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BAF-17-017-S-A-UK
BDA Agrément®
Stylite T-Beam System
Beam-and-Block Floor System

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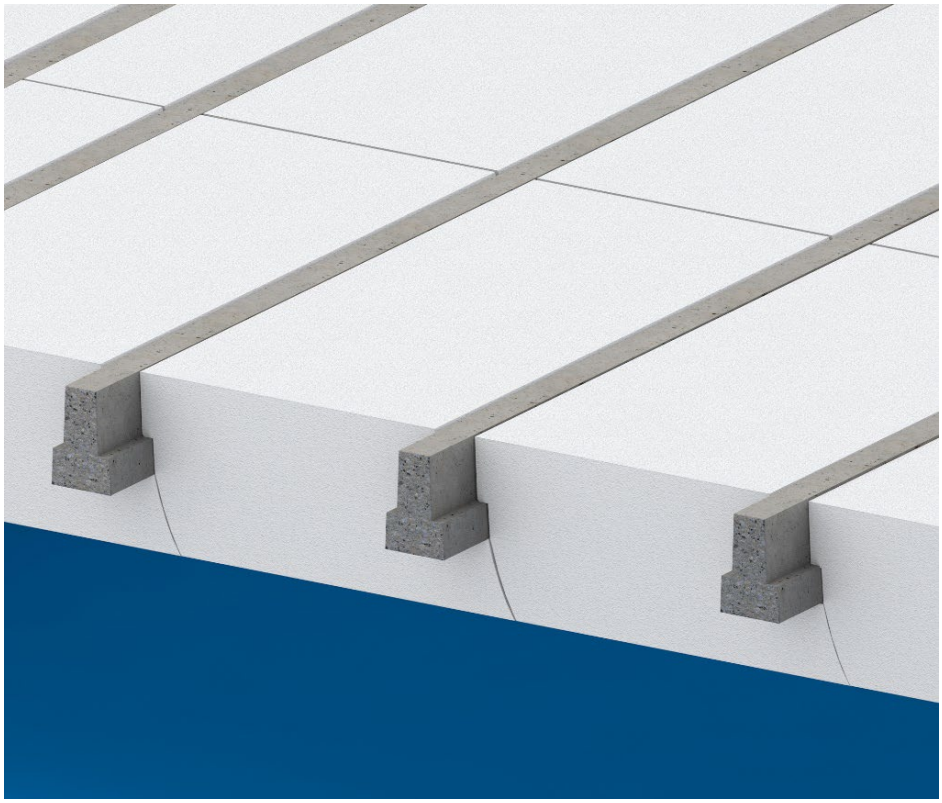
SCOPE OF AGRÉMENT

This Agrément relates to the Stylite T-Beam System (hereinafter the 'System'), a range of expanded polystyrene (hereinafter 'EPS') units. The System is for use as thermal insulation in suspended concrete ground floors in new domestic, residential and commercial buildings in the UK.

DESCRIPTION

The System comprises infill units formed from Stylite T-Beam (white) EPS and Stylite T-Beam Plus (grey) EPS, manufactured in accordance with BS EN 15037-4 and BS EN 13163, as applicable. The System is used in conjunction with perimeter edge strips, structural concrete toppings, pre-stressed concrete (hereinafter 'concrete') beams, and masonry closure and coursing blocks (manufactured by others) in suspended concrete ground floors over a subfloor void.

ILLUSTRATION



THIRD-PARTY ACCEPTANCE

See Section 3.3 (Third-Party Acceptance).

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
Business Unit Manager, Building Products

SUMMARY OF AGRÉMENT

This document provides independent information to specifiers, building control personnel, contractors, installers and other construction industry professionals considering the safety and fitness for the intended use 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

Thermal performance - when used in a correctly designed and installed System, the EPS units 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 (see section 2.2.9).

Moisture control - when used in a correctly designed and installed System, the EPS units can contribute to suitably controlling the risk of interstitial and surface condensation (see section 2.2.10).

Strength - the System has adequate strength to carry short-term loads likely to be encountered during the construction of a floor but makes no further loadbearing contribution once the structural concrete topping has achieved full strength (see section 2.2.11).

Durability - the System shall have a service life durability equivalent to that of the building into which it is incorporated (see section 2.2.12).

CE marking - the Agrément holder has responsibility for CE marking in accordance with all relevant harmonised European Product Standards (see section 2.2.13).

CONTENTS

CHAPTER 1 - GENERAL CONSIDERATIONS

1.1 - CONDITIONS OF USE

1.1.1 Design considerations
See section 2.2.

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 must be controlled by a competent person who must be an employee of the installation company.

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 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.

1.2 - PRODUCTION CONTROL AND QUALITY MANAGEMENT SYSTEM

Kiwa Ltd. has determined that the Agrément holder fulfils all 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.

