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BAF-22-250-S-A-UK
BDA Agrément®
Jetfloor System
Beam-and-Block Floor System

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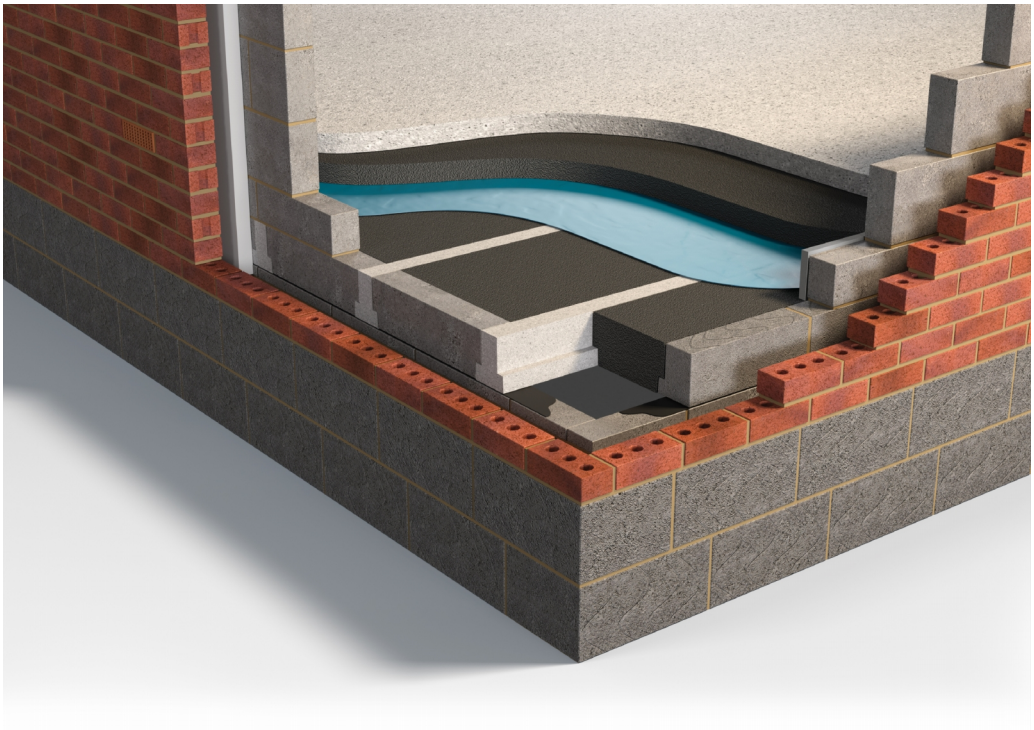
SCOPE OF AGRÉMENT

This BDA Agrément® (hereinafter 'Agrément') relates to Jetfloor System (hereinafter the 'System'). The System is a beam-and-block floor system consisting of pre-stressed concrete (hereinafter 'concrete') beams, concrete blocks and a range of expanded polystyrene (hereinafter 'EPS') components. The System is for use in suspended concrete ground floors of new residential buildings in the UK.

DESCRIPTION

The System comprises a range of concrete beams (BT02, RD09, T008 and H006), concrete blocks and EPS components (infill blocks, infill sheets, top sheets and perimeter strips). The EPS components are available in white or grey colours, manufactured in accordance with BS EN 13163 and BS EN 15037-4. The System is used in conjunction with structural concrete toppings in suspended concrete ground floors over a subfloor void.

ILLUSTRATION



THIRD-PARTY ACCEPTANCE

None requested by the Agrément holder.

STATEMENT

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

Craig Devine
Operations Manager, Building Products

Alpheo Mlotha CEng FIMMM MBA
Head of Operations, Building Products

SUMMARY OF AGRÉMENT

This document provides independent information to specifiers, specialists, engineers, building control personnel, contractors, installers and other construction industry professionals who are considering the safety and fitness for purpose of the System. This Agrément covers the following:

- Conditions of use;
- Production Control, Quality Management System and the Annual Verification Procedure;
- System components and ancillary items, points of attention for the Specifier and examples of details;
- Installation;
- Independently assessed System characteristics and other information;
- Compliance with national Building Regulations, other regulatory requirements and Third-Party Acceptance, as appropriate;
- Sources.

MAJOR POINTS OF ASSESSMENT

Moisture control - see Section 2.2.7 - when used in a correctly designed and installed System, the EPS components can contribute to suitably controlling the risk of interstitial and surface condensation.

Strength - see Section 2.2.8 - a correctly designed and installed System will have sufficient strength and rigidity to sustain and transmit both dead and imposed floor loads.

Thermal performance - see Section 2.2.9 - when used in a correctly designed and installed System, the EPS components can enable a suspended concrete ground floor to meet the requirements of the national Building Regulations in respect of thermal transmittance (hereinafter 'U-value') performance.

Durability - see Section 2.2.10 - the System shall have a service life durability equivalent to that of the building into which it is incorporated.

UKCA, UKNI and CE marking - see Section 2.2.11 - the manufacturers of the constituent products used within the System have responsibility for conformity marking, in accordance with all relevant British and European Product Standards.

CONTENTS

1 GENERAL CONSIDERATIONS

1.1 CONDITIONS OF USE

1.1.1 Limitations

This Agrément has been prepared in accordance with the mandatory requirements defined in the relevant Kiwa Technical Requirement. Some information in this Agrément is provided for guidance or reference purposes only; this information falls outside the scope of the Technical Requirement.

1.1.2 Application

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

1.1.3 Assessment

Kiwa Ltd. has assessed the System in combination with relevant test reports, technical literature, the Agrément holder's quality plan, DoPs and site visit, as appropriate.

1.1.4 Installation supervision

The quality of installation and workmanship shall be controlled by a competent person who shall be an employee of the installation company (hereinafter 'Installer').

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

1.1.5 Geographical scope

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

1.1.6 Validity

The purpose of this Agrément is to provide well-founded confidence to apply the System within the scope described. The validity of this Agrément is as published on www.kiwa.co.uk/bda.

1.2 PRODUCTION CONTROL AND QUALITY MANAGEMENT SYSTEM

Kiwa Ltd. has conducted an audit of the Agrément holder and determined that they fulfil all their obligations in relation to this Agrément in respect of the System.

The initial audit demonstrated that the Agrément holder has a satisfactory Quality Management System (QMS) and is committed to continuously improving their quality plan. Document control and record-keeping procedures were deemed satisfactory. A detailed Production Quality Specification (PQS) has been compiled to ensure traceability and compliance under the terms of this Agrément.

