

SCOPE

This Agrément relates to Duratherm Spray Foam Insulation (hereinafter the "Product"), an in-situ HFO blown, sprayed thermal insulation layer which contributes to the airtightness and watertightness of external timber framed walls with outer masonry leaves (where masonry includes clay and calcium silicate bricks, concrete blocks, and natural and reconstituted stone blocks). The Product is applied between the studwork in timber framed walls, in existing or new domestic buildings in the UK.

DESCRIPTION

The Product consists of two liquid components that are sprayed to form a closed cell structure, rigid polyurethane (PUR) seamless foam insulation layer to BS EN 14315-2 that adheres to the treated surfaces. It is produced by an exothermic reaction between the isocyanate component (A) and the resin component (B). Once applied the Product expands, solidifies and cures. The Product is applied in layers, until the final required design thickness (not exceeding 400 mm) is achieved.

PRODUCT ILLUSTRATION



THIRD-PARTY ACCEPTANCE

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

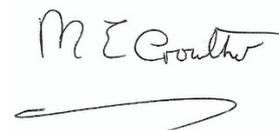
STATEMENT

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

Chris Vurley, IEng
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 Product. 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 Product 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 Product improves the thermal insulation of the timber framed walls and has a declared aged thermal conductivity of 0.025 - 0.027 W/mK* depending on thickness (see sections 2.1.10 and 2.4.1).

Moisture control - (see section 2.1.11) the Product:

- has a high volume closed cell percentage;
- has adequate water vapour transmission resistance;
- will contribute to limiting the risk of interstitial and surface condensation;
- has adequate resistance to water penetration.

Fire performance - the Product is classified as Euroclass E* (combustible) according to BS EN 13501-1.

Durability - the Product will have a service life equivalent to that of the structure into which it is incorporated (see section 2.1.8).

CE marking - The Agrément holder has taken responsibility for CE marking the Product 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 Product relates to its use in accordance with this Agrément and the Agrément holder's requirements.

1.1.3 Assessment

Kiwa Ltd. has assessed the Product 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 supervision

The quality of installation and workmanship must be controlled by a competent person who shall be an employee of the installation company.

The Product shall be installed strictly in accordance with this Agrément and the Agrément holder's requirements.

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 Product 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 Product.
- 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 PRODUCT (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 at 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 Applied building physics (heat, air, moisture)

The physical behaviour of the timber framed cavity walls incorporating the Product 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 timber framed cavity 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

For retrofit applications, existing constructions must be in a good state of repair with no evidence of rain penetration or damp. Any necessary repairs must be carried out prior to installation.

New timber framed cavity walls with masonry outer leaves shall be constructed in accordance with the national Building Regulations. Where required, due consideration must be given to NHBC Standards. Installation of the Product must not be undertaken until the cavity is weathertight, i.e. the roof is in place and the window and door openings are sealed.

To prevent water ingress, due consideration must be given to the design of joint detailing at window/door openings and flue pipe penetrations in accordance with BS 6093.

The Product may be used in walls above 12 m and up to 18 m in height where the Agrément holder has issued a suitable waiver.

Account should be taken of Government Accredited Construction details for Part L, England and Wales - timber frame detail illustrations; Accredited Construction details, Scotland - timber frame; and PAS 2030 Building Fabric Measures.

Room space ventilation openings should be arranged to prevent the ingress of rain, snow, birds and small animals and the risk of blockage by other building operations.

A suitable breather membrane incorporating lapped and sealed joints must be applied on the cavity face of the timber sheathing board to protect the sheathing and timber framed wall from moisture and allow water vapour from within the frame to pass into the cavity.

Where indicated (by assessment to BS 5250) a suitable vapour control layer (VCL) incorporating lapped and sealed joints must be applied behind the dry lining in rooms to restrict the passage of water vapour from within the home to the timber framed wall.

For internal fire protection, the Product must be covered by a suitable lining board with the joints fully sealed and supported by timber studwork elements except when used in a non-habitable room space.

Do not apply the Product over electrical cables. Re-route or re-lay cables in suitable conduit or trunking or de-rate electrical cables.

