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BAW-18-027-S-A-UK
BDA Agrément®
Wetherby Modular EWI Brick
Slip Façade Cladding System

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SCOPE

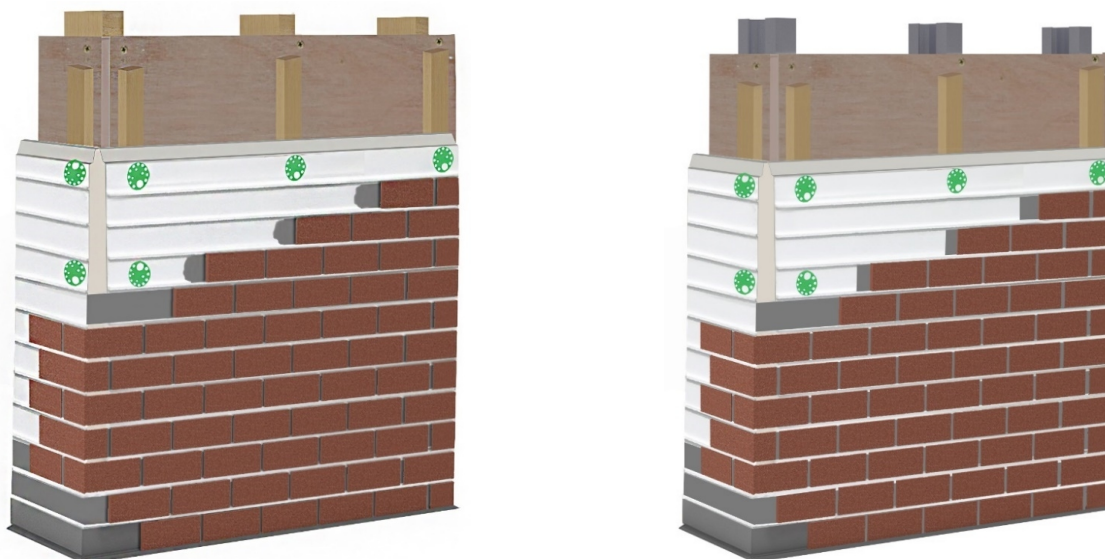
This Agrément relates to the Wetherby Modular EWI Brick Slip Façade Cladding System (hereinafter the 'System'). The System is a mechanically fixed, external wall insulation (hereinafter 'EWI'), brick slip cladding system. The System is suitable for installation on existing or new, residential and non-residential buildings including buildings of modular off-site manufacture (hereinafter 'OSM'):

- above damp-proof course (hereinafter 'DPC') level on masonry (where masonry includes clay and calcium silicate bricks, concrete blocks and natural and reconstituted stone blocks), external sheathed light-gauge steel frame (hereinafter 'LGSF') or structural timber frame (hereinafter 'STF') supporting walls (where LGSF and STF include exterior-grade cement-bonded particle board (hereinafter 'CBPB'), marine-grade plywood or exterior-grade orientated strand board (hereinafter 'OSB') with suitable strength and stiffness);
- above or below DPC level on buildings of modular OSM.

DESCRIPTION

The System consists of white tongue and groove edge profile, ribbed expanded polystyrene (hereinafter 'EPS') insulation boards, which are mechanically fixed through vertical spacer support rails to form a drained and partially ventilated cavity between the substrate wall and the EPS boards. The resultant cavity is to be a minimum of 15 mm deep. If required, the cavity can be formed up to 50 mm deep depending on the profile of the spacer support rails used. Wetherby Brick Slip Adhesive mortar (hereinafter 'brick slip adhesive') is applied to the EPS boards or clay fired brick slips (9 - 15 mm thick). The brick slips are pressed on to the EPS boards and are pointed to complete the brick slip finish.

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, used and maintained in accordance with this Agrément.

Craig Devine
Operations Manager, Building Products



Alpeo Mlotha CEng FIMMM MBA
Head of Operations, Building Products



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 typical details;
- Installation procedure;
- 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 insulation properties - The System increases the thermal insulation performance of external substrate walls and has a declared thermal conductivity (λ_D) of 0.036 W/mK * (see sections 2.1.6 and 2.1.7).

Mechanical resistance, strength and stability - The System has adequate strength and is designed to resist wind loads and impact damage normally encountered in the UK (see sections 2.1.8 and 2.1.9).

Condensation and water penetration risk - The System can contribute to limiting the risk of interstitial and surface condensation (see section 2.1.10) and will resist rain penetration across the partially ventilated cavity to the substrate wall (see sections 2.1.11 and 2.1.12).

Behaviour in relation to fire - The System is classified as European Classification B-s1, d0 in respect of reaction to fire in accordance with BS EN 13501-1 (see sections 2.1.13 and 2.1.14).

Durability - The System when installed and maintained in accordance with the Agrément recommendations and this Agrément, the System will have a service life expectancy in excess of 30 years (see section 2.1.15).

CE marking - The component manufacturers have taken responsibility for CE marking of the components 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).

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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 its' 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

It is recommended that the quality of installation and workmanship should be controlled by a competent person employed by the installing contractor. The System shall be installed and maintained in accordance with this Agrément and with the Agrément holder's installation requirements.

The System must be installed by operatives trained and approved by the Agrément holder. 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. Details of Approved Installers are available from the Agrément holder. Approved Installers are fully responsible for their quality control for each installation of the System that they undertake.

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 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 sufficient 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 in a frequency of not less than once per year by Kiwa Ltd.

2.1.1 Design responsibility

The Agrément holder reviews all designs submitted and offers design advice and guidance to ensure a compliant final project specific design.

2.1.2 Design considerations

There are general design considerations that apply in all instances, and project specific design considerations that apply specifically to existing buildings and new buildings.

2.1.2.1 General design considerations

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

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

An assessment of the structural performance of a substrate wall of a building must be carried out by a qualified structural engineer to confirm that:

- A supporting substrate wall has sufficient strength to withstand the loads applied to it from the System self-weight, and that it can resist the temporary additional loads that may be applied when installing the System;
- Design of a sub-frame is in accordance with the relevant Codes and Standards, such as to limit mid-span deflections to L/200 and cantilever deflections to L/150;
- A sheathed frame wall has adequate racking resistance.