1.3 ANNUAL VERIFICATION PROCEDURE - CONTINUOUS SURVEILLANCE

To demonstrate that the System conforms with the requirements of the technical specification described in this Agrément, an Annual Verification Procedure has been agreed with the Agrément holder in respect of continuous surveillance and assessment, and auditing of the Agrément holder's QMS.

2 TECHNICAL ASSESSMENT

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

2.1 SYSTEM COMPONENTS AND ANCILLARY ITEMS

2.1.1 Components included within the scope of this Agrément

The components listed below are integral to the use of the System.

EPS component	Description	Product Code	Dimensions (mm)		
			Width	Thickness	Length
infill narrow block	white (λ_D 0.036 W/mK) or grey (λ_D 0.030 W/mK) EPS 90 block components with a density of 16 - 19 kg/m^3 and compressive stress (10 % deformation) levels of CS(10)90	JCN (white), JPN (grey)	343	150	1,200
infill wide block		JCW (white), JPW (grey)	533	150	1,200
top sheet	white (λ_D 0.034 W/mK) or grey (λ_D 0.030 W/mK) EPS 130 top sheet components with a density of 22 - 25 kg/m^3 and with compressive stress (10 % deformation) levels of CS(10)130	J80C (white), J80P (grey) J150C (white), J150P (grey)	1,200	80, 150	2,400
infill sheet	white (λ_D 0.036 W/mK) or grey (λ_D 0.030 W/mK) EPS 90 infill sheet components with a density of 16 - 19 kg/m^3 and compressive stress (10 % deformation) levels of CS(10)90	J100C (white), J100P (grey)	1,200	100	2,400
perimeter strips	grey (λ_D 0.030 W/mK) EPS 70 perimeter strips with a density of 14 - 17 kg/m^3 and compressive stress (10 % deformation) level of CS(10)70	P34/P35	30	75/150	1,200

Concrete beam	Description	Dimensions (mm)		
		Top and bottom widths	Height	Maximum Length
BT02	steel-reinforced concrete beams with compressive strength of C50/60, CE marked, designed, and manufactured in accordance with BS EN 15037-1	73 and 125	150	5,600
RD09		165 and 215	150	6,900
T008		77 and 135	225	8,000
H006		100 and 150	150	6,600

Concrete block	Description	Product Code	Dimensions (mm)		
			Top and bottom widths	Height	Length
narrow end beam spacer block	blocks manufactured from autoclaved aerated concrete with compressive strength of 3.6 N/mm^2 (BR100N, BR100W, BR100L) or 7.3 N/mm^2 (TS100N, TS140N, TS100W, TS140W, JL100, JL140, TCBL100, TCBL140) and categorised as Category II masonry units in accordance with BS EN 771-4	TS100N, TS140N, BR100N	340 and 295	140	100/140
wide end beam spacer block		TS100W, TS140W, BR100W	535 and 485		
edge/PSI block		JL100, JL140, BR100L	100/140 and 125/165	140	440
coursing block		TCBL100, TCBL140	100/140	65	440

2.1.2 Ancillary items falling outside the scope of this Agrément

The following ancillary items detailed in this Section may be used in conjunction with the System, but fall outside the scope of this Agrément:

- structural concrete topping and reinforcement (macro-fibre, steel fibre, micro-fibre, steel mesh);
- proprietary spacers;
- gas membrane;
- damp-proof course (hereinafter 'DPC');
- damp-proof membrane (hereinafter 'DPM');
- vapour control layer (hereinafter 'VCL').

2.2 POINTS OF ATTENTION TO THE SPECIFIER

2.2.1 Design

2.2.1.1 Design responsibility

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

2.2.1.2 Basis of design

The characteristics detailed in the section titled 'Major Points of Assessment' shall be considered during the use of the System.

2.2.1.3 General design considerations
A project-specific design is required and shall give due consideration to the combination of EPS components, concrete blocks, concrete beams, and structural concrete toppings - see Section 2.2.11.

The System shall include suitable ventilation of the subfloor void (minimum 150 mm void between the underside of the floor and the ground surface). In locations where clay heave is anticipated or has been confirmed by geotechnical investigations by a competent specialist, an additional void of up to 300 mm may be required to accommodate the possible expansion of the ground below the floor.

The overlay to the EPS components may require a VCL or gas membrane and shall consist of a structural concrete topping (nominal 70 mm thickness measured at the bearing ends with a minimum 50 mm thickness measured at the centre of a floor and minimum Class C25/30), laid in accordance with the relevant clauses of BS 8204-1, BS 8204-2, and BS 8000-9. The thickness and Class shall be checked by a qualified structural engineer on a project-specific basis. Any visible gaps between EPS components or around service openings prior to installing the concrete shall be filled using expanding foam or strips of EPS.

Loadbearing walls shall not be placed on the EPS components.

The floor shall not be loaded with construction materials until the structural concrete topping has reached its design strength.

If present, mould or fungal growth shall be treated prior to the installation of the System.

Electrical cables that are likely to come into contact with the EPS components shall be protected by a suitable conduit or PVC-U trunking. Consider de-rating of electrical cables where the System restricts the air-cooling of cables.

The performance of a floor construction will depend on the insulation properties and type of floor covering used. Resistance to concentrated and distributed loads is a function of the structural concrete topping specification. Further guidance on the suitability of floor overlays can be found in BS EN 13810-1, DD CEN/TS 13810-2, BS 8204-1, and BS EN 312.

All EPS components shall be designed and manufactured in accordance with BS EN 13163 and BS EN 15037-4.

EPS infill narrow blocks shall always be used at perimeter edges. Either EPS infill narrow or wide blocks are then used successively towards the opposite wall. Infill sheets cut to a maximum width of 343 mm can be used within the floor and along the perimeter, as and when required to suit the floor layout and as shown on the approved construction drawings.

To accommodate varying concrete beam lengths, infill units shall not be cut to less than 300 mm in length.

The concrete blocks shall be UKCA and CE marked, designed, and manufactured in accordance with BS EN 771-4.

2.2.1.4 Project-specific design considerations
The project-specific design shall:
- be determined by the Agrément holder;
- take into account the requirements of the relevant national Building Regulations - see Section 3.2;
- take into account the service life durability required - see Section 2.2.10.

No pre-installation survey is required.

2.2.2 Applied building physics (heat, air, moisture)
A Specialist shall check the hygrothermal behaviour of a project-specific design incorporating the System and, if necessary, offer advice on improvements to achieve the final specification. The Specialist can be either a qualified employee of the Agrément holder or a suitably qualified consultant (in which case it is recommended that the Specialist co-operates closely with the Agrément holder).

2.2.3 Permitted applications
Only applications designed according to the specifications given in this Agrément are permitted. In each case, the Specifier and Installer shall co-operate closely with the Agrément holder.

2.2.4 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 can be undertaken by competent persons experienced in this type of work.