The Product is a closed cell foam which is inert once cured and is therefore chemically inactive by definition. The Product will not react with metals typically used in construction elements.

2.1.4 Project specific design considerations

Prior to the application of the Product, an inspection must be carried out. Typical checks should include:

- the external condition of the masonry wall, flashings etc.;
- the internal condition of the masonry wall where visible;
- there are no signs of dampness, staining or condensation on the external face of the timber sheathing;
- the condition of the sheathed timber framed wall to be insulated;
- existing masonry and timber framed cavity walls are structurally sound;
- condition of any breather membrane present on the inner face of the timber sheathing;
- room space ventilation requirements.

2.1.5 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.

2.1.6 Installer competence level

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

Installation shall be by installers who have been trained and approved by the Agrément holder under the Quality Installer Scheme™.

2.1.7 Delivery, storage and site handling

The two components of the Product are delivered to site in separate closed 205 litre type 1A1 drums. Both containers are labelled with component name and batch number and marked with the BDA Agrément® logo incorporating the number of this Agrément.

The optimum storage temperature is between 10 °C and 25 °C. The drums should not be exposed to direct sunlight, high temperatures or temperatures below 10 °C for long periods of time. Drums should be stored in a well-ventilated area protected from heat and frost and away from possible ignition sources.

Components A and B are sensitive to humidity, so they should be stored in sealed drums or hermetically sealed tanks and protected from humidity and rain.

The liquid isocyanate component is classified as 'harmful', under The Chemicals (Hazard Information and Packaging for Supply) Regulations 2009 (CHIP 4) and drums bear the appropriate hazard warning signs. When cured, the Product is non-hazardous.

2.1.8 Durability

There is no mould growth risk and the Product does not support vermin or insects.

The Product is durable, rot-proof and 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 reaction to fire does not decrease with time in accordance with BS EN 14315-1.

The adhesion after ageing is considered sufficient to ensure the stability of the Product.

The Product is frost and heat-resistant from -50 °C to +100 °C.

The Product will have a service life equivalent to that of the structure into which it is incorporated.

2.1.9 Maintenance and repair

The Product once installed, does not require regular maintenance provided the weathertightness of the external cavity wall is maintained. Damaged or poorly applied Product should be completely removed and re-applied. For advice in respect of repair and maintenance concerns, consult the Agrément holder.

Performance factors in relation to the Major Points of Assessment

2.1.10 Thermal performance

Thermal conductivity

Due to the nature of the closed cell structure of the Product, it offers good thermal resistance relative to its installed thickness.

For the purposes of U-value calculations and to determine if the requirements of national Building Regulations are met, the thermal resistance and U-value of external timber framed cavity walls incorporating the Product should be calculated in accordance with BS EN ISO 10211 (taking into consideration BS EN ISO 6946, BS EN ISO 10456 and BRE Report 443), using the Product's declared aged thermal conductivity (λ_D)*. Design and declared thermal values can be found in BS EN ISO 10456.

The Product can be used to upgrade properties that already have partially filled timber framed walls with rigid board insulation in place to meet current U-value requirements.

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 the external timber framed cavity wall incorporating the Product does not exceed the maximum and target U-values given in the national Building Regulations.

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 temperature factors can be found in the documents supporting the national Building Regulations and BS EN ISO 10211, BRE Information Paper 1/06, BRE Report 262, BRE Report 497 and PAS 2030.

The installed Product forms a solid and seamless air tight insulating foam layer without joints or gaps, reducing thermal bridges.

2.1.11 Moisture control

Cell structure

The Product has a high volume closed cell percentage (93 %) in accordance with BS EN ISO 4590.

Water vapour transmission resistance

The Product has a low level of water vapour transmission (high water vapour resistance) in accordance with BS EN 12086 Method A and does not favour the accumulation of water vapour between the Product and cavity substrate faces.