Deflection must be limited to prevent damage to the System.

A sheathed STF construction substrate wall should be designed in accordance with BS EN 1995-1-1.

A sheathed LGSF construction substrate wall should be designed in accordance with BS EN 1993-1-3.

The System must be designed to withstand wind action loads in accordance with BS EN 1991-1-4. Account must be taken of the location, shape and size of the building. The average yearly wind load action data for the site location must be collated and used to calculate the required design wind resistance (kN/m²) - positive and negative - of a given support spacing and fixing pattern. Special consideration should be given to locations with high wind-load pressure coefficients, as additional fixings may be necessary.

Subject to the requirements of the project specific design, the System may be secured to the substrate wall with fixings that pass through the spacer support rails that form the cavity between the substrate wall and the EPS boards.

The spacer support rails should be fixed into the sheathing board and/or existing studwork and the spacer support rail fixings must achieve a minimum pull out of 0.7 kN (subject to wind load calculations).

Fixings and fixing patterns must be selected to suit the specific wind loads to be encountered.

The maximum spacing centres between EPS board anchor fixings are:

- 600 mm - horizontal;
- 300 mm - vertical.

During the project specific design process, account should be taken of Government Accredited Construction Details for Part L - Masonry External Wall Insulation Illustrations, Timber Frame Illustrations and Steel Frame Illustrations for England and Wales and Accredited Construction Details for Scotland (hereinafter 'Government Accredited Construction Details'). Particular care is needed for design at openings, and the correct level of workmanship and design detailing of joints particularly around window and door openings should be in accordance with BS 6093.

It is essential that joint detailing is carried out to a high standard to prevent ingress of water and maintain the required thermal performance of the cladding system.

An assessment must be made in respect of all anticipated thermal movements to ensure the mitigation of damage by design.

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 galvanized steel or stainless-steel. Expansion joints should be provided at 7.5 m intervals when the length of the wall exceeds 12 m.

The drained and partially ventilated cavity behind the EPS boards must not be allowed to become blocked. There must be 11 mm holes at 150 mm centres in the base bead. The openings must be kept clean and free of obstructions. The ventilation holes at the base bead are small enough to prevent the ingress of rain, birds or animals. Insect mesh may be installed, if required.

For non-residential OSM buildings in England, Wales and Northern Ireland the System may be used in walls up to and including 3-storeys in height (not exceeding 12 m), however, different height restrictions apply for other buildings for fire performance purposes in accordance with the requirements of national Building Regulations (see section 2.1.13).

2.1.2.2 Project specific design considerations - existing buildings

An initial site survey is conducted by the Agrément holder or by an Approved Installer to determine the project specific design necessary for existing buildings.

A specification is prepared for each elevation of the building, indicating where appropriate:

- DPC level, the position of starter tracks, water deflection beads/battens/channels, expansion joints and weather seals;
- Detailing around windows, doors, eaves, gate posts, fences, clothes lines, satellite dishes, alarms, meter boxes and cables;
- Identification of services including external plumbing, utilities, fixtures and fittings requiring removal or alteration to facilitate installation of the System;
- Identification of areas where silicone/flexible sealants must be used.

This process includes fixing pull-out tests of the substrate wall in accordance with 'Construction Fixings Association - Guidance note: Procedure for Site Testing Construction Fixings' to determine pull-out strength values. Pull out test loads must be 2.5 x design load.

The pull-out resistance strengths of the substrate wall, spacer support rails and board anchor fixings must be checked by a competent person and shown to be adequate before installation of the System.

Subsequent project specific design considerations include confirmation that:

- There is no existing rising damp and there are no signs of dampness on the inner face of the substrate wall, other than those caused solely by condensation;
- Existing walls are structurally sound, in a good state of repair and show no evidence of rain or frost damage;
- Existing walls are watertight, clean and meet the requirements of the relevant Standards and national Building Regulations for airtightness.

Solid masonry substrate walls must be vapour permeable to ensure that moisture can escape from inside the building.

2.1.2.3 Project specific design considerations - new buildings

The System can be installed to new substrate walls constructed of:

- Masonry;
- Sheathed STF (consisting of exterior grade CBPB, marine grade plywood or exterior grade OSB with suitable strength and stiffness);
- Sheathed LGSF (consisting of exterior grade CBPB, marine grade plywood or exterior grade OSB with suitable strength and stiffness).

Buildings incorporating the System should be designed and constructed to prevent moisture penetration and air infiltration in accordance with the relevant Codes and Standards.

For modular projects that incorporate the System below DPC level, the following specific conditions will apply:

1. The System shall not come into contact with the surrounding ground;
2. The section of the System below DPC level shall never become immersed in standing water under any circumstances;
3. A detailed site ground condition survey shall be undertaken for each case and suitable land drainage below the modular housing units shall be designed and implemented accordingly;
4. The land drainage solution provided in response to condition 2 above shall not rely on pipework that may become blocked or mechanical systems that could fail;
5. Where the design below DPC level creates a 'bund', the land drainage solution provided in response to condition 2 above shall prevent the accumulation of rain or groundwater;
6. The section of the System installed below DPC level shall be separated from the remainder of the System at DPC level.

2.1.2.4 Project specific design considerations - fire barriers

The Approved Documents provide guidance with respect to practical compliance with the national Building Regulations. They incorporate guidance in respect of the incorporation of fire barriers. BRE Report 135 must be consulted when determining a project specific design.

2.1.3 Permitted applications

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

2.1.4 Installer competence level

The System shall be installed strictly in accordance with the instructions of the Agrément holder and the requirements of this Agrément.

Installation shall be by contractors with employees trained and approved by the Agrément holder.

2.1.5 Delivery, storage and site handling

System components are delivered to site in a mixture of packets, boxes, bales and containers, palletised and wrapped in plastic for delivery as necessary. 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 and profiles should be stored flat or to prevent distortion or buckling. EPS boards should not come into contact with solvents or materials containing volatile organic components or be exposed to open flame and other ignition sources.

Performance factors in relation to the Major Points of Assessment

2.1.6 Thermal insulation

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

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

For the purpose of U-value calculations and to determine if the requirements of national Building Regulations or other statutory requirements are met, the thermal resistance and U-value of 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 EPS board's declared thermal conductivity (λ_b).