2.2.5 Delivery, storage and site handling
The System components are delivered in suitable packaging bearing relevant identification information (such as the System name, production identification date or batch number, the Agrément holder's name, etc.) and, where applicable, the BDA Agrément® logo incorporating the number of this Agrément.

Prior to installation, the System components shall be stored in accordance with the Agrément holder's requirements. Good housekeeping protocols shall be followed to avoid damage.

2.2.6 Maintenance and repair
Once installed, the System does not require regular maintenance. For advice in respect of repair, consult the Agrément holder.

Performance factors in relation to the Major Points of Assessment

2.2.7 Moisture control

Condensation risk

Suspended concrete ground floors incorporating the System will adequately limit the risk of interstitial condensation when designed in accordance with BS 5250. A condensation risk analysis shall be completed by the Specifier at design stage.

In order to minimise the risk of interstitial condensation, the void space beneath the lowest point of the floor construction shall be at least 150 mm high, with provision for adequate through-ventilation in the form of ventilation openings provided in two opposing external walls. The ventilation openings shall not be less than 1,500 mm^2 per linear metre run of external wall or 500 mm^2 per square metre of floor area, whichever provides the greatest area. Pipes used to carry ventilating air shall be at least 100 mm in diameter.

When designed and installed in accordance with this Agrément, the System will contribute to a convection-free envelope of high vapour resistance.

To minimise the risk of interstitial condensation:

- at junctions with external walls, Specifiers shall ensure that wall insulation extends to at least 150 mm beyond the bottom of the concrete beam;
- at service penetrations, care shall be taken to minimise gaps in the System e.g. by filling using expanding foam.

2.2.8 Strength

General

A qualified structural engineer shall ensure that the System, including the structural concrete topping, is suitable for its intended use, including in the temporary works phase prior to the curing of the structural concrete topping.

Subject to a qualified structural engineer's project-specific design:

- where a partition wall (defined as a blockwork or stud wall) of ≤ 1 kN/m is required, this can be placed in any orientation across the floor area;
- loadbearing internal walls shall be built over concrete coursing blocks.

Partition walls:

- running parallel to the concrete beams shall be installed directly above the supporting concrete beams, or within a maximum distance from the supporting concrete beams as specified by the qualified structural engineer, who shall be consulted to ensure the structural concrete topping and concrete beams have suitable strength and stiffness to transfer the partition wall loading to supporting structural elements;
- running perpendicular to the concrete beams shall be adequately supported as per the project-specific design.

Top sheets shall not be installed with their joints in any zone of structural loading or influence.

EPS infill blocks/sheets and top sheets

EPS infill narrow and wide blocks, in conjunction with EPS top sheets, provide a formwork to the structural concrete topping. Only the top sheets contribute further to the floor's long-term structural performance in the form of load spreading once the structural concrete topping has been placed and obtained its full design strength.

Installation of the EPS infill blocks requires free movement of the concrete beams.

The structural concrete topping over the EPS infill narrow block at the perimeter, or EPS infill sheet if shown on the approved drawing, shall project no greater than 313 mm and shall be designed as a cantilevered slab. EPS infill blocks or infill sheet shall be cut accurately and squarely, and shall fit closely to the inner leaf of the wall or the perimeter insulation strip.

EPS infill narrow and wide blocks are designed to have a normal bearing of 20 mm, with a 5 mm allowance for misalignment and manufacturing tolerances in the straightness of the concrete beams. Therefore, a minimum bearing width of 15 mm shall be ensured.

Concrete beams

The concrete beams provide for the final strength of the floor, independent of any other constituent part of the System and shall be specified by the qualified structural engineer.

The project-specific configuration of the concrete beams shall be designed in accordance with BS EN 1992-1-1 by the qualified structural engineer, to ensure that the concrete beams are adequate to resist the applied loading. It shall be ensured that the natural frequency of the concrete beam exceeds 4 Hz and that the response factor of the floor to footfall vibration is in line with design guidance and industry best practice. Due design consideration shall be given to vibration from external sources or rhythmic activity.

The concrete beams shall be UKCA and CE marked, designed and manufactured in accordance with BS EN 15037-1.

The serviceability deflection limit of the proposed concrete beam shall be in accordance with BS EN 1992-1-1.

Calculations shall be made in line with the guidance and requirements of BS EN 1992-1-1 to determine the maximum effective spans of the concrete beams (making the assumption that the concrete beams are simply supporting and self-bearing). The minimum bearing width for supporting the concrete beam shall be 90 mm, as defined in BS 8103-1.

Where two or more concrete beams are placed side by side, such as under loadbearing walls, the spaces between the beam webs shall be filled with concrete (minimum Class C25/30) to give unity of action.

Structural concrete toppings

The structural concrete topping thickness and reinforcement specification shall be determined by the qualified structural engineer, in accordance with:

- BS EN 206;
- BS EN 1992-1-1;
- BS 8500-1;
- BS 8500-2;
- MPA British Precast Flooring Federation's 'Design Guide for Concrete Toppings to Beam and EPS Block Suspended Floors'.

Structural concrete toppings shall be in accordance with BS EN 206, BS 8500-1 and BS 8500-2, manufactured in plants covered by the QSRMC (Quality Scheme for Ready Mixed Concrete) scheme and laid by personnel with the appropriate skills and experience.

Due consideration shall be given to NHBC Guidance in respect of the use of reinforcements to structural concrete toppings above beam and block floors.

Where steel or polymer macro-fibre reinforcement is required by design, suitable products shall be specified and used. Consult the Agrément holder for further details.

If used:

- steel macro-fibres shall be UKCA and CE marked in accordance with BS EN 14889-1. For fresh and hardened concrete, their content shall be measured in accordance with BS EN 14721;
- polymer macro-fibres shall be UKCA and CE marked in accordance with BS EN 14889-2. For fresh and hardened concrete, their content shall be measured in accordance with BS EN 14488-7.

Structural concrete toppings reinforced only with polymer micro-fibres are not accepted on NHBC sites.

In circumstances when fibre dosage is determined by calculation, the dosage rate shall include 15 % additional fibres above the rate required that suits the design requirements, to allow for the batching process and deviations.

When reinforced with steel mesh, the structural concrete topping shall be designed in accordance with BS EN 1990 and BS EN 1992-1-1, with a maximum aggregate size of 20 mm.

The concrete specifications in Table 1 are suitable for single-family, self-contained dwelling blocks, using top sheets defined in Section 2.1.1 in accordance with the permitted imposed loads defined in Table 3.