Condensation risk

External timber framed cavity walls incorporating the Product will adequately limit the risk of interstitial and surface condensation when designed in accordance with BS 5250, BRE Report 262, BRE Digest 369 or BS EN ISO 13788. Room spaces should be ventilated in accordance with BS 5250. Care should be taken to provide adequate ventilation, particularly in rooms expected to experience high humidity, and to ensure the integrity of VCL's (where installed) and dry linings against vapour ingress.

It is essential that cavity wall design, construction and maintenance limits opportunities for vapour migration through gaps, cracks and laps in VCL's and through penetrations. This is particularly important for cavity walls which include layers of high resistance to vapour diffusion on both sides of the insulation layer.

A VCL must be used where indicated by a dynamic simulation. A VCL (with sealed laps) is acceptable on the inner framed walls with no penetrations.

A Condensation Risk Analysis can be carried out by the Agrément holder on a project specific basis, in accordance with BS 5250 and BS EN ISO 13788.

Water permeability

The closed cell structure means the Product is water-resistant.

The Product has adequate resistance to water absorption by immersion in accordance with BS EN 1609, Method B.

Resistance to precipitation including wind-driven rain penetration

Any rain water ingress through the outer masonry will drain down the partially ventilated cavity and evaporate. The sheathed timber framed wall is protected by a breather membrane.

2.1.12 Fire performance

The Product has a reaction to fire performance classification of Euroclass E* (combustible) in accordance with BS EN 13501-1.

The Product must be protected from naked flames and other ignition sources during and after application.

In situations where there is a higher than average risk of fire, the Product must be suitably separated from any potential source of ignition.

The exposed Product could contribute to the development stages of a fire; however this would be to a limited extent in the early stages of a fire.

Once installed, except for a non-habitable room application, the Product must be contained by a suitable lining board fixed to battens or rafters and with all joints taped, sealed and supported by rafters, noggins or battens. Consequently, in these conditions, the Product will not contribute to the development stages of a fire.

Timber framed wall panels shall control and resist the spread of fire and smoke. Timber framed walls must include cavity barriers at edges, around openings, penetrations, at junctions with roof or floor cavities and in extensive cavities and fire stops in accordance with the relevant provisions of the national Building Regulations.

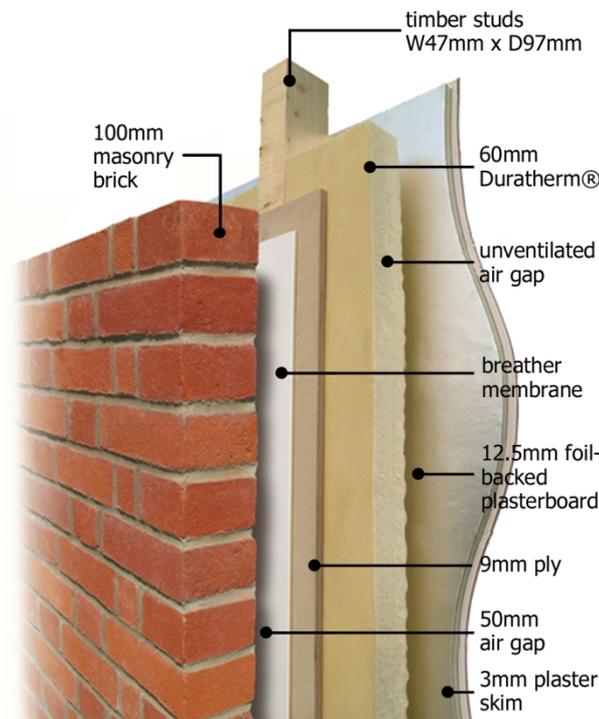
The installed Product will affect the fire resistance properties of load-bearing timber framed walls and should be shown to satisfy the loadbearing capacity performance criterion of BS 476-21 or BS EN 1365-1 for the required fire resistance period.

Proximity of flues and appliances

The Product must be separated from heat-emitting flue pipes, fixed combustion appliances, incinerators, devices, fireplaces and chimneys and any potential source of ignition where the temperature is in excess of 70 °C, by non-combustible material in accordance with the provisions of the national Building Regulations.

