation to fire - the System is classified as European Classification A2-s1,d0, in accordance with BS EN 13501-1 (see section 2.1.10).

Durability - when installed and maintained in accordance with the Agrément holder's recommendations and this Agrément, the System will have a service-life durability of at least 30 years. The service-life durability can be extended to 60 years, if all fixings and fully exposed beads, trims, and profiles are specified as austenitic stainless steel, the System is subject to a suitable inspection regime and is maintained accordingly (see section 2.1.8).

CE marking - the product manufacturers have taken responsibility for CE marking of the products used in the System in accordance with all relevant harmonised European Product Standards. An asterisk (*) appearing in this Agrément indicates that data shown is given in the product manufacturer's Declaration of Performance (DoP).

CONTENTS

Chapter 1 - General considerations

- 1.1 - Conditions of use
- 1.2 - Initial Factory Production Control (FPC)
- 1.3 - Quality Management System (QMS)
- 1.4 - Annual verification procedure - continuous surveillance

Chapter 2 - Technical assessment

- 2.1 - Points of attention to the Specifier
- 2.2 - Examples of details
- 2.3 - Installation
- 2.4 - Independently assessed System characteristics
- 2.5 - System components and ancillary items

Chapter 3 - CDM, national Building Regulations and Third-Party Acceptance

- 3.1 - The Construction (Design and Management) Regulations 2015 and The Construction (Design and Management) Regulations (Northern Ireland) 2016
- 3.2 - National Building Regulations
- 3.3 - Third-Party Acceptance

Chapter 4 - Sources

Chapter 5 - Amendment history

CHAPTER 1 - GENERAL CONSIDERATIONS

1.1 - CONDITIONS OF USE

1.1.1 Design considerations

See section 2.1.

1.1.2 Application

The assessment of the System relates to its use in accordance with this Agrément and the Agrément holder's requirements.

1.1.3 Assessment

Kiwa Ltd. has assessed the System in combination with relevant DoPs, test reports, technical literature and factory and site visits. Also, the NHBC Standards have been taken into consideration. Factory Production Control has been assessed.

1.1.4 Installation supervision

It is recommended that the quality of installation and workmanship is controlled by the Agrément holder.

1.1.5 Geographical scope

The validity of this document is limited to England, Wales, Scotland and Northern Ireland, with due regard to chapter 3 of this Agrément (CDM, national Building Regulations and Third-Party Acceptance).

1.1.6 Validity

The purpose of this BDA Agrément® is to provide for well-founded confidence to apply the System within the Scope described. The validity of this Agrément is three years after the issue date, and as published on www.kiwa.co.uk/bda. After this, the validity of the Agrément can be extended every three years after a positive review.

1.2 - INITIAL FACTORY PRODUCTION CONTROL (FPC)

- Kiwa Ltd. has determined that the Agrément holder has fulfilled all the provisions of the specifications described in this Agrément in respect of the System.
- The initial FPC audit demonstrated that the Agrément holder has a satisfactory Quality Management System (QMS) and is committed to continuously improving their FPC operations.
- A detailed Production Quality Specification (PQS) has been compiled to ensure traceability and compliance under the terms of this Agrément.

1.3 - QUALITY MANAGEMENT SYSTEM (QMS)

- The Agrément holder:
 - has an effective and well maintained QMS in operation which covers the necessary clauses required for BDA Agrément®.
 - is committed to continually improving their FPC, QMS and associated procedures.
- Document control and production line procedures were deemed satisfactory, with enough evidence provided in support of BDA Agrément® requirements.

1.4 - ANNUAL VERIFICATION PROCEDURE - CONTINUOUS SURVEILLANCE

To demonstrate that the FPC is in conformity with the requirements of the technical specification described in this Agrément, the continuous surveillance, assessment and approval of the FPC will be done at a frequency of not less than once per year by Kiwa Ltd.

This Agrément does not constitute a design guide for the System. It is intended as an assessment of safety and fitness for purpose only.

2.1 - POINTS OF ATTENTION TO THE SPECIFIER

2.1.1 Design responsibility

A Specifier may not undertake a project-specific design; the Specifier shall co-operate closely with the Agrément holder to agree a project-specific design. The Agrément holder retains full design responsibility unless the design is subsequently modified by others.

2.1.2 Applied building physics (heat, air, moisture)

The physical behaviour of walls incorporating the System shall be verified as suitable by a competent specialist, who can be either a qualified employee of the Agrément holder or a qualified consultant. The Specialist will check the physical behaviour of the external wall design and, if necessary, can offer advice in respect of improvements to achieve the final specification. It is recommended that the Specialist co-operates closely with the Agrément holder.

2.1.3 General design considerations

A project-specific design is required. This shall be done in close co-operation with the Agrément holder.

This Agrément covers the use of the System in any exposure zone, in accordance with BS 8104.

The System should be installed above damp-proof course (DPC) level and a minimum of 150 mm above ground level.

Internal wet work (e.g. screed or plastering) should be completed and allowed to dry prior to the application of the System.

Assessment of the structural performance of the System should be carried out by the Agrément holder to confirm that the System can resist the design impact and wind loads, can safely transfer loads to the building and can accommodate all anticipated thermal movements without damage.

The sheathing board in the LGSF supporting wall must be a minimum of 9 mm thick.

Sheathing boards must be weather resistance category A or B and bending strength class 2 or 3, in accordance with BS EN 12467. The boards must be classified as European Classification A1, in accordance with BS EN 13501-1.

New buildings should incorporate suitably deep window cills to adequately shed water clear of the System.

Rendered walls shall be detailed to reduce the risk of damage due to movement in the sheathed LGSF supporting wall, taking into consideration differential movement in dissimilar materials.

Where required, properly constructed movement joints (designed to cater for the calculated degree of movement to control expansion, contraction and cracking without reducing the stability and weathertightness of the wall) should be carried through the System using movement beads of PVC, powder coated galvanised steel or stainless steel.

Examples of relevant detailing for external cladding systems with a drainage cavity used with LGSF can be found in SCI Publication P343.

The service-life durability of the System can be extended to 60 years by using mechanical fixings and fully exposed beads, trims and profiles made of austenitic stainless steel.

2.1.4 Project-specific design considerations

The Agrément holder must ensure that the following considerations are included in the development of a project-specific design:

- thermal transmittance (hereinafter 'U-value') requirements;
- thermal expansion effects of the supporting wall and the System;
- likely local impact resistance;
- pull-through of fixings;
- pull-out of fixings;
- effect of wind actions on the System.

The number of fixings per m² required through the System reinforcing mesh (and MW insulation) is a variable design value and must be equal to or greater than that needed to achieve the required project-specific design wind load.

The System has been tested in accordance with CWCT Standard Test Methods for Building Envelopes and achieved ± 2400 Pascals for serviceability and ± 3600 Pascals for safety (with a ratio of insulation fixings equivalent to 6.25 per m² in a grid pattern of 400 mm by 400 mm).