Table 1 - Macro-polymer fibre, micro-polymer fibre and steel fibre reinforced self-compacting/standard structural concrete topping specifications

Fibre brand		**Durus EasyFinish**	**Nexus 85**	**Adfil SF86**	**FCS Zenith 60**	**Sika Fibre 1050B&BA**	**Adfil Fibrin X-T**
Fibre type		Macro-fibre		Steel fibre			Micro-fibre
Fibre material		Macro-synthetic fibre		Steel			Monofilament polypropylene
Standard		BS EN 14889-2		BS EN 14889-1			BS EN 14889-2
Fibre class		II	-	II	-	-	Ia
Minimum thickness of concrete topping ends (mm)		70					
Minimum thickness of concrete topping centres (mm)		50					
Minimum thickness above services (mm)		50					
Minimum Grade		C20/25					
Maximum aggregate size[i] (mm)	Self-compacting concrete[ii]	20					
	Standard concrete[ii]	20					
Minimum dosage (kg/m^3)		2.5	2.25	7.5	11.5		0.91

[i] the aggregate for concrete shall comply with BS EN 12620

[ii] concrete specification and workability shall be selected as appropriate for the intended installation method, in accordance with BS 8500-1 and BS EN 206

The concrete specifications in Table 2 are suitable for single-family, self-contained dwelling blocks with the permitted imposed loads defined in Table 3.

Table 2 - Self-compacting/standard structural concrete topping specifications

Mesh		**A142**[i]
Standard		BS 4483
Minimum thickness of concrete topping ends (mm)		70
Minimum thickness of concrete topping centres (mm)		50
Minimum Grade		C20/25
Maximum aggregate size[ii] (mm)	Self-compacting concrete[iii]	10
	Standard concrete[iii]	20

[i] structural mesh shall be sized and designed in accordance with BS EN 1990, BS EN 1991-1-1 and BS EN 1992-1-1

[ii] the aggregate for concrete shall comply with BS EN 12620

[iii] concrete specification and workability shall be selected as appropriate for the intended installation method in accordance with BS 8500-1 and BS EN 206

Table 3 - Imposed and partition floor loads for structural concrete toppings reinforced with steel fibres, micro-polymer fibres, macro-polymer fibres and steel mesh, in accordance with BS EN 1991-1-1

Description	Characteristic value of loads
	Residential buildings
Uniformly distributed load (UDL) q_k (kN/m^2)	1.5-2
Concentrated load Q_k (kN)	2-3
Partition loading, perpendicular and parallel to concrete beams (kN/m)	3
Allowance for moveable partitions (kN/m^2) when self-weight ≤ 3.0 kN/m	1.2

Imposed concentrated loads:

- shall not be combined with imposed uniformly distributed loads or other variable actions;
- for residential buildings is assumed to be applied over a square plate of an area not less than 50 mm by 50 mm.

Do not combine distributed loads with point loads or with line loads (self-weight of partition walls).

2.2.9 Thermal performance

For the purpose of U-value calculations and to determine if the requirements of the national Building Regulations are met, thermal resistances shall be calculated according to BRE Report 443 and BS EN ISO 10211, using the declared thermal conductivities (λ_D) values given in Section 2.5.4. The recommendations of the 'Thermal Bridging Guide' shall also be observed.

The requirement for limiting heat loss through the building fabric, including the effect of thermal bridging, can be satisfied if the U-values of the building elements do not exceed the maximum values in the relevant Elemental Methods given in the national Building Regulations. Further information with respect to national Building Regulations is given in Section 3 of this Agrément.

Junction linear thermal transmittance (ψ) values

The Agrément holder provides a design service to maximise the benefit of the System in improving ψ-values, including external walls (perpendicular and parallel), party walls, thresholds and temperature factors. Care shall be taken in the overall design and construction of junctions with other elements 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 IP 1/06, BRE Report 262 and BRE Report 497. Modelling can be undertaken according to BRE Report 497. Consult the Agrément holder for further details. See Section 2.5.4.

2.2.10 Durability

The System shall have a service life durability equivalent to that of the building into which it is incorporated. The expected lifespan of the building itself shall be at least 60 years.

The EPS components in the System are protected from the majority of agents likely to cause deterioration and will remain effective as insulation for the life of the building. However, EPS components may deteriorate when subjected to volatile organic compounds (VOCs) or other gases, and where such conditions apply, an assessment shall be made by a suitably qualified person to determine the compatibility of the EPS components with any potential emissions.

2.2.11 UKCA, UKNI and CE marking

The aerated concrete blocks shall be CE marked, designed and manufactured in accordance with BS EN 771-4. All EPS components shall be designed and manufactured in accordance with BS EN 13163 and BS EN 15037-4. The concrete beams shall be CE marked, designed, and manufactured in accordance with BS EN 15037-1.