Any moisture penetration will affect thermal conductivity but the thermal value will recover when the insulation dries out. The System is designed to minimise moisture penetration to the insulation layer.

2.1.7 Thermal bridging at junctions and around openings

Care must be taken in the overall design and construction of junctions with other elements and openings to minimise thermal bridges and air infiltration.

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, PAS 2030 and PAS 2035.

The plastic insulation washer on the insulation board anchor fixings, helps reduce thermal bridging. Account should be taken of Government Accredited Construction Details. Details must be designed to minimise all areas of cold bridging.

2.1.8 Structural loading

The supporting wall must be able to take the full wind load, as well as any racking load, on its' own. No contribution from the System may be assumed in this regard. The substrate wall must have adequate strength to resist additional loads that may be applied as a result of installing the System. The project specific design must ensure that:

- The System attachment to the substrate wall has adequate fixing pull-out capacity for the calculated wind loads;
- Thermal expansion effects of both metal rails and metal structural frame and the cladding to be supported are taken into consideration in the design and detailing.

The design of the STF or LGSF is in accordance with the relevant codes and Standards so as to limit mid-span deflections to $L/200$ and cantilever deflections to $L/150$.

The System has adequate dynamic wind uplift load (suction) resistance and suitable mechanical strength to ETAG 034.

When installed on suitable walls, the System can adequately transfer to the wall the self-weight and negative (suction) and positive (pressure) wind loads normally experienced in the United Kingdom. Positive wind load is transferred to the substrate wall directly via bearing and compression of the brick-slips and insulation to the battens, and through the sheathing board to the structural frame. Negative wind pressure is resisted by the bond between EPS board and brick slips; the insulation boards are retained by the EWl system anchors secured to the spacer support rails.

2.1.9 Impact resistance

When tested for hard body impact resistance in accordance with ETAG 034 the System is categorised as Category I and can therefore be used in all conditions as detailed below:

- I - a zone readily accessible at ground level to the public and vulnerable to hard body impacts but not subjected to abnormally rough use;
- II - a zone liable to impacts from thrown or kicked objects, but in public locations where the height of the kit 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;
- III - a zone not likely to be damaged by normal impacts caused by people or by thrown or kicked objects;
- IV - a zone out of reach from ground level.

2.1.10 Condensation risk

External walls incorporating the System will adequately limit the risk of interstitial and surface condensation when designed in accordance with BS 5250 and BRE Report 262. A condensation risk analysis shall be completed at project specific design stage for all parts of the construction, including at junctions, openings and penetrations to minimise the risk of condensation. Assuming the installation has taken place on an occupied building, and when correctly installed, no condensation will form on the internal wall and become a problem. The cavity is drained and partially ventilated to prevent moisture build up in the cavity.

Interstitial condensation

External walls incorporating the System will adequately limit the risk of interstitial condensation when they are designed and constructed in accordance with BS 5250 and BRE Digest 369. The 'dew' point position is calculated to check that warm vapour transmitting through the substrate wall, from an internal space, will continue to be 'pushed' through to the surface.

Surface condensation

External walls incorporating the System will adequately limit the risk of surface condensation on internal walls when the thermal transmittance (U-value) does not exceed a maximum of $0.7 \text{ W/m}^2\text{K}$ at any point and the junctions with other elements and openings when designed in accordance with BS 5250.

2.1.11 Resistance to precipitation including wind-driven rain

The System, when properly installed in accordance with this Agrément, will resist rain penetration across the partially ventilated cavity to the substrate wall surface and satisfy this requirement as given in either the relevant national Building Regulations or BRE Report 262. The System can help to protect existing external facing brickwork from severe weather conditions.

The drained and partially ventilated cavity between the back of the EPS board and substrate wall must be a minimum 15 mm depth. Water passing through the EPS board joints and collecting in the cavity owing to rainwater or condensation will be removed by drainage and ventilation.

The System will provide a degree of protection against rain ingress to ETAG 034. However, care should be taken to ensure that substrate walls are adequately weathertight prior to application of the System.

The System Designer and Approved Installers should take particular care in detailing around openings, penetrations and movement joints to minimise the risk of rain ingress. Design of joints should be in accordance with BS 6093.

The guidance given in BRE Report 262 should be followed in connection with the weathertightness of wall constructions. The Agrément holder 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.

Where used, sheathing boards must be of a suitable exterior grade, with appropriately sealed joints, sealed penetrations and vapour control layers where required.

Examples of relevant detailing for EWI systems with a drainage cavity used with LGSF can be seen in SCI Publication P343.

At the tops of walls, the System should be protected by an adequate coping, overhang or other detail designed for use with this System.

Drainage deflection beads are incorporated into the System to deflect any water present in the drainage cavity around openings, other penetrations or items that block the drainage cavity.

A hygrothermal conditioning test and wind-driven rain test on the installed System to ETAG 034 showed the System has adequate resistance to artificial weathering and resistance to thermal shock and both indicate the suitability of the System for use at a level of rain exposure classed as very severe i.e. in all wind-driven rain exposure zones in accordance with BS 8104.

2.1.12 Water vapour transmission resistance

When installed the brick slip faced EPS boards offer significant resistance to the transmission of water vapour to BS EN 12086. The ventilation gap behind the EPS boards aids moisture release from inside the building. The cavity is partially vented at a ventilation level of < 500 mm²/m length of wall in the horizontal direction - for vertical air layers.

2.1.13 Behaviour in relation to fire

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

For non-residential buildings in England, Wales and Northern Ireland, the System shall not be used on buildings with a storey of 18 m or more above ground level; the System can be used without any boundary restrictions. Refer to the relevant national Building Regulations for types of buildings and any exclusions that may apply.

For residential buildings in England, Wales, Northern Ireland and all buildings in Scotland, the System is not classified as non-combustible and is restricted to buildings with no floor more than 11 m above ground and not less than 1 m from the boundary. In such cases, the System may be excluded from the unprotected area calculation regardless of openings. Refer to the national Building Regulations for types of buildings and any exclusions that may apply.

The System, when installed to a second storey and above, shall include a minimum of one stainless steel fixing per m² of EPS insulation, whichever is the lesser, fixed through the EPS insulation, in addition to the other enhanced EPS insulation fasteners normally specified.