In terms of pull-through and pull-out of fixings, the Agrément holder recommends the following use of fixings for the typical design wind loads anticipated:

Design wind load (kN/m ²)	Fixing type	Number of fixings				
		Vertical c/c (mm)	Horizontal c/c (mm)	Number per m ²	Fixing pull-out (kN/m ²)	Fixing pull-through (kN/m ²)
1.0	Fixing of fillet to sheathing board ^{1,2}	300	600	5.55	1.94	2.55
	Fixing of CS2 sheathing board through fillets to primary sheathing board ^{1,2}	300	600	5.55	1.94	2.55
	Insulation fixing to sheathing board ^{3,4}	400	400	6.25	2.63	1.33

Design wind load (kN/m ²)	Fixing type	Number of fixings				
		Vertical c/c (mm)	Horizontal c/c (mm)	Number per m ²	Fixing pull-out (kN/m ²)	Fixing pull-through (kN/m ²)
1.25	Fixing of fillet to sheathing board ^{1,2}	300	600	5.55	1.94	2.55
	Fixing of CS2 sheathing board through fillets to primary sheathing board ^{1,2}	300	600	5.55	1.94	2.55
	Insulation fixing to sheathing board ^{3,4}	400	400	6.25	2.63	1.33
1.5	Fixing of fillet to sheathing board ^{1,2}	300	600	5.55	1.94	2.55
	Fixing of CS2 sheathing board through fillets to primary sheathing board ^{1,2}	300	600	5.55	1.94	2.55
	Insulation fixing to sheathing board ^{3,4}	375	375	7.10	2.63	1.50
1.75	Fixing of fillet to sheathing board ^{1,2}	300	600	5.55	1.94	2.55
	Fixing of CS2 sheathing board through fillets to primary sheathing board ^{1,2}	300	600	5.55	1.94	2.55
	Insulation fixing to sheathing board ^{3,4}	345	345	8.40	2.63	1.78
2.0	Fixing of fillet to sheathing board ^{1,2}	275	600	6.05	2.12	2.55
	Fixing of CS2 sheathing board through fillets to primary sheathing board ^{1,2}	275	600	6.05	2.12	2.55
	Insulation fixing to sheathing board ^{3,4}	320	320	9.80	2.63	2.08
2.25	Fixing of fillet to sheathing board ^{1,2}	250	600	6.64	2.32	2.55
	Fixing of CS2 sheathing board through fillets to primary sheathing board ^{1,2}	250	600	6.64	2.32	2.55
	Insulation fixing to sheathing board ^{3,4}	305	305	10.70	2.63	2.27

¹ Ejot TBF 4.8 mm screw achieving an average pull-out resistance of 0.7 kN. Safety factor of 2 is applied.

² Ejot declared result of 1.16 kN using Ejot TBF 4.8 mm screw. Safety factor of 2.5 is applied.

³ Typical value of 0.7 kN is assumed. Result is multiplied by 0.6 in line with EOTA TR 051.

⁴ Rockwool declared value of 0.53 kN based on a 60 mm diameter washer with a plate stiffness of 0.6. Safety factor of 2.5 is applied.

A project-specific condensation risk analysis shall be carried out in accordance with BS 5250 Annex D to minimise the risk of surface and interstitial condensation.

The project-specific design should include detailing around openings, penetrations and movement joints to minimise the risk of wind-driven rainwater ingress in accordance with BS 6093.

Horizontal and vertical movement joints must be part of the project-specific design and must be carried through the System using movement beads of plastic, galvanised or austenitic stainless steel as appropriate.

A site assessment check and suitability survey must be conducted prior to installation, to the Agrément holder's specification.

During the assessment and survey, fixing pull-out strength (kN) tests must be conducted on the supporting wall surface in accordance with EOTA TR 051 and EAD 330196-01-0604. The results of the assessment and survey assist the Agrément holder in determining the type, size and minimum number of fixings required for each MW insulation slab. When using pull-out data for fixings, the material safety factor γ_m must be considered.

2.1.5 Permitted applications

Only applications designed according to the specifications as given in this Agrément are allowed under this Agrément, and in each case the Specifier will have to co-operate closely with the Agrément holder.

2.1.6 Installer competence level

The Agrément holder operates an Approved Installer Scheme for this System, under which the installers are approved, registered and regularly reviewed by the Agrément holder to demonstrate that they are competent to carry out installations of the System in accordance with this Agrément. Approved Installers are fully responsible for their quality control for each installation of the System that they undertake.

2.1.7 Delivery, storage and site handling

The System components are delivered to site in a mixture of packets, boxes, bales and tubs, palletised and wrapped in plastic, as necessary.

Materials and products shall be protected and stored in a satisfactory manner to prevent damage, distortion, uneven weathering and degradation.

Components should be handled with care to avoid damage and should be kept in dry, frost-free conditions, stored off the floor in ventilated areas, and should not be exposed to direct sunlight for prolonged periods.

Beads, trims and other profiles are supplied in varying lengths and must be stored flat to prevent buckling. To avoid bi-metallic corrosion, aluminium, galvanised steel or austenitic stainless steel components should not be stored together. Do not use damaged, soiled or saturated System components.

The System packaging bears the System name, the Agrément holder's name and the BDA Agrément® logo incorporating the number of this Agrément.

2.1.8 Durability

The System is comprised of durable materials and products that are adequately resistant to deterioration and wear in normal service conditions. There is no mould risk to any component in the System.

The System is stable to pulsating load, temperature variation, humidity, shrinkage and/or swelling, freeze-thaw cycles, immersion in water, chemical and biological attacks, corrosion and UV radiation.

All components retain their properties during the overall service life of the System under normal conditions of use and maintenance.

The service-life durability of the System will depend on the building location and height, degree of exposure, detailing, use of the building and maintenance and repairs being carried out. If there is regular inspection, maintenance and any defects are promptly repaired in accordance with the Agrément holder's recommendations, the System will have a working service-life durability of at least 30 years.

The System's service-life durability can be extended to 60 years by using mechanical fixings and fully exposed beads, trims and profiles made of austenitic stainless steel. Components manufactured from uPVC in sheltered locations and not subject to direct UV light exposure do not need substituting with austenitic stainless steel materials.

The render finish contains a safe level of anti-fungicide to resist the growth of most fungi and algae found in the UK. It has a high resistance to dirt retention, rot and is non-swelling and UV-stable.

The render finish is compatible with the MW insulation and minimises the risk of de-bonding, cracking and crazing.

2.1.9 Maintenance and repair

The project-specific design must incorporate appropriate access arrangements for cleaning, inspection, maintenance and repair.

The maintenance schedule for the installed System must include regular visual inspection of the System for:

- signs of damaged areas and cracks in the render exceeding 0.2 mm;
- sealant around openings and service entry points;
- external plumbing and fittings, gutter and drainpipes to confirm that they are performing properly.

The render finish may become discoloured by algae and lichens in wet areas. Cleaning with fresh warm water and light brushing will mitigate this. A mild detergent or traffic film remover can be applied and washed off. Any surface algae can be cleaned off using an algicide.

Any damage should be repaired immediately in accordance with BS EN 13914-1 and the Agrément holder's Maintenance and Repair Manual.

Replace failed elements such as sealants, joint seals and corroded materials to ensure that water ingress does not occur.

Where required, a project-specific 60-year service-life durability maintenance plan must be prepared. As a minimum, this should include an inspection for evidence of defects twelve months after the original installation and subsequently every five years.

2.1.10 Performance factors in relation to the Major Points of Assessment

Thermal performance

The System can assist in reducing the U-value of external walls. It is essential that detailing is carried out to a high standard if the ingress of water into the MW insulation is to be avoided and the full thermal benefit is to be obtained from the installation of the System. Any moisture penetration will affect thermal conductivity, but the thermal value will recover when the MW insulation dries out. The System is designed to minimise moisture penetration to the MW insulation layer.

Care must be taken in the overall design and construction of junctions with other elements and openings, to minimise cold bridging and air infiltration. Due consideration should be given to the Government Accredited Construction Details.

Guidance on linear thermal transmittance, heat flows and surface temperatures can be found in the documents supporting the national Building Regulations and BS EN ISO 10211, BRE Information Paper IP1/06, BRE Report 262, BRE Report 497 and PAS 2030.

The requirement for limiting heat loss through the building fabric, including the effect of thermal bridging, can be satisfied if the U-value of the wall incorporating the System does not exceed the maximum and target U-values given in the national Building Regulations.

The U-value of a completed wall construction will depend on the MW insulation thickness, degree of ventilation to the drained cavity, fixing method, type of fixing and the insulating value of the supporting wall and its internal finish.

For U-value calculations and to determine if the requirements of national Building Regulations are met, the thermal resistance and U-value of the walls incorporating the System should be calculated according to BS EN ISO 10211 (taking into consideration BS EN ISO 6946, BS EN ISO 10456 and BRE Report 443), using the declared thermal conductivity (λ_D) of the MW insulation.

Strength

The sheathed LGSF supporting wall must have sufficient strength to withstand all wind, dead and imposed loads applied to and from the System, including any temporary loads that could be applied during installation. The strength of the LGSF supporting wall must be verified by a suitably qualified engineer.

Wind loads must be calculated for each project-specific design in accordance with BS EN 1991-1-4. The CS2 fillet strip layout and fixing pattern must be designed accordingly.