2.3 EXAMPLES OF TYPICAL DETAILS

Diagram 1 - BT02 concrete beam section

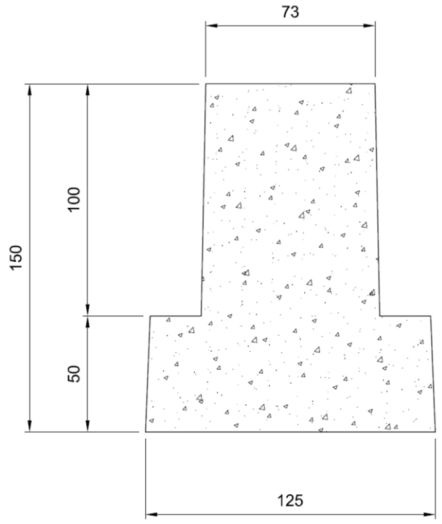


Diagram 2 - RD09 concrete beam section

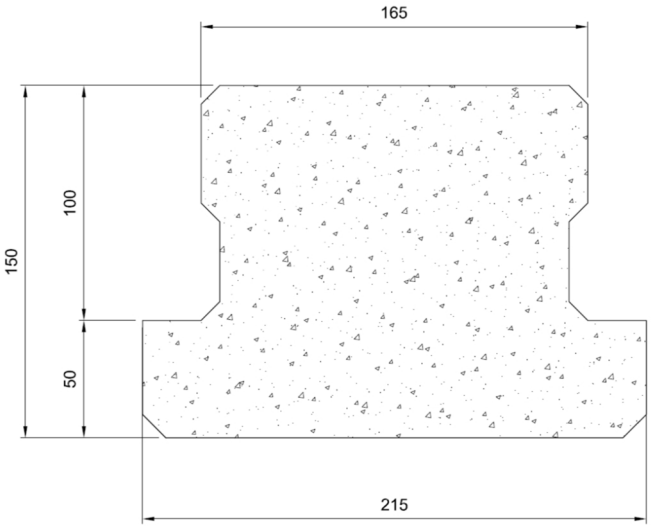


Diagram 3 - T008 beam section

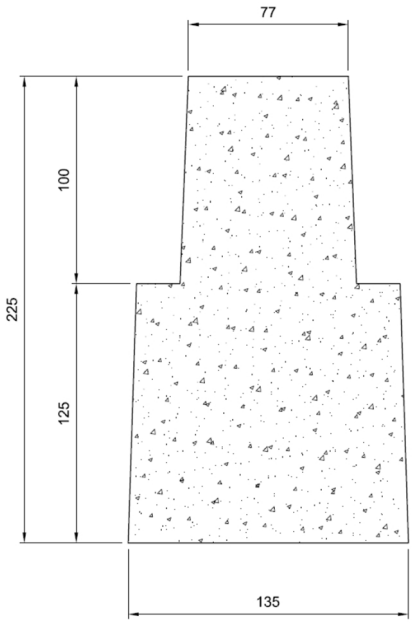


Diagram 4 - H006 beam section

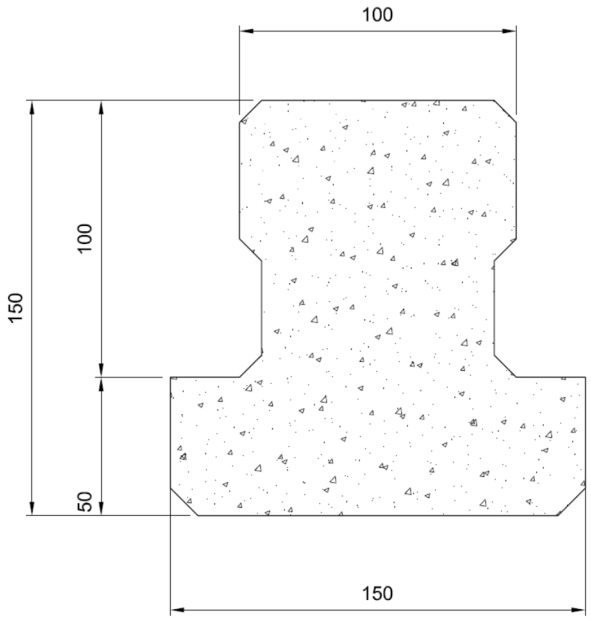
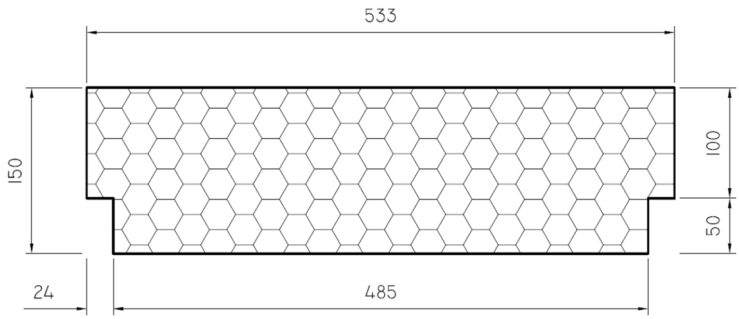
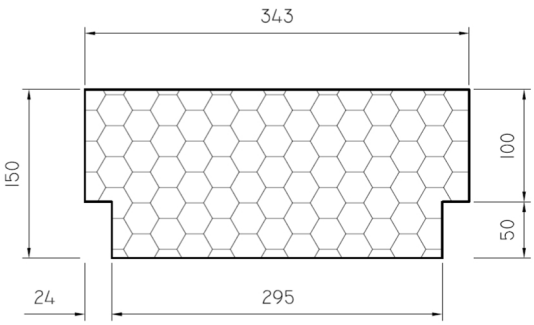