2.2 - EXAMPLES OF DETAILS

Figure - 1 Typical timber framed wall design



2.3 - INSTALLATION

2.3.1 Installer competence level

See section 2.1.6.

2.3.2 Delivery, storage and site handling

See section 2.1.7.

2.3.3 General

Installation of the Product shall be carried out in accordance with BS 8000-0, BS EN 14315-1 and BS EN 14315-2.

Application of the Product is to be left until the masonry wall is weathertight, the roof is in place and the window and door openings are sealed.

During application, prohibit contact with open flames and the presence of ignition sources.

Do not weld or cut metal which is in contact with the Product. If it is necessary to weld metal elements, this must be done before spraying the Product.

All of the timber studwork void from ground level to the roof or any vertical cavity barrier between adjacent properties should be filled.

During spraying, the ambient air temperature and substrate temperature must ideally be between 15 °C and 25 °C and not be lower than 10 °C. An infrared or contact thermometer can be used for checking substrate surface temperature.

The moisture content of any timber to be sprayed must be measured with a substrate hygrometer and be < 20 % before application commences.

The presence of surface humidity leads to the formation of a highly porous foam with low adhesion to the substrate.

Penetrating or rising damp on the timber sheathing is not permitted.

The relative humidity of the air in the room must be < 85 % to minimise the risk of surface condensation.

When spraying, it is important to ensure that the compressed air used is completely dry.

Application of the Product may produce a build-up of harmful vapours. Installers must wear personal protection equipment (PPE) when working with the Product. Some vapours given off by component chemicals are heavier than air and will tend to move to lower parts of the building compartment. These areas should be suitably ventilated. In certain conditions (e.g. application in a confined space) the use of extractor fans is recommended. Ensure proper ventilation in the work area.

The spraying machine must be specially designed to mix and spray the Product via a spray gun. The Product is applied with volumetric displacement pumps with fixed mixing ratio A/B = 1/1 by volume. The ratio will be controlled prior to each application by measuring the flow rates of the two components before they pass through the mixer in the spraying machine. The value must not differ by 5 % by mass to the indicated value.

The machine must have a temperature controller in the preheaters and in the hoses. The working temperature must be set between 40 °C and 50 °C depending on the ambient temperature conditions.

The Product must not make contact with heat-emitting flue pipes, appliances and chimneys etc. If hot work is to take place near the Product, it must be cut back by 2 m and protected by heat blankets.

2.3.4 Preparation

- Any necessary repairs to the sheathed timber framed wall must be made prior to spraying;
- sleeve or close air vents to prevent blockage by the Product;
- services e.g. electrical cables may need re-routing or trunking;
- the timber substrate must be clean, dry and free from dirt, dust, grease, oils. Metallic substrates must be free of rust or oil;
- any necessary repairs to cavity walls such as replacing damp or broken/rotten window / door frame timbers must be made prior to application;
- make cavity walls weather-tight before application of the Product;
- isolate heat-emitting pipes, flues, devices by applying non-combustible thermal insulation material around them;
- a small adhesion test to the substrate should be made to guarantee good bonding, especially on metal surfaces. This will determine if a primer is required for maximum adhesion;
- any timber treatment carried out;
- cover front faces of surfaces not to be sprayed e.g. exposed timber studwork;
- cover services e.g. electrical cables and pipes;
- access to services, task lighting, safety and breathing equipment and ventilation facility (if required) should be positioned in the compartment to be treated prior to spraying.