CS2 fillet strips must be fixed into the existing LGSF supporting wall and must achieve a minimum pull-out strength resistance of 0.7 kN.

For wind loads $> 1.5 \text{ kN/m}^2$, extra fixings may be required.

Positive wind load is transferred to the LGSF supporting wall directly via compression of the finished MW insulation and sheathing boards. Negative wind load is resisted by the mechanical fixings through the reinforcing mesh, sheathing boards and CS2 fillet strips and the bond between the basecoat and the render finish.

High-impact (armour) mesh must be part of the design for wall areas that may be subject to a high risk of impact, e.g. wall zones adjacent to pedestrian areas.

The basecoat has a high level of adhesion strength.

High-impact (armour) mesh (minimum 370 g/m²) has a higher impact resistance than high-performance (standard) mesh (minimum 160 g/m²).

Moisture control

The System design must be suitably detailed to resist the penetration of water and wind and must allow water vapour to pass outwards from the core of the building.

Hygrothermal performance:

- the System has adequate hygrothermal resistance to heat-rain and freeze-thaw cycling, in accordance with ETAG 034, ETAG 004 and BS EN 16383;
- the System has adequate resistance to moisture and humidity changes, in accordance with ETAG 004.

Condensation risk:

- external walls incorporating the System can adequately limit the risk of surface and interstitial condensation when designed in accordance with BS 5250 Annex D and BRE Report 262.

Surface condensation:

- the System can adequately limit the risk of surface condensation on internal walls when the U-value of the wall does not exceed the maximum values given in the national Building Regulations.

Interstitial condensation:

- the 'dew' point position of a project-specific design must be calculated to check that warm vapour transmitting through the supporting wall, from an internal space, will continue to pass through to the outer surface of the external wall;
- to avoid possible problems from interstitial condensation in walls, care must be taken in the design of rooms expected to have high humidity.

Water vapour transmission:

- the System is classed as breathable and allows the passage of water vapour to the outside. The LGSF should be suitably designed with vapour control layers (VCLs) and breather membranes to suit the building use.

Weathertightness:

- the System can improve the weather resistance of existing external sheathed LGSF supporting walls;
- the System has adequate resistance to driving rain under pulsating air pressure, in accordance with BS EN 12865 and BS EN 1027. Any moisture entering the System through poor detailing, inadequate seals or defective details will collect in the cavity behind and be removed by natural gravity drainage and ventilation.

Moisture penetration:

- the sheathing boards and basecoat have a high resistance to water absorption if wetted. The System finish layer is water repellent;
- the System has a low propensity for water absorption by capillary action after hygrothermal conditioning, in accordance with ETAG 004.

The insulation base track shall have a minimum open area of 600 mm² per linear metre run of wall, to allow any residual trapped moisture from construction to escape. The openings in the insulation base track shall be small enough to prevent the ingress of birds, animals or small insects and must be kept free of obstructions.

The cavity rail (the L-shaped profile at the bottom of the cavity between the two sheathing boards) shall have a minimum open area of 600 mm² per linear metre run of wall to allow effective drainage.

Behaviour in relation to fire

Cavity fire barriers must be installed in line with compartment walls and floors, as advised in BRE Report 135 and as required under the national Building Regulations. Materials used for cavity barriers and firestops shall be capable of producing adequate resistance to fire and smoke. Intumescent strips must be applied behind each fire barrier.

The System must include a minimum of one stainless steel fixing (to the Agrément holder's specification) per m² of MW insulation, or per insulation batt, whichever is the greater, fixed through the reinforcing mesh and MW insulation, in addition to the other MW insulation fasteners normally specified.

The System is classified as European Classification A2-s1,d0, in accordance with BS EN 13501-1.

2.2 - EXAMPLES OF DETAILS

Figure 1 - Fixing pattern utilised in CWCT testing - mechanical fixings through mesh (grid pattern of 400 mm by 400 mm)