Diagram 5 - Typical EPS components sections



wide infill block
JCW / JPW



narrow infill block
JCN / JPN

Diagram 6 - Typical aerated concrete blocks sections

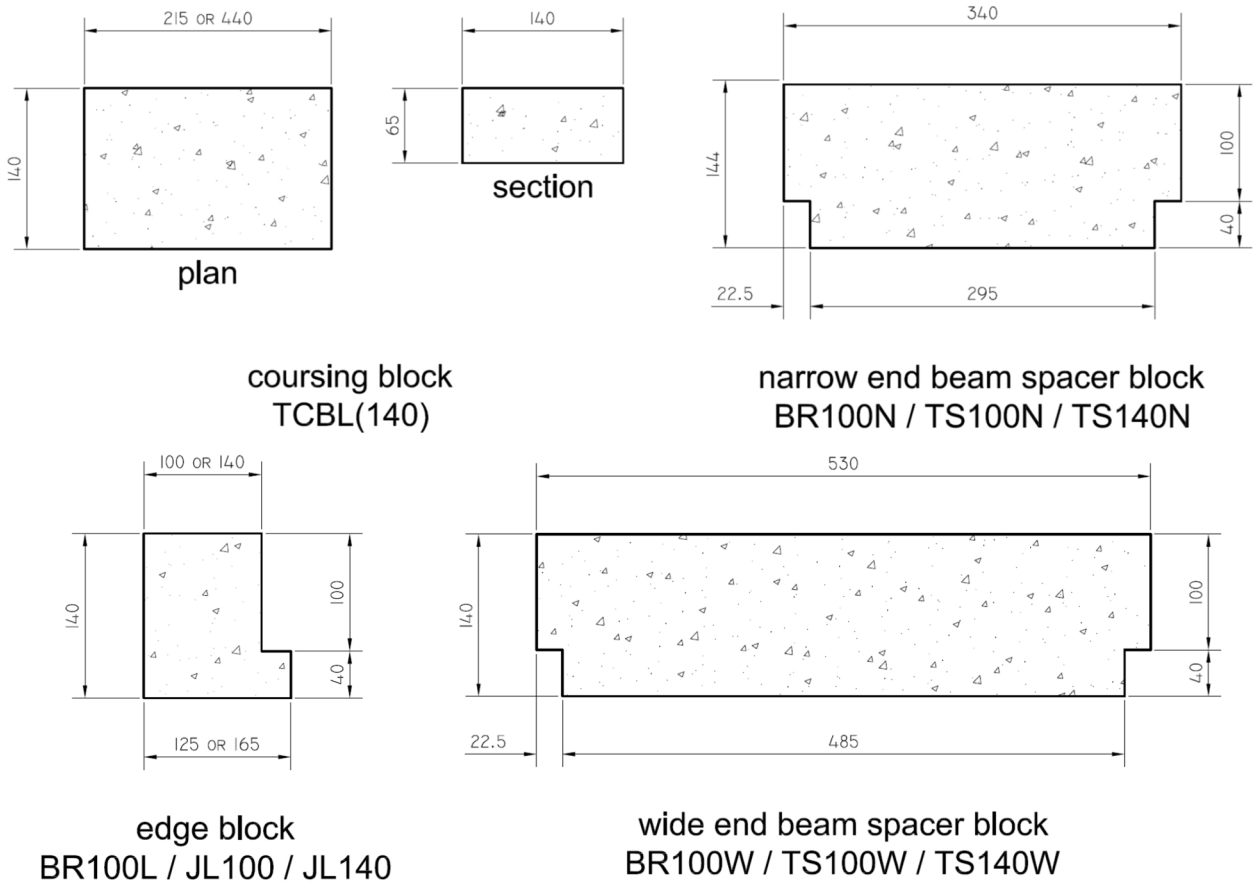
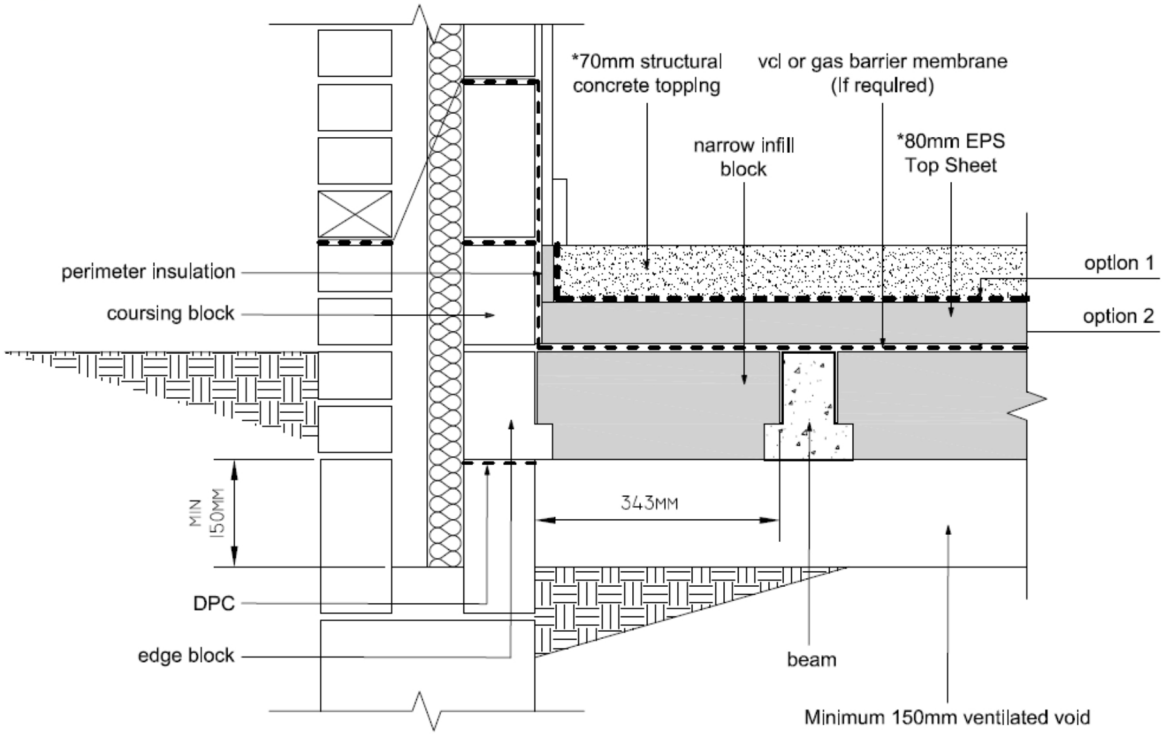


Diagram 7 - Typical installation example of a wall junction



construction adjacent wall

* 150mm EPS topsheet can also be used with 75mm concrete topping

Diagram 8 - Standard construction with RD09 beam

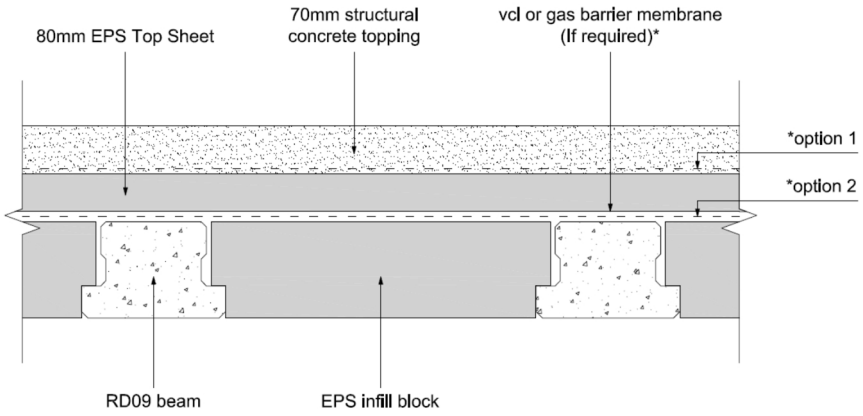


Diagram 9 - Standard construction with T008 beam

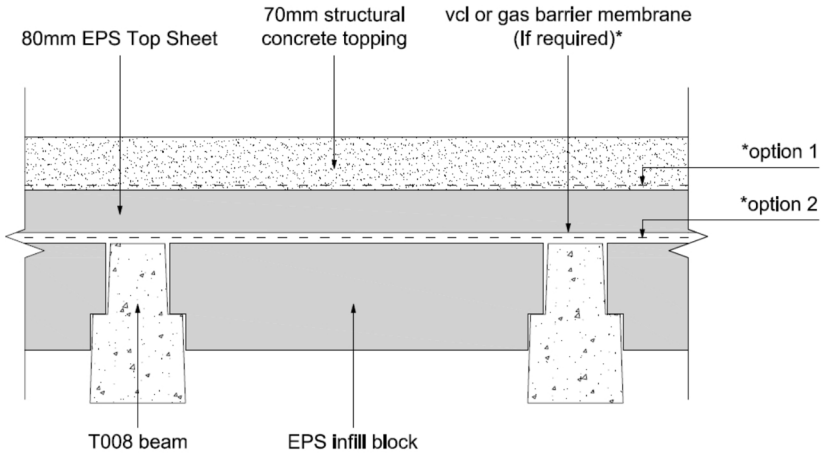
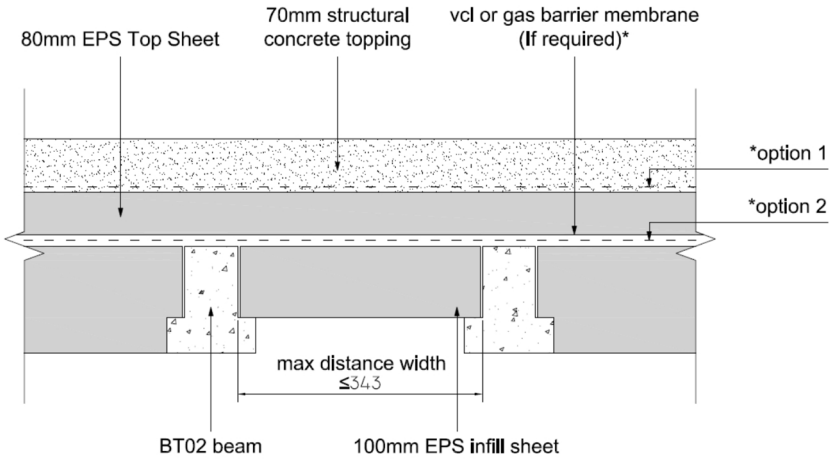