The fire resistance of walls is based on the occupancy, size and use of the building and shall be a minimum of 30 minutes. It is then specified in 60-minute intervals thereafter.

Cavity fire barriers shall 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 shall be applied behind each fire barrier.

Walls shall be designed and constructed:

- to adequately resist the passage and penetration of fire;
- so that the unseen spread of fire and smoke within concealed spaces in the wall is inhibited.

For guidance and detailed conditions of use regarding supporting wall fire performance, cavity closers and barriers, fire stopping of service penetrations and combustibility limitations for other materials and components used in the overall wall construction, designers shall refer to the relevant national Building Regulations.

2.1.14 Proximity of flues and appliances

The installed System shall be adequately separated from any chimney or heat-producing appliance or an incinerator flue pipe passing through a wall. Recommended means of separation are detailed in the Approved Documents supporting the national Building Regulations.

Guidance on separation in STF supporting walls can be found in:

- IGEN IGE/UP/7;
- BSRIA/TRADA IEP6.

2.1.15 Durability

The System comprises durable materials and the ventilation openings at the bottom base track will prevent the ingress of rain, birds or animals. There is no mould risk to any component in the System.

The System is considered to be adequately resistant to deterioration and wear by the normal service conditions, provided it is installed in accordance with the requirements of this Agrément.

The durability and service life of the System will depend upon the building location and height, the intended use of the building and the immediate environmental conditions. Providing regular inspection and maintenance is carried out and any defects promptly repaired in accordance with the Agrément holder's maintenance and repair instructions, the installed System should be effective as an EWI System with a service life expectation in excess of 30 years.

Regular inspection and maintenance of the System below DPC level is not required for the System to achieve a working service-life durability of at least 30 years.

2.1.16 Maintenance and repair

A maintenance schedule for the installed System must include regular visual inspection checks:

- Of the brick slips for signs of disbandment; dislodged slips should be re-fixed using brick slip adhesive;
- Of the brick slips for damage; damaged brick slips must be removed and replaced with new ones, re-fixed using brick slip adhesive;
- Of the sealant around openings and service entry points;
- Of architectural details designed to shed water to confirm that they are performing properly;
- To ensure that water is not leaking from external downpipes or gutters.

Maintenance should include the replacement and resealing of joints at window and door frames at regular intervals.

The brick slip finish may become discoloured with time, the rate of which depends on the locality, initial colour, the degree of exposure and atmospheric pollution, as well as the design and detailing of the wall. Discoloration by algae and lichens may occur in wet areas.

Materials with signs of corrosion must be replaced.

Damaged areas must be repaired using the appropriate components and procedures detailed in the Wetherby Brick Slip Aftercare Guide.

2.2 - EXAMPLES OF DETAILS

Diagram 1 - Wetherby EWI Fixing Pattern (subject to wind load calculations)