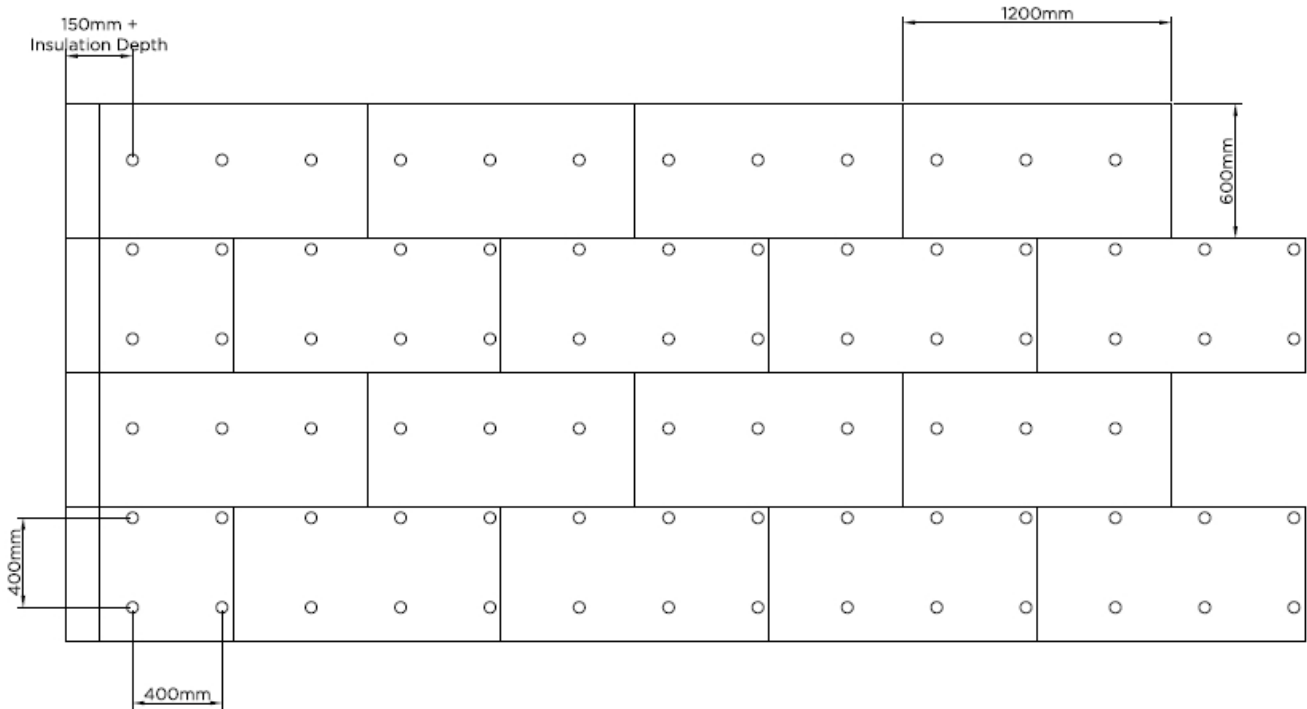


Figure 2 - External corner detail

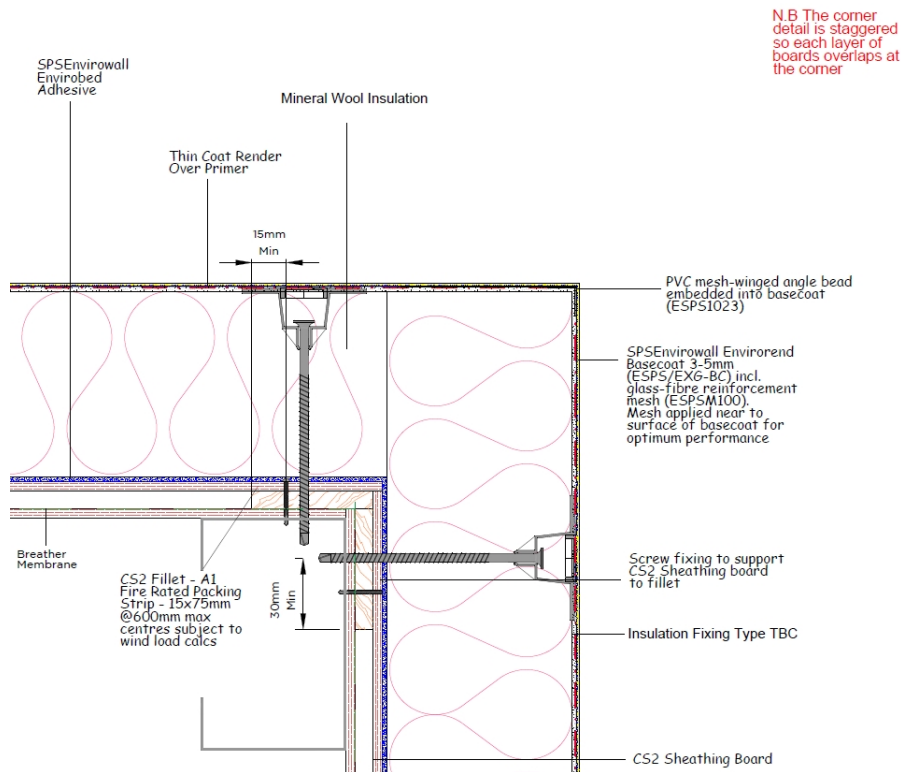


Figure 3 - Vertical fire barrier detail

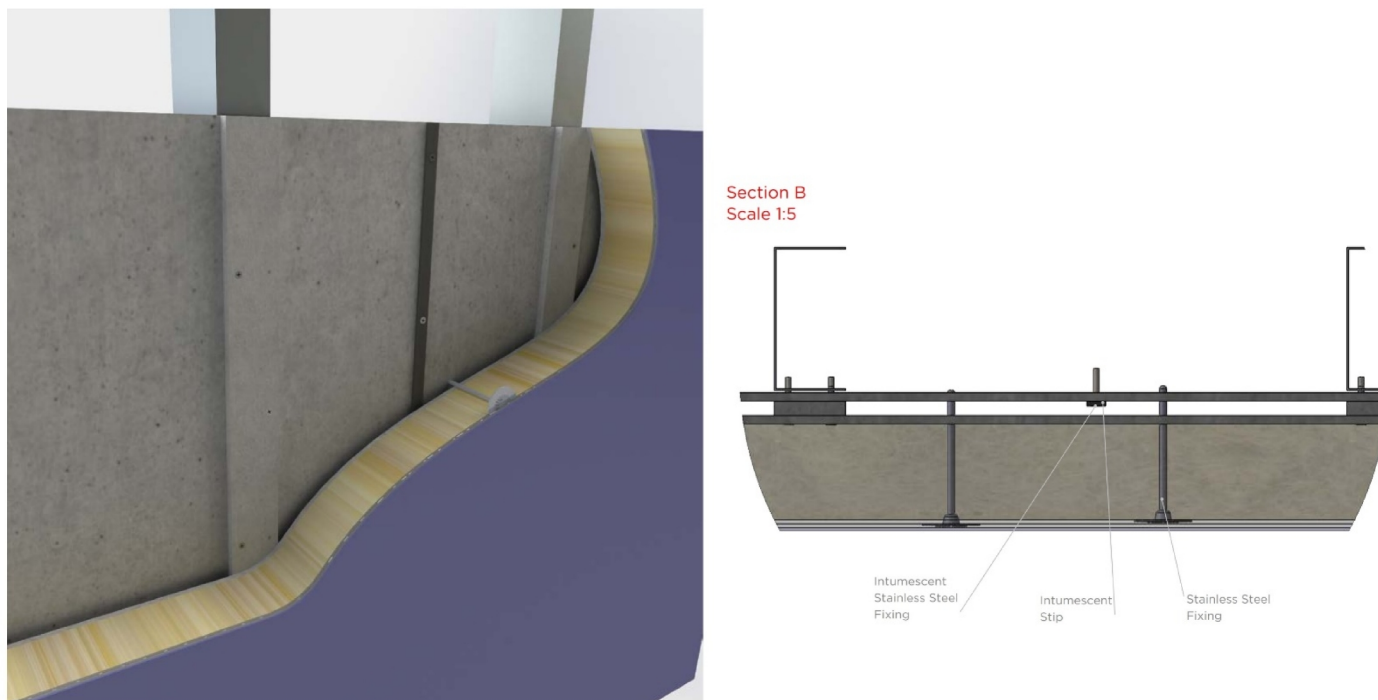


Figure 4 - Window reveal detail

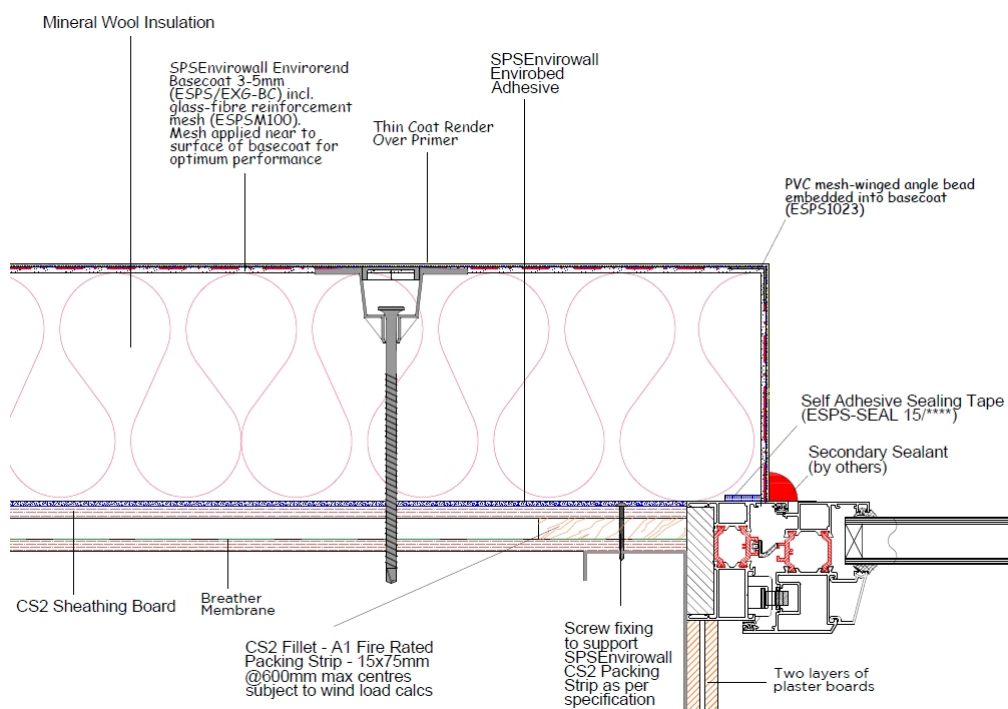


Figure 5 - Horizontal fire barrier detail

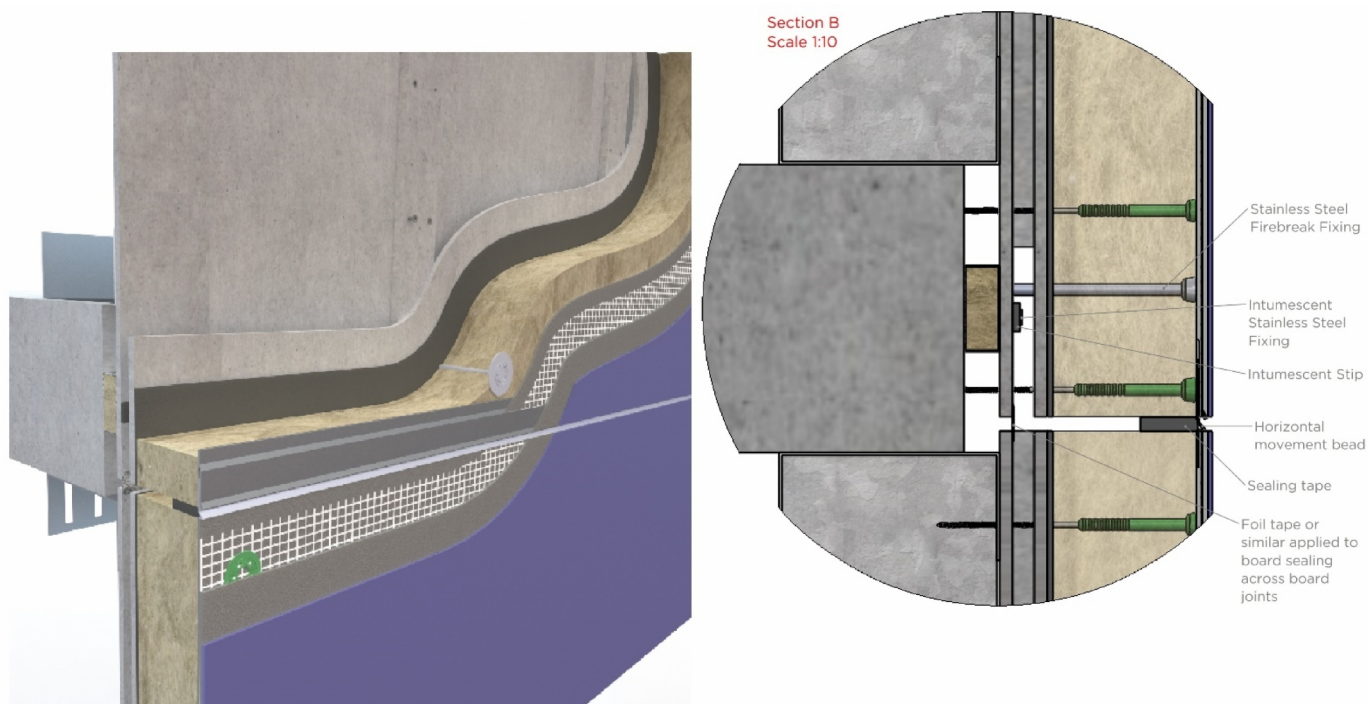


Figure 6 - Window head detail

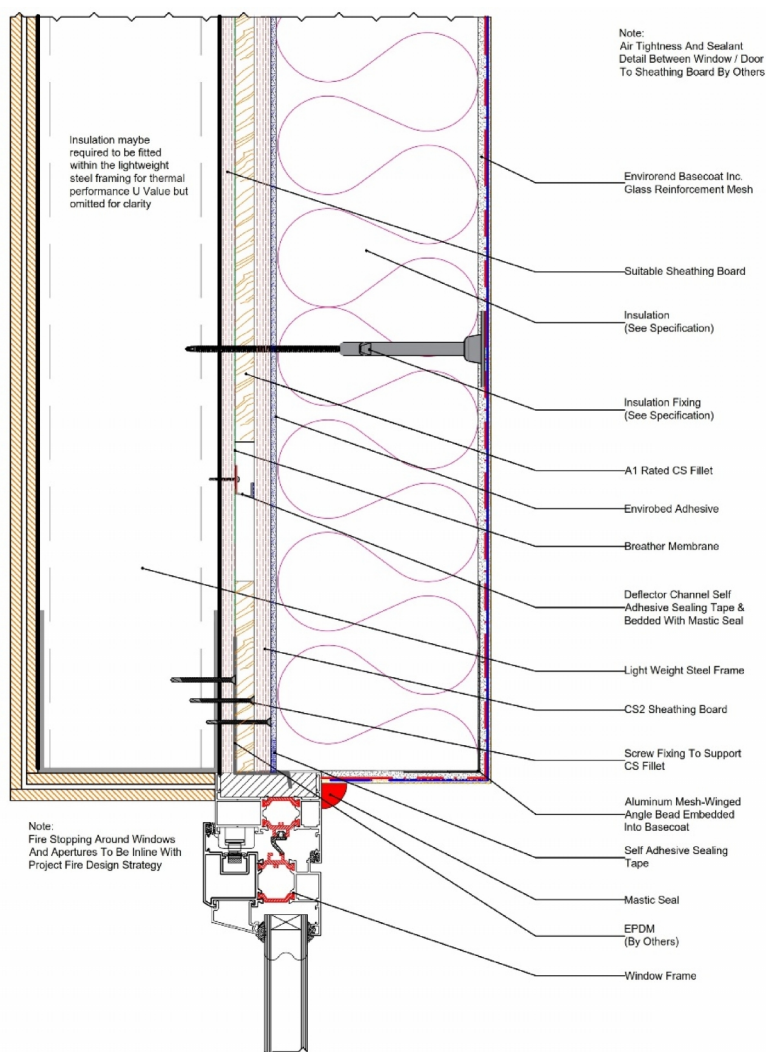


Figure 7 - Horizontal movement joint detail

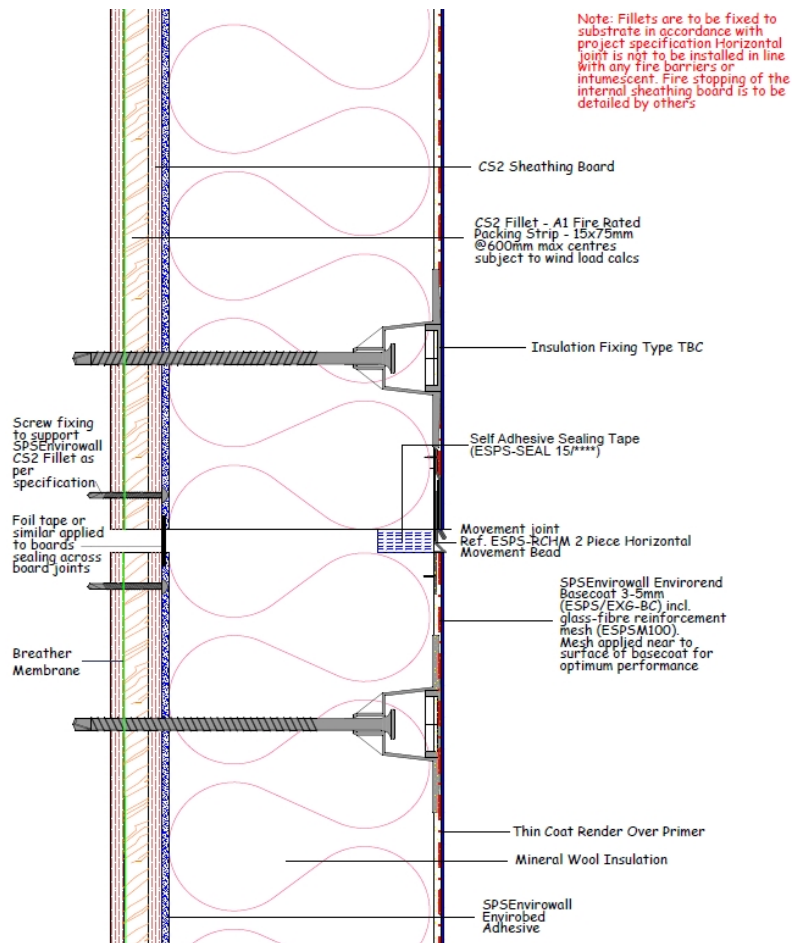


Figure 8 - Window cill detail

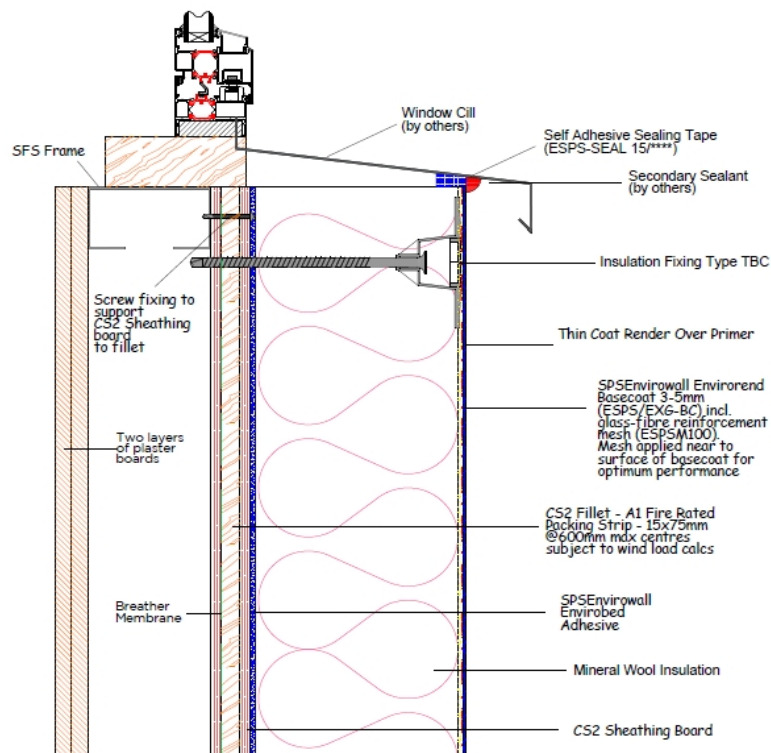
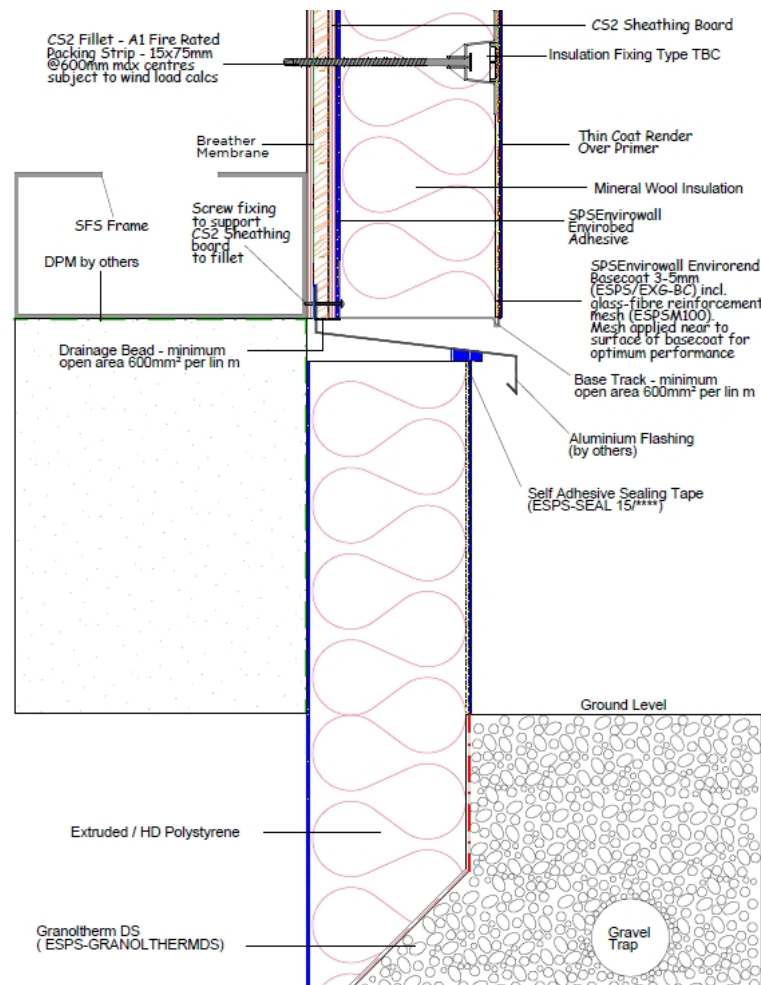


Figure 9 - Base bead below ground detail



2.3 - INSTALLATION

2.3.1 Installer competence level

The System must be installed strictly in accordance with the instructions of the Agrément holder and the requirements of this Agrément. See section 2.1.6.

2.3.2 Delivery, storage and site handling

See section 2.1.7

2.3.3 General

Project-specific design drawings are supplied by the Agrément holder.

The basecoat must not be applied if the temperature will fall below 0 °C within 72 hours of completion of application.

Weather conditions should be monitored to allow the correct finishing application and curing conditions. Do not apply the render if any of the following conditions are likely to arise during application or shortly following application:

- rain, frost, fog or mist;
- a saturated or frost-bound base;
- if the basecoat surface or air temperature is < 5 °C or > 30 °C.

Care must be taken to securely fix all beads, trims and profiles plumb, square and true to line and level. The longest possible lengths of material should be used.

Where possible, application on individual wall surfaces should be completed in one operation, without breaks. If breaks cannot be avoided, they should be terminated where services or architectural features such as drainpipes, reveals or lines of doors and windows offer natural stop lines.