2.3.5 Outline procedure

Warm room - insulation between sheathed studwork

1. Set the appropriate temperature and pressure parameters to guarantee the mixing quality of the Product and select a suitable spraying nozzle.
2. Carry out quality control tests to check for a round spray pattern, sticky patches, light or dark patches/streaks, no voids, consistent colour, appearance, reaction profile - cream time, gel time, tack free time, free rise density, using test methods in accordance with BS EN 14315-1, Annex E. Interlaminar adhesion must be checked on a two-layer spray sample. Density of the Product is checked in accordance with the Agrément holder's recommendations.
3. The Product is sprayed onto the timber sheathing board between the timber studwork in sections, starting at the bottom and working upwards towards the ceiling. Each section is sprayed in a horizontal direction, from right to left and from left to right, continuously.
4. Care should be taken to minimise the degree of overspray generated whilst spraying.
5. The total minimum Product thickness to be applied will depend on the required U-value. The installer must check the total thickness applied by means of a depth gauge with measuring pin to ensure the required thickness is met. The installer must be aware of the maximum insulation layer thickness in ventilated room designs.
6. The Product is sprayed between studwork directly onto the inside of the sheathing in a flash coat/primer (5 mm layer thickness using a quick pass).
7. Once this layer is cured (dry to the touch), a second layer (20 - 25 mm thick) is applied to give a minimum total thickness of 25 mm.
8. Additional layers should be applied within 10 minutes of the previous layer to achieve the design thickness (not exceeding 400 mm).
9. Once cured and cold the Product can be trimmed flat using a hand-saw if required, being careful not to cut into timber studwork.

Warm room - insulation between sheathed and covered timber studwork

If insulation thickness required is greater than the studwork depth, cross-battens are then mechanically fixed to the studwork. The battens must be of sufficient width and spacing (up to 600 mm) to provide adequate support to which the plasterboard can be mechanically fixed and then filling resumes in 20 mm layers.

2.3.6 Finishing

The Product should be cured and cold prior to undertaking any finishing work.

After installation in non-habitable rooms where the Product is left exposed, fire warning labels must be placed in prominent positions.

Once installed, except when used in a non-habitable room space, the Product must be covered by a suitable lining board, with all joints taped, sealed and supported by studwork, noggins or battens.

2.4 - INDEPENDENTLY ASSESSED PRODUCT CHARACTERISTICS

2.4.1 Thermal performance

Declared aged thermal conductivity (λ_D) to BS EN 14315-1, Annex C, ISO 8301 and BS EN 12667	0.027 W/mK* for < 80 mm thickness 0.026 W/mK* for 80-120 mm thickness 0.025 W/mK* for > 120 mm thickness
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2.4.2 Moisture control

Cell structure

Open and closed cell volume % to BS EN 14315-1 and BS EN ISO 4590	Mean 93 % closed cell content, Class CCC4
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Water vapour transmission

Water vapour transmission diffusion resistance factor to BS EN 14315-1 and BS EN 12086, Method A	Mean 38 for 70 mm thickness Mean 42* for 60 mm thickness
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Water permeability

Short-term water absorption by 24 hr partial immersion to BS EN 14315-1 and BS EN 1609, Method A, B	Mean 0.09 Kg/m ² * for 60 mm thickness Mean 0.02 Kg/m ² for 70 mm thickness
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2.4.3 Fire performance

Ignitibility to BS EN ISO 11925-2	Surface flame propagation < 80 mm flame height in 30 s, edge flame < 80 mm flame height, turned around at 90 ° with foam edge exposed = 80 mm flame height, no flaming droplets/particles - pass
Flammability - surface spread of flame to BS 476-7	Class 1
Reaction to fire performance classification to BS EN 13501-1	Class E*

The REACH Statement for the Product in respect of dangerous substances confirms no flame retardants or biocides are present.

2.5 - ANCILLARY ITEMS

Note:

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

- spray machinery including plural component proportioners (double acting positive displacement piston metering pumps) fitted with spray gun application equipment;
- non-breathable and breathable membranes;
- VCL;
- conduit/trunking;
- lining boards.