Diagram 10 - Standard construction with infill sheet



2.4 INSTALLATION

The System shall be installed strictly in accordance with the instructions (hereinafter 'Installation Manual') of the Agrément holder, the requirements of this Agrément and the requirements of BS 8000-0.

2.4.1 Project-specific installation considerations

No pre-installation survey is required.

2.4.2 Preparation

The following considerations apply before starting the work:

- the underfloor void shall be a minimum of 150 mm and, where the ground has clay heave potential, the void shall be increased accordingly;
- where there are either land drains or good natural drainage, the ground level beneath the floor does not need to be raised to the external ground level;
- the surface base beneath the void shall be laid level and free of topsoil and vegetation. Any material used to level the surface shall be hard and dry;
- sufficient time shall be allowed for the mortar in supporting substructure walls to reach its full design strength prior to the laying of the concrete beams, which, in turn, shall be laid on a continuous DPC, in accordance with CP 102;
- underfloor ventilation shall be provided to the subfloor void. Wall ties and concrete cavity fill shall be incorporated in the substructure masonry to ensure structural integrity.

The following works shall be undertaken before installing the System:

- a continuous DPC shall be laid along the supporting wall below the floor, in accordance with BS 8102;
- supporting walls shall be constructed in advance of the floor being installed, to allow the mortar to reach its full design strength.

2.4.3 Outline installation procedure

Detailed installation procedures can be found in the Agrément holder's Installation Manual.

The outline procedure is as follows:

- lay the concrete beams on top of the DPC at the approximate locations and centres;
- place the concrete perimeter edge or PSI blocks at either end of the plot, parallel to the concrete beams;
- place the concrete narrow or wide end beam spacer blocks at the approximate locations and centres;
- position the concrete beams accurately and tightly against the concrete narrow or wide end beam spacer blocks; if multiple concrete beams are used in the layout, secure the beams together using concrete;
- install the EPS infill narrow or wide blocks; where necessary, cut them with a handsaw or core drill to suit service hole locations;
- cut and lay the EPS infill sheet as required;
- embed the concrete coursing blocks and PSI blocks around the perimeter, including vertical joints, and allow to cure;
- install the EPS perimeter edge insulation strips against the perimeter wall;
- lay the EPS top sheet over the floor; where necessary, cut with a handsaw to accommodate service holes;
- where required, install a DPM and or a gas barrier membrane. Sufficient membrane shall be allowed over the footprint of the building to protect the edges from excess concrete. Either membrane can be installed above or below the EPS top sheet as required.

2.4.4 Finishing

The following finishing is required on completion of the installation:

- position proprietary spacers. If a steel mesh is specified, over the floor at the required centres, propriety spacers shall be installed to position the steel mesh at the mid height level;
- pour the specified structural concrete topping carefully, from a height no greater than 500 mm, ensuring heaping is no higher than 300 mm;
- finish the structural concrete topping as per the project-specific design. Temporary weather protection may be required.

2.5 INDEPENDENTLY ASSESSED SYSTEM CHARACTERISTICS

2.5.1 Moisture control

Test	Standard	Result				
		EPS White		EPS Grey		
		90	130	70	90	130
Water vapour diffusion resistance factor, μ	BS EN 13163	30 - 70		20 - 40	30 - 70	

2.5.2 Strength

Test	Standard	Result				
		EPS White		EPS Grey		
		90	130	70	90	130
Mechanical resistance	BS EN 15037-4	R1		R1		
Compressive stress at 10 % deformation	BS EN 826	90 kPa	130 kPa	70 kPa	90 kPa	130 kPa

2.5.3 Fire performance

Test	Standard	Result				
		EPS White		EPS Grey		
		90	130	70	90	130
Reaction to fire	BS EN 13501-1	E		E		

2.5.4 Thermal performance

Test	Standard	Result				
		EPS White		EPS Grey		
		90	130	70	90	130
Thermal conductivity λ_D	BS EN 12667	0.036 W/mK	0.034 W/mK	0.030 W/mK	0.030 W/mK	0.030 W/mK

Calculation	Junction detail	Result Ψ
Psi junction Ψ for junctions between a grey Jetfloor with 80 mm top sheet and a wall with a U-value of 0.258 W/m^{2}K	external wall parallel	0.048 W/mK
	external wall perpendicular	0.062 W/mK
	partition within same dwelling	0.056 W/mK
	separating wall value	0.058 W/mK

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 THE NATIONAL BUILDING REGULATIONS

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

This Agrément shall not be construed to confer the compliance of any project-specific design with the national Building Regulations.

3.2.1 England

The Building Regulations 2010 and subsequent amendments

- A1Loading - a correctly designed and installed System can sustain and transmit dead and imposed floor loads to the ground
- C2(c) Resistance to moisture - the System will contribute to limiting the risk of surface and interstitial condensation
- L1(a)(i) Conservation of fuel and power - the System will limit heat gains and losses through a floor
- Regulation 7(1) Materials and workmanship - the System is manufactured from suitably safe, durable materials for the application and can be installed to give a satisfactory performance
- Regulation 26 CO_2 emission rates for new buildings - the System will contribute to a building to not exceed its CO_2 emission rate
- Regulation 26A Fabric energy efficiency rates for new dwellings - the System will contribute to satisfying this Requirement
- Regulation 26C Fabric energy efficiency rates for new dwellings - the System will contribute to satisfying this Requirement

3.2.2 Wales

The Building Regulations 2010 and subsequent amendments

- A1 Loading - a correctly designed and installed System can sustain and transmit dead and imposed floor loads to the ground
- C2(c) Resistance to moisture - the System will contribute to limiting the risk of surface and interstitial condensation
- L1(a)(i) Conservation of fuel and power - the System will limit heat gains and losses through a floor
- Regulation 7(1) Materials and workmanship - the System is manufactured from suitably safe, durable materials for the application and can be installed to give a satisfactory performance
- Regulation 26 CO_2 emission rates for new buildings - the System will contribute to a building to not exceed its CO_2 emission rate
- Regulation 26A Primary energy consumption rates for new buildings - the System will contribute to satisfying this Requirement
- Regulation 26B Fabric performance values for new dwellings - the System will contribute to satisfying this Requirement
- Regulation 26C Fabric energy efficiency rates for new dwellings - the System will contribute to satisfying this Requirement