For whole elevations or long, uninterrupted runs, render should be applied from the same batch to ensure colour consistency. Subsequent deliveries of material should be mixed with any residual original material to avoid obvious colour differences.

2.3.4 Preparation

Prior to commencement of work the supporting wall must be finished and free from protrusions and uneven jointing.

The flatness of substrate surfaces must be checked using a straight-edge tool spanning the storey height. Irregularities greater than 10 mm in a 1 m² area must be made good or packed out prior to installation of the CS2 fillet strips to ensure that the sheathing boards that are the finished face of the LGSF supporting wall are installed with a smooth, in-plane, finished surface. Packers can be used to ensure the CS2 fillet strips are set out correctly. Longer fixings may be required in areas that have been levelled, to ensure the correct embedment depth is achieved.

2.3.5 Outline procedure

The detailed System installation sequence can be found in full in the Agrément holder's Technical Installation Manual.

The outline installation procedure is common to both 30 and 60-year service-life durability System specifications.

EnviroSil top coat (option 1)

The render should be stirred, and a small amount of water may be added (to a maximum of 2 % by volume) if required.

Apply onto the primer coat with a stainless steel smoothing trowel and float to a thickness of 1.0 to 3.0 mm (thickness determined by grain size). Rub with a plastic float in a circular motion to create the required finish within 5 to 15 minutes after application.

A straight edge can be used to help ensure a flat surface, and wet sponges, wooden boards or similar tools can be used to create the desired textured finish.

Wipe clean all exposed nosing, cills etc.

EnviroMin top coat (option 2)

The render is mixed with between 6.5 to 7.0 litres of cold water.