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 Product, 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

- B3(1) Internal fire spread (structure) - the Product does not prejudice the stability of walls.
- B3(4) Internal fire spread (structure) - a wall incorporating the Product can inhibit the unseen spread of fire and smoke within concealed spaces.
- C2(a) Resistance to ground moisture - the Product does not absorb water by capillary action and may therefore be used in situations where it bridges the damp proof course (DPC) of the inner and outer leaf.
- C2(b) Resistance to precipitation moisture - a wall incorporating the Product can resist rain penetration to the inner leaf and satisfy this Requirement.
- C2(c) Resistance to condensation moisture - the Product can contribute to satisfying this Requirement.
- J4 Protection of building - the Product can be separated from combustion appliances, flue pipes, fireplaces and chimneys to prevent the building catching fire.
- L1(a)(i) Conservation of fuel and power - the Product can contribute to limiting heat gains and losses through a wall.
- Regulation 7 - Materials and workmanship - the Product is manufactured from suitably safe and durable materials for its application and can be installed to give a satisfactory performance.
- Regulation 23(1) Requirements relating to thermal elements - the Product can contribute to a wall complying with the requirements of L1(a)(i).
- Regulation 26 - CO₂ emission rates for new buildings - the Product can contribute to satisfying this Requirement.
- Regulation 26A - Fabric energy efficiency rates - the Product can contribute to satisfying this Requirement.

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

- B3(1) Internal fire spread (structure) - the Product does not prejudice the stability of walls.
- B3(4) Internal fire spread (structure) - a wall incorporating the Product can inhibit the unseen spread of fire and smoke within concealed spaces.
- C2(a) Resistance to ground moisture - the Product does not absorb water by capillary action and may therefore be used in situations where it bridges the damp proof course (DPC) of the inner and outer leaf.
- C2(b) Resistance to precipitation moisture - a wall incorporating the Product can resist rain penetration to the inner leaf and satisfy this Requirement.
- C2(c) Resistance to condensation moisture - the Product can contribute to satisfying this Requirement.
- J4 Protection of building - the Product can be separated from combustion appliances, flue pipes, fireplaces and chimneys to prevent the building catching fire.
- L1(a)(i) Conservation of fuel and power - the Product can contribute to limiting heat gains and losses through a wall.
- Regulation 7 - Materials and workmanship - the Product is manufactured from suitably safe and durable materials for its application and can be installed to give a satisfactory performance.
- Regulation 23(1) Requirements relating to thermal elements - the Product can contribute to a wall complying with the requirements of L1(a)(i).
- Regulation 26 - CO₂ emission rates for new buildings - the Product can contribute to satisfying this Requirement.
- Regulation 26A - Fabric energy efficiency rates - the Product can contribute to satisfying this Requirement.
- Regulation 26B - Fabric performance values for new dwellings - the Product 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) Fitness and durability of materials and workmanship

- The Product is manufactured from acceptable materials and is considered to be 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

- 2.1 Compartmentation - a wall incorporating the Product can inhibit the spread of fire and smoke.
- 2.3 Structural protection - the Product does not prejudice the load-bearing capacity of walls.
- 2.4 Cavities - a wall incorporating the Product can inhibit the unseen spread of fire and smoke within concealed spaces.
- 3.4 Moisture from the ground - the Product can contribute to a construction satisfying this standard with reference to clause 3.4.1 of the Technical Handbooks; the Product can be used in situations where it bridges the DPC of the inner and outer leaf.
- 3.10 Precipitation - the Product can contribute to adequately protecting the building from precipitation penetrating to the inner face of the building.
- 3.15 Condensation - a wall incorporating the Product can be designed and constructed to inhibit surface and interstitial condensation.
- 3.19 Combustion appliances - relationship to combustible materials - the Product can be separated from fixed combustion appliances to prevent damage to the building.
- 6.1(b) Carbon dioxide emissions - the Product can contribute to the building reducing carbon dioxide emissions.

- 6.2 Building insulation envelope - the Product can contribute to the insulation envelope, which reduces heat loss.
- 7.1(a)(b) Statement of sustainability - the Product can contribute to satisfying the relevant requirements of Regulation 9 and Standards 1 to 6 in relation to the Technical Handbook (Domestic). The Product will therefore contribute to a construction meeting a bronze level of sustainability as defined in Standard 7.1. In addition, the Product can contribute to a construction meeting a higher level of sustainability.