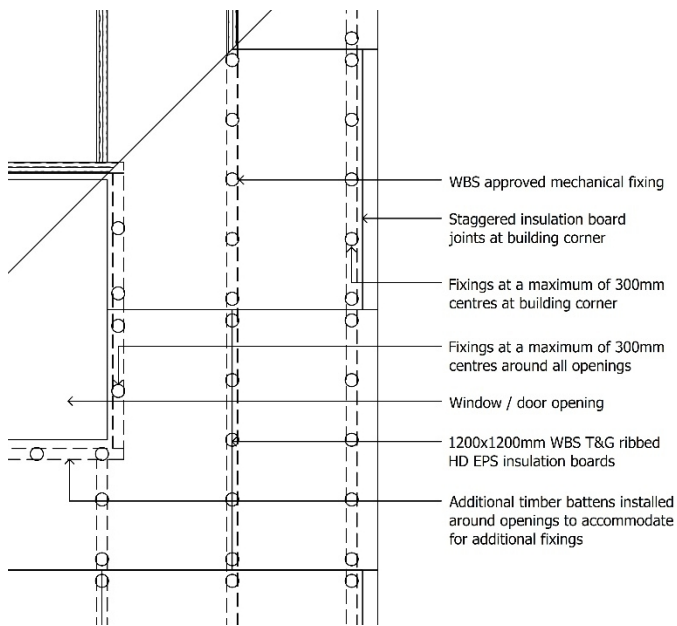


Diagram 2a - Typical horizontal fire barrier detail

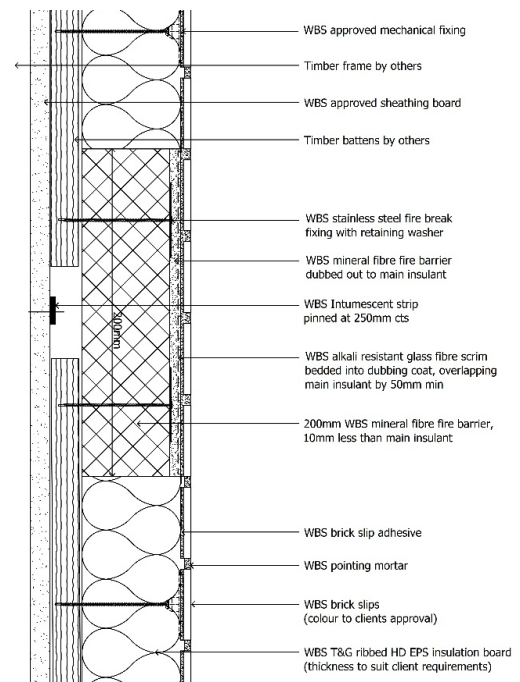


Diagram 2b - Typical vertical fire barrier detail

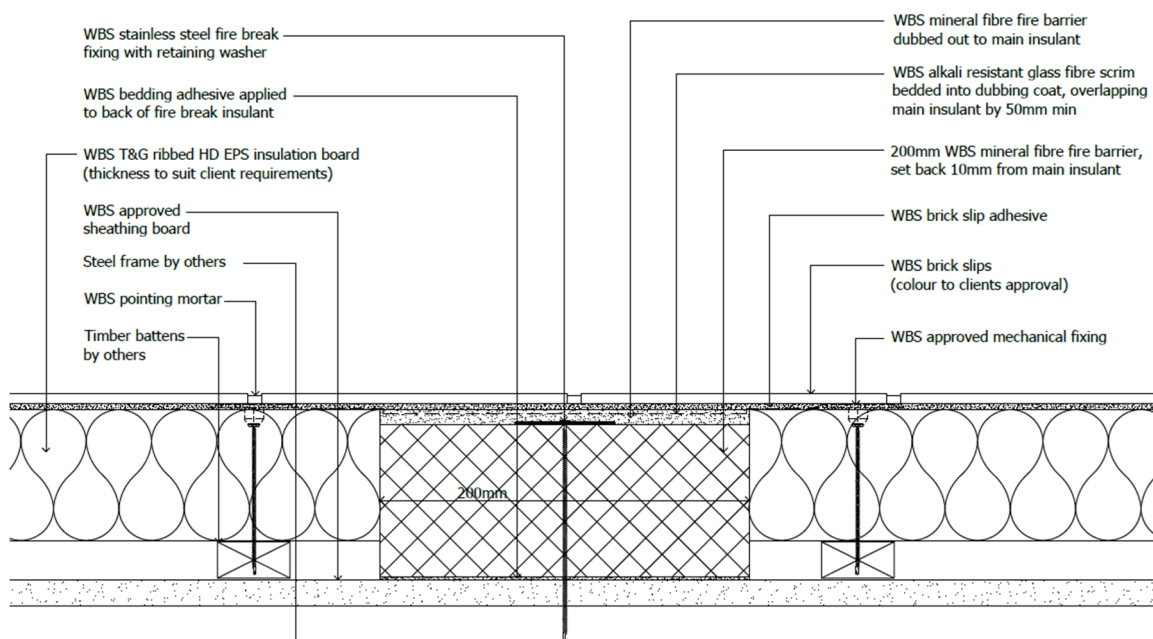


Diagram 3 - Roof abutment detail

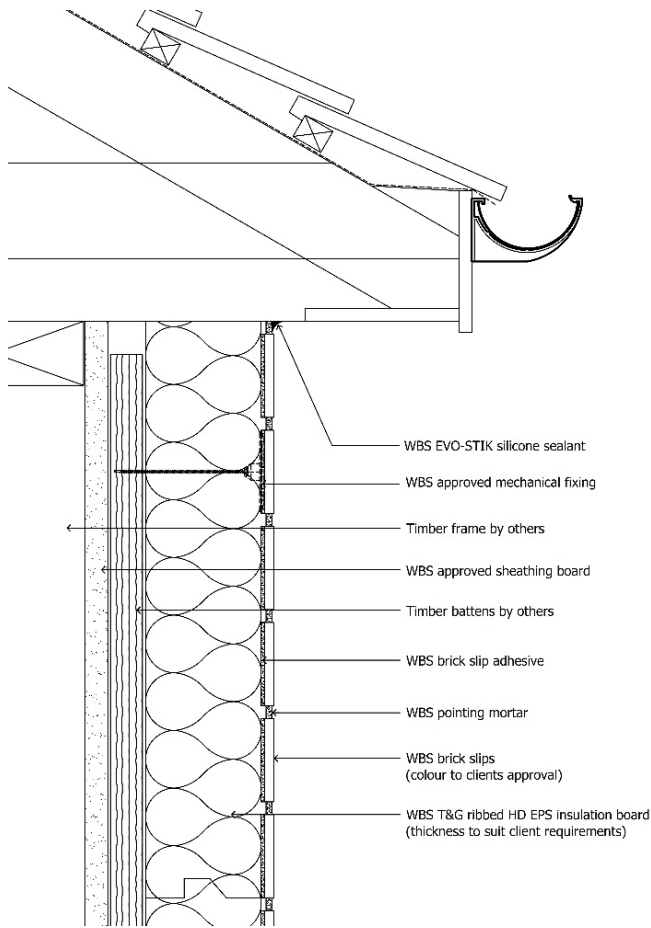


Diagram 4 - Typical base detail

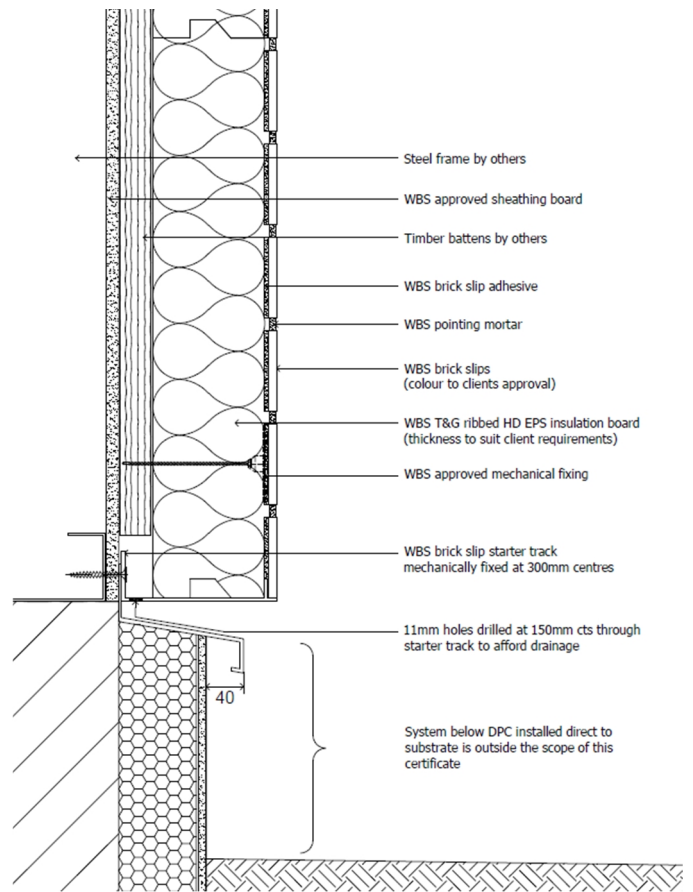
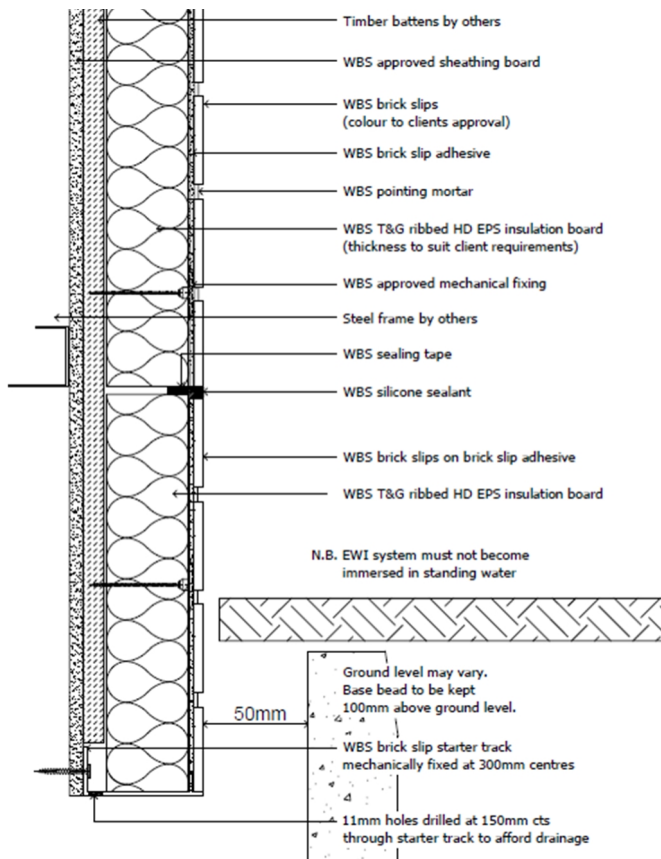