Apply onto the base coat with a stainless steel smoothing trowel and float to a thickness of 1.0 to 3.0 mm (thickness determined by grain size). Rub with a plastic float in a circular motion to create the required finish within 5 to 15 minutes after application.

A straight edge can be used to help ensure a flat surface, and wet sponges, wooden boards or similar tools can be used to create the desired textured finish.

Wipe clean all exposed nosing, cills etc.

Completion

Apply APU bead or flexible silicone sealant around windows, window cills and door frames, and where the installation abuts any other building or surface to ensure a weathertight joint.

2.4 - INDEPENDENTLY ASSESSED SYSTEM CHARACTERISTICS

2.4.1 Thermal insulation

The MW insulation has a declared thermal conductivity (λ_D) to BS EN 12667 - 0.036 W/mK*.

2.4.2 Hygrothermal behaviour conditioning test (accelerated weathering)

A wall incorporating the System was sealed into a hygrothermal chamber for testing to ETAG 004, ETAG 034 and Draft BS EN 16383. The System exhibited no degradation/defects after 80 cycles of heat-rain and 5 cycles of freeze-thaw and no failures in performance.

2.4.3 Structural loading

The System has been tested in accordance with CWCT Standard Test Methods for Building Envelopes and achieved ± 2400 Pascals for serviceability and ± 3600 Pascals for safety (with a ratio of insulation fixings equivalent to 6.25 per m² in a grid pattern of 400 mm by 400 mm).

2.4.4 Impact resistance

- hard-body impact resistance tests to ISO 7892, in accordance with ETAG 004, allow the System to be classified as Category II;
- soft-body impact resistance tests to ISO 7892 in accordance with ETAG 004 showed no damage at 300 J impact energy.

2.4.5 Resistance to precipitation including wind-driven rain

A hygrothermal conditioning test (30-year weathering and UV) and wind-driven rain test to ETAG 004, ETAG 034 and BS EN 16383 on the installed System both indicate the suitability of the System in any exposure zone to BS 8104.

2.4.6 Water absorption

Water absorption capillarity to ETAG 004 - < 0.5 kg/m² after 24 hours - pass.