3.2.3 Scotland

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

3.2.3.2 Regulation 9 Building Standards - Construction

- 1.1 Structure - a correctly designed and installed System can sustain and transmit the design loads to the ground
- 3.15 Condensation - the System will contribute to limiting the risk of surface and interstitial condensation
- 6.1(b) Carbon dioxide emissions - the System will contribute to reducing carbon dioxide emissions of a building
- 6.2 Building insulation envelope - the System will contribute to the insulation envelope to resist thermal transfer
- 7.1(a)(b) Statement of sustainability - the System can contribute to satisfying the relevant Requirements of Regulation 9, Standards 1 to 6, and will therefore contribute to a construction meeting a bronze level of sustainability as defined in this Standard. In addition, the Product can contribute to a construction meeting a higher level of sustainability, as defined in this Standard

3.2.3.3 Regulation 12 Building Standards - Conversions

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

3.2.4 Northern Ireland

The Building Regulations (Northern Ireland) 2012 and subsequent amendments

- 23(1)(i)(iii)(b) Fitness of materials and workmanship - the System is manufactured from materials which are considered to be suitably safe and acceptable for use as thermal insulation
- 29 Condensation - the System will contribute to limiting the risk of surface and interstitial condensation
- 30 Stability - a correctly designed and installed System can sustain and transmit dead and imposed floor loads to the ground
- 39(a)(i) Conservation measures - the System will contribute to satisfying this Requirement
- 40(2) Target carbon dioxide emission rate - the System will contribute to reducing carbon dioxide emissions of a building

3.3 THIRD-PARTY ACCEPTANCE

None requested by the Agrément holder.

4 SOURCES

- BS EN ISO 9001:2015 Quality management systems. Requirements
- BS EN ISO 10211:2017 Thermal bridges in building construction. Heat flows and surface temperatures. Detailed calculations
- BS EN 206:2013+A2:2021 Concrete. Specification, performance, production and conformity
- BS EN 312:2010 Particleboards. Specifications
- BS EN 771-4:2011+A1:2015 Specification for masonry units. Autoclaved aerated concrete masonry units
- BS EN 826:2013 Thermal insulating products for building applications. Determination of compression behaviour
- BS EN 1990:2002+A1:2005 Eurocode. Basis of structural design
- NA to BS EN 1990:2002+A1:2005 UK National Annex for Eurocode. Basis of structural design
- BS EN 1991-1-1:2002 Eurocode 1. Actions on structures. General actions. Densities, self-weight, imposed loads for buildings
- NA to BS EN 1991-1-1:2002 UK National Annex to Eurocode 1. Actions on structures. General actions. Densities, self-weight, imposed loads for buildings
- BS EN 1992-1-1:2004+A1:2014 Eurocode 2: Design of concrete structures. General rules and rules for buildings
- NA+A2:2014 to BS EN 1992-1-1:2004+A1:2014 UK National Annex to Eurocode 2. Design of concrete structures. General rules and rules for buildings
- BS EN 12620:2002+A1:2008 Aggregates for concrete
- 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 13163:2012+A2:2016 Thermal insulation products for buildings. Factory made expanded polystyrene (EPS) products. Specification
- BS EN 13501-1:2018 Fire classification of construction products and building elements. Classification using data from reaction to fire tests
- BS EN 13810-1:2002 Wood-based panels. Floating floors. Performance specifications and requirements
- BS EN 14488-7:2006 Testing sprayed concrete. Fibre content of fibre reinforced concrete
- BS EN 14721:2005+A1:2007 Test method for metallic fibre concrete. Measuring the fibre content in fresh and hardened concrete
- BS EN 14889-1:2006 Fibres for concrete. Steel fibres. Definitions, specifications and conformity
- BS EN 14889-2:2006 Fibres for concrete. Polymer fibres. Definitions, specifications and conformity
- BS EN 15037-1:2008 Precast concrete products. Beam-and-block floor systems. Beams
- BS EN 15037-4:2010+A1:2013 Precast concrete products. Beam-and-block floor systems. Expanded polystyrene blocks
- BS 4483:2005 Steel fabric for the reinforcement of concrete. Specification
- BS 5250:2021 Management of moisture in buildings. Code of practice
- BS 8000-0:2014 Workmanship on construction sites. Introduction and general principles
- BS 8000-9:2003 Workmanship on building sites. Cementitious levelling screeds and wearing screeds. Code of practice
- BS 8102:2022 Protection of below ground structures against water ingress. Code of practice
- BS 8103-1:2011 Structural design of low-rise buildings. Code of practice for stability, site investigation, foundations, precast concrete floors and ground floor slabs for housing
- BS 8204-1:2003+A1:2009 Screeds, bases and in situ floorings. Concrete bases and cementitious levelling screeds to receive floorings. Code of practice
- BS 8204-2:2003+A2:2011 Screeds, bases and in situ floorings. Concrete wearing surfaces. Code of practice
- BS 8500-1:2015+A2:2019 Concrete. Complementary British Standard to BS EN 206. Method of specifying and guidance for the specifier
- BS 8500-2:2015+A2:2019 Concrete. Complementary British Standard to BS EN 206. Specification for constituent materials and concrete
- BRE Information Paper IP 1/06:2006 Assessing the effects of thermal bridging at junctions and around openings
- BRE Report 262:2002 Thermal insulation: avoiding risks
- BRE Report 443:2019 Conventions for U-value calculations
- BRE Report 497:2016 Conventions for calculating linear thermal transmittance and temperature factors
- CP 102:1973 Code of practice for protection of buildings against water from the ground
- DD CEN/TS 13810-2:2003 Wood-based panels. Floating floors. Test methods
- MPA British Precast Flooring Federation, September 2017: Design Guide for Concrete Toppings to Beam and EPS Block Suspended Floors
- Zero Carbon Hub 2016 Thermal Bridging Guide. An introductory guide to thermal bridging in homes

Remark - Apart from these sources, technical information and confidential reports have been assessed; any relevant documents are in the possession of Kiwa Ltd. and are kept in the Technical Assessment File of this Agrément. The Installation Manual for the System may be subject to change; contact the Agrément holder for the clarification of revisions.

5 AMENDMENT HISTORY

Revision	Amendment description	Author	Approver	Date
-	First issue	A Chapman	C Devine	September 2023

6 CONDITIONS OF USE

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