Diagram 5 - Typical base detail (below DPC level for modular OSM projects)



2.3.1 Installer competence level

The System shall be installed strictly in accordance with the instructions of the Agrément holder and the requirements of this Agrément.

Installation shall be by contractors with employees trained and approved by the Agrément holder.

2.3.2 General

Installation of the System shall be carried out in a workmanlike manner in accordance with the Agrément holder's Application Guide installation instructions and current good building practice.

2.3.3 Site assessment checks and suitability survey

The flatness of substrate surfaces must be checked using a straight-edge spanning the storey height. Irregularities greater than 10 mm in plane must be made good prior to installation, to ensure that the insulation boards are installed with a smooth in-plane finished surface. Suitable packers can be used to ensure the spacer support rails are installed level.

2.3.4 Site preparatory works

Prior to commencement, the following should be completed, for example:

- Surfaces should be sound, clean and free from loose material;
- Internal wet work, e.g. screeding or plastering, should be completed and allowed to dry prior to the application of the System;
- The roof is in place and window and door openings are sealed;
- All modifications, such as provision for fire stopping and necessary repairs to the building structure must be completed before installation commences;
- Remove fence posts, clothes lines, satellite dishes, alarms, meter boxes and cables etc. These can be relocated after the System is installed;
- Remove, extend beyond the surface and securely re-fix external soil stacks, wastewater pipes, overflows, ducts, vent pipes where required;
- Satellite dish/cable boxes/security lights/alarm boxes are removed. If necessary, protection channel will be installed to safely sleeve cabling;
- Extend eaves using an under or over eave extension so that there will be a minimum 40 mm overhang from the drip edge of the eave to the front edge of the System and ensure a sufficient fall is provided. Similar overhangs should also be achieved at the soffit. If there is no soffit or it is of insufficient depth, then a verge trim will be required;
- Structural movement joints/slip joints modified and used to replicate any structural movement joints in the existing substrate;
- Combustion air vents, underfloor vents, and all flues must be adequately sleeved or other cavity closures present or otherwise modified;
- Boiler flues, air vents, pressure release valves, condensing pipes and grilles etc. must be extended using pipe collar extensions;
- Flues, chimneys and combustion air ventilators must be continuously sleeved through the wall. Reference should be made to CIGA's Technician's guide to best practice: Flues, chimneys and combustion air ventilators, so that the performance and safety of fuel burning appliances is not compromised by the installation of the System;
- Supports for services/fittings e.g. soil and rainwater pipes, signs, CCTV cameras should be fixed back to the load-bearing background using proprietary countersunk stainless-steel screws or other non-corrodible fixings. No load is to be transferred to the System;
- Where necessary, protection channel conduits will be installed so any PVC insulated cables avoid contact with the EPS board to prevent plasticiser migration which can cause loss of protection to the conductors;
- External power cables covered over by cover plates must be well labelled with warning signs.

2.3.5 Materials and site conditions

- Suitable scaffolding that has a minimum gap of 300 mm from the elevation surface, shall be erected, maintained and later removed;
- All temporary supports for drains, pipes and cables shall be provided and maintained until the permanent supports are reinstated;
- After removal of existing rainwater pipes, temporary flexible long narrow plastic tubing tied below the gutter drain hole or rainwater goods shall be provided for the discharge of rainwater from the buildings to protect the System surfaces against rain, snow or other precipitation wash-off;
- Protect all existing works, approaches, paths, steps and adjacent surfaces including window and door frames using suitable sheeting, boards and covers.

Under PAS 2035 guidance for funded schemes, Ofgem recommend that the installer has responsibility for ensuring that the EWI System design includes detailed instruction as to how an appropriate level of background ventilation is to be identified, maintained or provided.

2.3.6 Adverse weather

Do not apply:

- Adhesives/mortars when air temperature is at or below 5 °C and when relative humidity is equal to or greater than 90 %;
- Materials when the air temperature or wall surface is more than 30 °C without protection of the surface.

2.3.7 Delivery, storage and site handling

The System components are delivered to site in suitable packaging bearing the System component name and the production identification date or batch number; and where applicable the BDA Agrément® logo incorporating the number of this Agrément.

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 and profiles should be stored flat or to prevent distortion or buckling. EPS boards should not come into contact with solvents or materials containing volatile organic components or be exposed to open flame and other ignition sources.

Brick slip adhesive and pointing mortar must be stored in dry conditions, off the floor, protected from frost and excessive heat. Mortar and adhesives are to be stored in temperatures between 5 °C and 30 °C.