2.4.7 Water vapour transmission resistance

- water vapour resistance to BS EN ISO 7783 - 1.41 MNs/g for EnviroSil finish (option 1) or 2.73 MNs/g for EnviroMin finish (option 2);
- water vapour diffusion of air (m) to BS EN ISO 7783 - 0.28 m (of air) for EnviroSil finish (option 1) or 0.54 m (of air) for EnviroMin finish (option 2).

2.4.3 Behaviour in relation to fire

The full System make-up (MW insulation with render finishes) has been classified as European Classification A2-s1,d0, in accordance with BS EN 13501-1.

2.5.1 System components included within the scope of this Agrément

The following components are integral to the System:

Component		Description	Dimensions
Packers	Horseshoe packers	Polypropylene packers inserted behind CS2 fillet strips to create a variable cavity	1, 2, 3, 5, 8, 10, 15, 30 mm
Fillet strips	Supporting vertical CS2 fillet strips	Calcium silicate or fibre cement board with weather resistance category A, B and bending strength class 2, 3 to BS EN 12467 plus A1 fire classification to BS EN 13501-1	15 mm thick, 2400 mm long, minimum 75 mm wide
	Mechanical fixings for CS2 fillet strips	Ejot TBF wing tip fixings Evolution WHX self-drilling, self-tapping screws	
Sheathing boards	CS2 secondary sheathing boards	Calcium silicate or fibre cement board with weather resistance category A, B and bending strength class 2, 3 to BS EN 12467 plus A1 fire classification to BS EN 13501-1	Minimum 9 mm thick, 2400 mm long, 1200 mm wide; horizontal movement joints sealed with foil tape and expanding sealing tape
	Mechanical fixings for CS2 sheathing boards	Ejot TBF wing tip fixings Evolution WHX self-drilling, self-tapping screws	
MW insulation	Rockwool DD insulation	Minimum 105 kg/m ³ average density to BS EN 13162, λ_D 0.036 W/mK*	Minimum 50 mm thick, 1.2 m long, 0.6 m wide
	Knauf Mono Density insulation		
	Mechanical fixings for MW insulation	Fischer FABS 31 self-drilling, self-tapping metal screws with Fischer Termofix H washers Ejot TKR screws	85 to 200 mm long by 5.8 mm diameter screws with 60 mm diameter head by 10 to 150 mm deep tube washer 35 to 300 mm long by 4.8 mm diameter
Fire barrier	Fire barrier fixings	Rawlplug UCF stainless steel screws	80 to 350 mm long, 6.0 or 8.0 mm diameter
		Ejot TKE stainless steel screws	50 to 200 mm long by 4.8 mm diameter
Mesh	High-impact mesh (minimum 370 g/m ²)	Alkali-resistant, plastic-coated, glass-fibre reinforcing mesh	50 m by 1 m rolls, 4 mm by 4 mm grid size
	High-performance mesh (minimum 160 g/m ²)		
Mortar	Basecoat mortar (EnviroRend)	Polymer-modified cement base coat to DIN 18557	Applied in one or two layers, 3 to 5 mm final thickness
Top coat render finish	Option 1 - EnviroSil Silicone primer and finish	Resin-based emulsion primer (vapour permeable and colour matched to the top coat) with thin-coat granular textured flexible render	Primer applied in one thin coat application, finish applied to a minimum 1.0 mm thickness
	Option 2 - EnviroMin Mineral finish	Thin-coat mineral based textured flexible render	Available in a range of grain sizes and colours

2.5.2 Ancillary items

Ancillary items detailed in this section may be used in conjunction with the System but fall outside the scope of this Agrément:

- deflector channel - uPVC, to prevent rainwater build-up over openings and deflect rainwater into the cavity behind the CS2 sheathing boards;
- drainage bead - metal with drainage slots, at bottom of the cavity between the sheathing boards;
- insulation base track and connection clip - aluminium base rail profiles with drainage/ventilation holes, insect mesh and fixings;
- stop bead with mesh - uPVC, aluminium, galvanised steel or austenitic stainless steel 2.5 m long, including connectors and fixings;
- corner bead with mesh - plastic, steel or aluminium with uPVC mesh; 2.5 m long, including connectors and fixings;
- beads, trims and profiles - uPVC, aluminium, galvanised steel or austenitic stainless steel, with mesh as appropriate, and including connectors and fixings;
- powder-coated aluminium flashings - aluminium, for detailing cills and copings;
- sealing tape - 3 to 5 mm thick tape, to seal joints with copings, cill flashings and underside of window cills as required;
- expansion movement joints - aluminium, steel or uPVC and fixings at party wall junctions and existing horizontal expansion joints within the structure;
- APU bead profile with mesh - 6 mm wide, 2.4 m long, for window, door and aperture frame sealing;
- insect mesh - plastic, with 4 mm drainage holes for fixing with the base beads;
- intumescent strip - 1.0 and 2.5 m long, fixed behind each fire barrier using stainless steel, self-drilling, self-tapping screws;
- foam filler - polyurethane foam in spray can.

CHAPTER 3 - CDM, NATIONAL BUILDING REGULATIONS AND THIRD-PARTY ACCEPTANCE

3.1 - THE CONSTRUCTION (DESIGN AND MANAGEMENT) REGULATIONS 2015 AND THE CONSTRUCTION (DESIGN AND MANAGEMENT) REGULATIONS (NORTHERN IRELAND) 2016

Information in this Agrément may assist the client, Principal Designer/CDM co-ordinator, designer and contractors to address their obligations under these Regulations.

3.2 - NATIONAL BUILDING REGULATIONS

In the opinion of Kiwa Ltd., the System, if installed and used in accordance with Chapter 2 of this Agrément, can satisfy or contribute to satisfying the relevant requirements of the following national Building Regulations.

3.2.1 - ENGLAND REQUIREMENTS: THE BUILDING REGULATIONS 2010 AND SUBSEQUENT AMENDMENTS

- A1(1)(2) Loading - the System can sustain and transmit combined dead, imposed and wind loads to the ground via the supporting structure
- B4(1) External fire spread - the System can adequately resist the spread of fire over walls and from one building to another
- C2(b) Resistance to moisture - the System can adequately protect the building from precipitation, including wind-driven spray
- C2(c) Resistance to moisture - the System can adequately protect the building from interstitial and surface condensation
- L1A(a)(b) Conservation of fuel and power in new dwellings - the System can contribute to limiting heat gains and losses through walls
- Regulation 7(1) Materials and workmanship - the System is manufactured from suitably safe and durable materials for their application, and can be installed to give a satisfactory performance
- Regulation 26 CO₂ emission rates for new buildings - the System can contribute to satisfying this Requirement
- Regulation 26A Fabric energy efficiency rates - the System can contribute to satisfying this Requirement

3.2.2 - WALES REQUIREMENTS: THE BUILDING REGULATIONS 2010 AND SUBSEQUENT AMENDMENTS

- A1(1)(2) Loading - the System can sustain and transmit combined dead, imposed and wind loads to the ground via the supporting structure
- B4(1) External fire spread - the System can adequately resist the spread of fire over walls and from one building to another
- C2(b) Resistance to moisture - the System can adequately protect the building from precipitation, including wind-driven spray
- C2(c) Resistance to moisture - the System can adequately protect the building from interstitial and surface condensation
- L1A(a)(b) Conservation of fuel and power in new dwellings - the System can contribute to limiting heat gains and losses through walls
- Regulation 7(1) Materials and workmanship - the System is manufactured from suitably safe and durable materials for their application, and can be installed to give a satisfactory performance
- Regulation 26 CO₂ emission rates for new buildings - the System can contribute to satisfying this Requirement
- Regulation 26A Primary energy consumption rates for new buildings - the System can contribute to satisfying this Regulation
- Regulation 26B Fabric performance values for new dwellings - the System can contribute to satisfying this Requirement

3.2.3 - SCOTLAND REQUIREMENTS: THE BUILDING (SCOTLAND) REGULATIONS 2004 AND SUBSEQUENT AMENDMENTS

3.2.3.1 Regulations 8 (1)(2) Durability, workmanship and fitness of materials

- The System is manufactured from acceptable materials and is adequately resistant to deterioration and wear under normal service conditions, provided it is installed in accordance with the requirements of this Agrément