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(a)(i)(iii)(b) Fitness of materials and workmanship - the Product is manufactured from materials which are considered to be suitably safe and acceptable for use as described in this Agrément.
- 28 Resistance to moisture and weather - the Product can contribute to protecting the building from the passage of moisture from the weather.
- 29 Condensation - the Product can contribute to limiting the risk of interstitial condensation.
- 35 Internal fire spread - Structure (1) - the Product does not prejudice the stability of walls.
- 35 Internal fire spread - Structure (4) - a wall incorporating the Product can inhibit the unseen spread of fire and smoke within concealed spaces.
- 39(a)(i) Conservation measures - the Product can contribute to limiting heat gains and losses through a wall.
- 40(2) Target carbon dioxide emission rate - the Product can contribute to a building not exceeding its target CO₂ emission rate.
- 43 Renovation of thermal elements - renovation work should be carried out to ensure the wall complies with requirement 39(a)(i).
- 73 Protection of people and buildings - the Product can be separated from combustion appliances, flue pipes, fireplaces and chimneys to prevent damage to the building.

3.3 - THIRD-PARTY ACCEPTANCE

NHBC - In the opinion of Kiwa Ltd., the Product, 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 6.2 External timber framed walls.

CHAPTER 4 - SOURCES

- BS EN ISO 4590:2016 Rigid cellular plastics. Determination of the volume percentage of open cells and of closed cells
- BS EN ISO 6946:2017 Building components and building elements. Thermal resistance and thermal transmittance. Calculation methods
- 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 ISO 11925-2:2010 Reaction to fire tests. Ignitability of products subjected to direct impingement of flame. Single-flame source test
- BS EN ISO 13788:2012 Hygrothermal performance of building components and building elements. Internal surface temperature to avoid critical surface humidity and interstitial condensation. Calculation methods
- BS EN 338:2016 Structural timber. Strength classes
- BS EN 1602:2013 Thermal insulating products for building applications. Determination of the apparent density
- BS EN 1604:2013 Thermal insulating products for building applications. Determination of dimensional stability under specified temperature and humidity conditions
- BS EN 1607:2013 Thermal insulating products for building applications. Determination of tensile strength perpendicular to faces
- BS EN 1609:2013 Thermal insulating products for building applications. Determination of short term water absorption by partial immersion
- BS EN 1995-1-1:2004+A2:2014 Eurocode 5: Design of timber structures. General. Common rules and rules for buildings
- 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 13238:2010 Reaction to fire tests for building products. Conditioning procedures and general rules for selection of substrates
- 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 14081-1:2016 Timber structures. Strength graded structural timber-1 with rectangular cross section. General requirements
- BS EN 14315-1:2013 Thermal insulating products for buildings. In-situ formed sprayed rigid polyurethane (PUR) and polyisocyanurate (PIR) foam products. Specification for the rigid foam spray system before installation
- BS EN 14315-2:2013 Thermal insulating products for buildings. In-situ formed sprayed rigid polyurethane (PUR) and polyisocyanurate (PIR) foam products. Specification for the installed insulation products
- BS EN 15026:2007 Hygrothermal performance of building components and building elements. Assessment of moisture transfer by numerical simulation
- BS 476-7:1997 Fire tests on building materials and structures. Method of test to determine the classification of the surface spread of flame of products
- BS 476-21:1987 Fire tests on building materials and structures. Methods for determination of the fire resistance of loadbearing elements of construction
- BS 4978:2007+A2:2017 Visual strength grading of softwood. Specification
- BS 5250:2011+A1:2016 Code of practice for control of condensation in buildings
- BS 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 8104:1992 Code of practice for assessing exposure of walls to wind-driven rain
- ISO 8301:1991 Ed 1 Thermal insulation. Determination of steady-state thermal resistance and related properties. Heat flow meter apparatus
- BRE Information Paper 1/06:2006 Assessing the effects of thermal bridging at junctions and around openings
- 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
- PAS 2030:2017 Specification for the installation of energy efficiency measures in existing buildings. Building Fabric Measures (BFM)
- SG19:2018 Thermal performance of in-situ PU polyurethane products used as thermal insulation for buildings with a new blowing agent
- NHBC Standards:2019

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
A	First issue	P. Oakley	C. Forshaw	April 19