Brick slip boxes are stored off ground in adequately dry weatherproof and ventilated storage and shall be protected against frost.

Fixings, tape, and adhesive/sealant are to be stored boxed, dry and kept off the ground until intended use.

2.3.8 Procedure

The detailed System installation sequence can be found in full in the Wetherby Brick Slip Application Guide. In outline:

1. Fix the metal BSR starter track base bead horizontally to the wall just above DPC level at base of the wall, or 150 mm above ground level.
2. Fix stop beads vertically on a continuous bead of EVO-STIK silicone sealant to the extent of the System, and its abutment to untreated areas e.g. meter boxes, rising service supplies etc.
3. Fix angle verge trim on sealing tape at the top of the System. Apply EVO-STIK silicone sealant to the top of the verge to ensure no water ingress is possible.
4. Extend window cills by fixing over or under cills where required, ensuring a minimum 40 mm overhang where required. Apply EVO-STIK silicone sealant where required.
5. Fix vertical spacer support rails at maximum 150 mm centres for timber battens and at maximum 300 mm centres either side for metal rails. Spacer support rails are fixed at maximum 600 mm horizontal centres. Additional spacer support rails must be installed around openings to accommodate for additional fixings.
6. Fix drainage deflector beads above all openings at a 10 ° minimum fall, ensuring all moisture is channelled away from the opening below.
7. Fire barriers must be installed to locations as detailed in the project specific design.
8. Identify live or used air vents, grilles etc. and extend through the System as work progresses.
9. Place the first course of EPS boards onto the base bead and secure through the spacer support rails into the substrate wall. Fix the boards mechanically to the spacer support rails using approved fixings at a rate of 10 fixings per board in accordance with the fixing pattern. Continue with additional boards ensuring the boards are tightly butt-jointed and that a staggered bonding pattern is adhered to. Board joints should not occur within 200 mm of the corners of openings. Where the boards butt up against dissimilar materials, supply and install sealing tape and ensure the boards are fitted tight against the seal, ensuring full compression of the tape. At building corners, boards must be installed with staggered joints and overlapped. PinkGrip adhesive should be installed between the staggered boards at the building corner to improve the strength of the joint. Additional fixings should be installed to ensure a maximum of 300 mm centres at either side of building corners and around all openings. Installation is carried out to the highest level on each wall.
10. Fix movement beads at agreed locations using appropriate fixings. Structural movement joints must be carried through the System.
11. Fix surface mounted beads directly to the insulation board at required locations using appropriate fixings.
12. Natural variations in colour, texture and dimensions of the brick slips may be present. It is advisable to mix slips from at least five different boxes to minimise grouping of colours. Apply brick slip adhesive to the back of the pistol corners and door/window reveals. Measure the distance between corners and/or outer edges to identify the number of bricks required per course and the subsequent width of the vertical pointing joint. Coursing and brick slip positioning can be marked out on the EPS boards. Apply brick slip adhesive to the back of each flat brick slip and install within the board profiles according to the bond pattern required leaving a consistent joint width between each (approximately 10 mm). Stagger all vertical joints to give the appearance of conventional brickwork or install in a stack bond pattern in accordance with the required design. Alternatively, brick slip adhesive can be trowel applied direct to the ribbed insulation at approximately 3 - 5 mm thickness. Whilst wet the brick slips can be pushed into the adhesive, resting on the EPS rib. Plastic spacers can be inserted between brick slips to help position them accurately.
13. Once brick slips have set in place, point up with pointing mortar using a pointing gun and a pointing trowel. Once pointing mortar is dry, brush down the wall to remove all loose mortar etc. Once completely dry, remove any excess mortar using a stiff brush.
14. Wipe clean all exposed PVC nosing, cills etc., at each work stage whilst adhesive is still wet.
15. Gun apply a continuous bead of EVO-STIK silicone sealant at points where the brick slips butt up against other materials ensuring water tightness., e.g. window frames, door frames, eaves, etc. Sealant must be applied with care and attention, ensuring a full and continuous bead of sealant is applied uniformly at all junctions where required.
16. Remove/wipe clean all splashes, droppings from exposed PVC nosing, cills etc., immediately whilst any sealant or pointing mortar is still wet.
17. All trunked air vents, e.g. those providing under-floor ventilation and combustion air for heating appliances, must be checked and any obstructions must be cleared. All flues must be carefully checked by an appropriate test (e.g. a smoke test) to verify that they are clear and unobstructed.
18. Post-installation inspection checks must be carried out to ensure that the installation has been completed and that no damage has occurred to the building as soon as possible after completion of the work or at a minimum of 7 days after completion of the work and before removing scaffolding. Report any defects immediately.

2.4 - INDEPENDENTLY ASSESSED SYSTEM CHARACTERISTICS

2.4.1 Thermal insulation

The EPS board 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 034 - the System exhibited no failures in performance.

2.4.3 Structural loading

- **EPS boards and brick slips**
 - Average pull-off strength - bond strength between brick slip and EPS board (brick slip adhesive) to ETAG 004 - 0.08 N/mm².
- **System**
 - A dynamic wind uplift suction test on both direct fix and on timber battens to ETAG 004 demonstrated that the System withstood cycles up to 4.0 kPa.

2.4.4 Impact resistance

- Hard body impact resistance tests to ISO 7892 in accordance with ETAG 034 allow the System to be classified as Category I.

2.4.5 Resistance to precipitation including wind-driven rain

- A hygrothermal conditioning test (30-year weathering and UV) and wind-driven rain test 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 034 for brick slip adhesive - 0.147 kg/m².
- Water absorption capillarity to ETAG 034 for insulation System with brick slip adhesive - 0.143 kg/m².

2.4.7 Water vapour transmission resistance

- Water vapour transmission resistance to BS EN ISO 12572 - mean 6.87 MNs/g.
- According to ETAG 004, the water vapour diffusion value of the brick slips is 1.45 m (of air).

2.4.8 Behaviour in relation to fire

The following tests were conducted on full System make-up samples (EPS panel with brick slip face):

- Ignitability by direct impingement of single-flame tests to determine reaction to fire to BS EN ISO 11925-2.
- Reaction to fire tests by thermal attack using a single burning item to BS EN 13823.

The System has been classified in accordance with BS EN 13501-1 as European Classification B-s1, d0.