3.2.3.2 Regulation 9 Building Standards - Construction

- 1.1(a)(b) Structure - the System can sustain and transmit combined dead, imposed and wind loads to the ground via the supporting structure
- 2.6 Spread to neighbouring buildings - the System can inhibit the spread of fire to neighbouring buildings
- 2.7 Spread on external walls - the System can inhibit the spread of fire on external walls
- 2.8 Spread from neighbouring buildings - the System can inhibit the spread of fire to the building
- 3.10 Precipitation - the System can resist precipitation penetrating to the inner face of the building
- 3.15 Condensation - the System can be designed and constructed to inhibit surface or interstitial condensation
- 6.1(b) Carbon dioxide emissions - the System can contribute to satisfying this Requirement
- 6.2 Buildings insulation envelope - the System can contribute to satisfying this Requirement
- 7.1(a)(b) Statement of sustainability - the System can contribute to meeting the relevant Requirements of Regulation 9, Standards 1 to 6 and therefore will contribute to a construction meeting a bronze level of sustainability as defined in this Standard

3.2.3.3 Regulation 12 Building standards - conversions

- All comments given under Regulation 9 also apply to this Regulation, with reference to Schedule 6 of The Building (Scotland) Regulations 2004 and subsequent amendments, clause 0.12 of the Technical Handbook (Domestic) and clause 0.12 of the Technical Handbook (Non-Domestic)

3.2.4 - NORTHERN IRELAND

REQUIREMENTS: THE BUILDING REGULATIONS (NORTHERN IRELAND) 2012 AND SUBSEQUENT AMENDMENTS

- 23(a)(i)(iii)(b) Fitness of materials and workmanship - the System is manufactured from materials which are suitably safe and acceptable as described in this Agrément
- 28(b) Resistance to moisture and weather - the System can be constructed to prevent the passage of moisture
- 29 Condensation - the System can be designed and constructed to prevent interstitial condensation
- 30(a) Stability - the System can sustain and transmit combined dead, imposed and wind loads to the ground via the supporting structure
- 36(a) External fire spread - the System can adequately resist the spread of fire over walls and from one building to another
- 39(a)(i) Conservation measures - the System can contribute to limiting heat gains and losses through walls
- 40(2) Target CO₂ emission rate - a wall incorporating the System shall be designed and constructed as not to exceed its target CO₂ emission rate
- 43 Renovation of thermal elements - the renovation work carried out to ensure the wall complies with requirement 39(a)(i)

3.3 - THIRD-PARTY ACCEPTANCE

NHBC - In the opinion of Kiwa Ltd., the System, if installed, used and maintained in accordance with this Agrément, can satisfy or contribute to satisfying the relevant requirements in relation to NHBC Standards, Chapter 6.9 Curtain walling and cladding and Chapter 6.11 Render.

CHAPTER 4 - SOURCES

- BS EN ISO 1716:2018 Reaction to fire tests for products. Determination of the gross heat of combustion (calorific value)
- BS EN ISO 6946:2017 Building components and building elements. Thermal resistance and thermal transmittance. Calculation methods
- BS EN ISO 7783:2018 Paints and varnishes. Determination of water-vapour transmission properties. Cup method
- BS EN ISO 10211:2017 Thermal bridges in building construction. Heat flows and surface temperatures. Detailed calculations
- BS EN ISO 10456:2007 Building materials and products. Hygrothermal properties. Tabulated design values and procedures for determining declared and design thermal values
- BS EN 1027:2016 Windows and doors. Water tightness. Test method
- BS EN 1990:2002+A1:2005 Eurocode. Basis of Structural Design
- BS EN 1991-1-4:2005+A1:2010 Eurocode 1. Actions on structures. General actions. Wind actions
- BS EN 1993-1-3:2006 Eurocode 3. Design of steel structures. General rules. Supplementary rules for cold-formed members and sheeting
- BS EN 10088-2:2014 Stainless steels. Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes
- BS EN 12086:2013 Thermal insulating products for building applications. Determination of water vapour transmission properties
- BS EN 12467:2012+A2:2018 Fibre-cement flat sheets. Product specification and test methods
- BS EN 12524:2000 Building materials and products. Hygrothermal properties. Tabulated design values
- BS EN 12667:2001. Thermal performance of building materials and products. Determination of thermal resistance by means of guarded hot plate and heat flow meter methods. Products of high and medium thermal resistance
- BS EN 12865:2001 Hygrothermal performance of building components and building elements. Determination of the resistance of external wall systems to driving rain under pulsating air pressure
- BS EN 13116:2001 Curtain walling. Resistance to wind load. Performance requirements
- BS EN 13162:2012+A1:2015 Thermal insulation products for buildings. Factory made mineral wool (MW) products. Specification
- BS EN 13238:2010 Reaction to fire tests for building products. Conditioning procedures and general rules for selection of substrates
- BS EN 13501-1:2018 Fire classification of construction products and building elements. Classification using test data from reaction to fire tests
- BS EN 13823:2010+A1:2014 Reaction to fire tests for building products. Building products excluding floorings exposed to the thermal attack by a single burning item
- BS EN 13914-1:2016 Design, preparation and application of external rendering and internal plastering. External rendering
- Draft BS EN 16383:2012 Thermal insulating products for building applications. Determination of the hygrothermal behaviour of external thermal insulation composite systems with renders (ETICS)
- BS 5250:2011+A1:2016 Code of practice for control of condensation in buildings
- BS 6093:2006+A1:2013 Design of joints and jointing in building construction. Guide
- BS 8000-0:2014 Workmanship on construction sites. Introduction and general principles
- BS 8000-12:1989 Workmanship on building sites. Code of practice for decorative wallcoverings and painting
- BS 8104:1992 Code of practice for assessing exposure of walls to wind-driven rain
- BS 8414-2:2015+A1:2017 Fire performance of external cladding systems. Test method for non-loadbearing external cladding systems fixed to and supported by a structural steel frame
- ISO 7892:1988 Vertical building elements - Impact resistance tests - Impact and general test procedures
- BRE Information Paper 1/06:2006 Assessing the effects of thermal bridging at junctions and around openings
- BRE Report 135:2013 Fire performance of external thermal insulation for walls of multi-storey buildings
- BRE Report 262:2002 Thermal insulation: avoiding risks
- BRE Report 443:2006 Conventions for U-value calculations
- BRE Report 497:2016 Conventions for calculating linear thermal transmittance and temperature factors
- CWCT Standard Test Methods for Building envelopes:2005
- DIN 18557:1997 Factory mortar - production, control and delivery
- EAD 330196-01-0604:2017 Plastic anchors made of virgin or non-virgin material for fixing of external thermal insulation composite systems with rendering
- EOTA TR 051:2018 Recommendations for job site tests of plastic anchors and screws
- ETAG 004:2013 Guideline for European Technical Approval of External Thermal Insulation Composite Systems (ETICS) with Rendering
- ETAG 017:2005 Vetre Kits - Prefabricated Units for External Wall Insulation
- ETAG 034:2012 Kits for External Wall Claddings Part 1: Ventilated Cladding Kits comprising Cladding components and associated fixings
- ETAG 034:2012 Kits for External Wall Claddings Part 2: Cladding Kits comprising Cladding components, associated fixings, subframe and possible insulation layer
- Government Accredited Construction Details, Part L, Steel Frame Illustrations:2019
- NHBC Standards 2020
- PAS 2030:2019 Specification for the installation of energy efficiency measures in existing dwellings and insulation in residential park homes
- SCI Publication P343:2006 Insulated Render Systems Used With Light Steel Framing

Remark: apart from these sources confidential reports may also have been assessed; any relevant reports are in the possession of Kiwa Ltd. and kept in the Technical Assessment File of this Agrément; the Installation Guides are current at the time of publication and may be subject to change, the Agrément holder should be contacted for clarification of revision.

CHAPTER 5 - AMENDMENT HISTORY

Revision	Amendment Description	Amended By	Approved By	Date
-	First issue	C Vurley	C Forshaw	December 2019
A	Re-issue with NHBC acceptance	C Devine	C Vurley	November 2020