2.5 - ANCILLARY ITEMS

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

- Metal starter track;
- Fire barriers;
- Mineral wool (MW) firebreaks to BS EN 13162;
- Intumescent strips;
- Beads and trims;
- Adhesive tape;
- PinkGrip adhesive;
- EVO-STIK silicone sealant.

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, designers and contractors to address their obligations under these Regulations.

3.2 - NATIONAL BUILDING REGULATIONS

In the opinion of Kiwa Ltd., the System, if installed, used and maintained 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 wall
- 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
- L1(a)(i) Conservation of fuel and power - the System can contribute to limiting heat gains and losses through walls
- Regulation 7(1) Materials and workmanship - the System is manufactured from suitable and safe materials for its application
- Regulation 23(1) Requirements relating to thermal elements - the System can contribute to walls complying with the requirements of L1(a)(i)
- 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
- Regulation 26C Target primary energy rates for new buildings - 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 wall
- 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
- L1(a)(i) Conservation of fuel and power - the System can contribute to limiting heat gains and losses through walls
- Regulation 7(1) Materials and workmanship - the System is manufactured from suitable and safe materials for its application
- Regulation 23(1) Requirements relating to thermal elements - the System can contribute to walls complying with the requirements of L1(a)(i)
- 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 Requirement
- Regulation 26B Fabric performance values for new dwellings - the System can contribute to satisfying this Requirement
- Regulation 26C Minimum energy efficiency rating - 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 Regulation 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 wall
- 2.4 Cavities - the System can inhibit the unseen spread of fire and smoke within concealed spaces
- 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 protects the outer wall face from precipitation
- 3.15 Condensation - the System can be designed and constructed to inhibit condensation
- 6.1(b) Carbon dioxide emissions - the System can contribute to satisfying this Requirement
- 6.2 Building 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 - Conversion

- 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(1)(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)(b) 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 Superstructure (excluding roofs).

- BS EN ISO 6946:2017 Building components and building elements. Thermal resistance and thermal transmittance. Calculation methods
- BS EN ISO 10211:2007 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 ISO 11925-2:2010 Reaction to fire tests. Ignitability of products subjected to direct impingement of flame. Single-flame source test
- BS EN ISO 12572:2016 Hygrothermal performance of building materials and products. Determination of water vapour transmission properties. Cup method
- BS EN 351-1:2007 Durability of wood and wood-based products. Preservative-treated solid wood. Classification of preservative penetration and retention
- BS EN 771-1:2011+A1:2015 Specification for masonry units. Clay masonry units
- BS EN 1991-1-4:2005+A1:2010 Eurocode 1. Actions on structures. General actions. Wind actions
- NA to BS EN 1991-1-4:2005+A1:2010 UK National Annex to 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 1995-1-1:2004+A2:2014 Eurocode 5. Design of timber structures. General. Common rules and rules for buildings
- NA to BS EN 1995-1-1:2004+A1:2008 UK National Annex to Eurocode 5. Design of timber structures. General. Common rules and rules for buildings
- BS EN 12004-1:2017 Adhesives for ceramic tiles. Requirements, assessment and verification of constancy of performance, classification and marking
- BS EN 12086:2013 Thermal insulating products for building applications. Determination of water vapour transmission properties
- 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 13162:2012+A1:2015 Thermal insulation products for buildings. Factory made mineral wool (MW) products. Specification
- 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 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 14411:2016 Ceramic tiles. Definition, classification, characteristics, assessment and verification of constancy of performance and marking
- BS EN 16383:2016 Thermal insulating products for building applications. Determination of the hygrothermal behaviour of external thermal insulation composite systems with renders (ETICS)
- BS 5250:2021 Management of moisture in buildings. Code of practice
- BS 6093:2006+A1:2013 Design of joints and jointing in building construction. Guide
- BS 8104:1992 Code of practice for assessing exposure of walls to wind-driven rain
- BS 8221-1:2012 Code of practice for cleaning and surface repair of buildings. Cleaning of natural stone, brick, terracotta and concrete
- ISO 7892:1988 (R07) Vertical building elements. Impact resistance tests. Impact bodies 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
- BRE Digest 369:1992 Interstitial condensation and fabric degradation
- BSRIA/TRADA IEP6:2006 Services in Timber Framed Construction
- ETAG 004:2013 Guideline for European Technical Approval of External Thermal Insulation Composite Systems with Rendering
- ETAG 034 Kits for External Wall Claddings - I: Ventilated Cladding Kits comprising cladding components and associated fixings:2012
- ETAG 034 Kits for External Wall Claddings - II: Cladding Kits comprising cladding components, associated fixings, subframe and possible insulation layer:2012
- PAS 2030:2019 Specification for the installation of energy efficiency measures in existing dwellings and insulation in residential park homes
- PAS 2035:2019 Retrofitting dwellings for improved energy efficiency - Specification and guidance
- Government Accredited Construction Details
- IGEM IGE/UP/7:2008 Gas installation in timber framed and light steel framed buildings
- SCI Publication P343:2006 Insulated Render Systems Used with Light Steel Framing
- NHBC Standards 2018
- Construction Fixings Association - Guidance note: Procedure for Site Testing Construction Fixings:2012

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 Guide is 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 |
|-----------------|--|-------------------|--------------------|----------------|
| E | First Issue | P Oakley | C Forshaw | August 2018 |
| F | Update | P Oakley | C Forshaw | August 2018 |
| G | Re-submission for 3 rd Party Acceptance | P Oakley | C Forshaw | August 2018 |
| H | Various updates | P Oakley | C Forshaw | August 2018 |
| I | Re-submission for 3 rd Party Acceptance | C Forshaw | C Forshaw | August 2018 |
| J | Second Issue | C Forshaw | C Forshaw | November 2018 |
| K | Update to reflect changes in the national Building Regulations | C Devine | C Vurley | December 2020 |
| L | Update with below DPC information | C Devine | C Vurley | September 2021 |
| M | Re-issue following successful 3 Year Renewal; updates to BS 5250 and PAS 2030/2035 | C Devine | C Vurley | March 2022 |
| N | Updates to Building Regulations and Fire Performance | A Chapman | C Devine | May 2023 |