CHAPTER 2 - TECHNICAL ASSESSMENT

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

2.1 - SYSTEM COMPONENTS AND ANCILLARY ITEMS

2.1.1 Components included within the scope of this Agrément
The following components are integral to the use of the System:

Component	Description	EPS grade	Dimensions (mm)			
			Top Width	Toe Width	Thickness	Length
starter infill	Stylite T-Beam (white) EPS units and Stylite T-Beam Plus (grey) EPS units with compressive stress (10 % deformation) level of CS(10)100	EPS 100	300	400, 500, 600	230 - 500	1200
end infill			300	300		
standard infill			540	640, 740, 840		
half infill			270	370, 470, 570		

2.1.2 Ancillary items falling outside the scope of this Agrément
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, for transferring loads to the concrete beams;
- concrete beams, for transferring loads to the supporting primary structure; the concrete beams shall be CE marked, designed and manufactured in accordance with BS EN 15037-1;
- PlusTherm perimeter edge strip, for insulating the perimeter of the structural concrete topping and reducing cold bridging;
- vapour control layer (hereinafter 'VCL'), to reduce the risk of condensation, compatible with EPS units;
- gas membrane, to provide a barrier against harmful ground gases, compatible with EPS units;
- masonry standard and half-closure blocks, for use as the inner leaf of a wall;
- coursing blocks, for use as the inner leaf of a wall;
- expanding foam, to fill gaps between EPS units or around service openings;
- damp-proof course (hereinafter 'DPC'), for protection of the structure against water from the ground.

2.2 - POINTS OF ATTENTION TO THE SPECIFIER

2.2.1 Design responsibility
A Specifier may undertake a project-specific design, in which case it is recommended that the Specifier co-operates closely with the Agrément holder. The Specifier or installing contractor is responsible for the final as-built design.

2.2.2 Applied building physics (heat, air, moisture)
A competent specialist shall check the hygrothermal behaviour of a project-specific design incorporating the System and, if necessary, can offer advice in respect of 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 consultant Specialist co-operates closely with the Agrément holder).

2.2.3 General design considerations
A project-specific design is required and shall give due consideration to the combination of EPS units, 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 units shall consist of a VCL or gas membrane and a structural concrete topping (minimum 65 mm thickness), laid in accordance with the relevant clauses of BS 8204-1 and/or BS 8204-2, and BS 8000-9. Any gaps between EPS units or around service openings, visible prior to installing the concrete, shall be filled using expanding foam or strips of EPS.

Loadbearing walls shall not be placed on the EPS units.

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

Electrical cables that are likely to come into contact with the EPS units shall be protected by a suitable conduit or PVC-U trunking. Consider de-rating 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. When the System is used under a concrete slab, resistance to concentrated and distributed loads is a function of the slab 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.

2.2.4 Project-specific design considerations
The project-specific design shall take into account the service life durability required - see section 2.2.12.

The project-specific design shall take into account the requirements of the national Building Regulations - see section 3.2.

No pre-installation survey is required for installation.

2.2.5 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.

2.2.6 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 sort of work.

2.2.7 Delivery, storage and site handling
The System is delivered to site in suitable packaging, bearing the System name, the Agrément holder's name and the BDA Agrément® logo incorporating the number of this Agrément.

Prior to installation, store the System components in accordance with the Agrément holder's requirements. When required, particular care shall be taken to:
- avoid exposure to direct sunlight for extended periods of time;
- avoid exposure to high or low temperatures for extended periods of time;
- store in a well-ventilated covered area to protect from rain, frost and humidity;
- store away from possible ignition sources;
- stack off the ground to avoid contamination;
- avoid contact with organic solvents;

EPS units with extended toe widths require handling with extra care.

2.2.8 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

2.2.9 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 2.5.1. The recommendations of the Thermal Bridging Guide shall also be observed.

The Agrément holder can provide a service for 2D and 3D calculations for numerically modelled EPS beam-and-block configurations, complying with BS EN ISO 13370, BS EN ISO 10211 and BRE Report 497.

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 Chapter 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, BRE Report 497 and PAS 2030. Modelling can be undertaken according to BRE Report 497. Consult the Agrément holder for further details.

Default typical ψ-values are given in SAP 2012.

2.2.10 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 1500 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, for example by filling using expanding foam.

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

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, subject to the Structural Engineer's project-specific design.

Partition walls:

- running parallel to the concrete beams shall be installed directly above, or within a maximum distance from the supporting concrete beams specified by the Structural Engineer, who shall be consulted to ensure the structural concrete topping and concrete beam(s) 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.

Infill units

Infill units provide a formwork to the structural concrete topping. They make no further contribution to the long-term structural performance of the floor in the form of load spreading once the structural concrete topping has been placed and obtained its full design strength.

Installation of the infill units requires free movement of the concrete beams. This will also assist with fitting multiple concrete beams and thicker infill units.

Concrete beams shall not be placed in contact with parallel walls as this creates a cold bridge.

It is good practice to begin each bay with a starter infill unit and to continue installing EPS units in the direction of the toe, working towards the opposite wall. Changes in direction shall be avoided, as this could lead to gaps in the System.

The structural concrete topping over the starter/end infill units shall project no greater than 300 mm and shall be designed as a cantilevered slab. End infill units can be cut from full or half units, accurately and squarely, so they fit closely to the inner leaf of the wall.

To accommodate varying concrete beam lengths, infill units shall not be cut to less than 300 mm in length and shall be positioned at the floor edges.

Infill units 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, independently of any other constituent part of the System. The concrete beams are outside the scope of this Agrément and shall be specified by the Structural Engineer. The following information is given for guidance.

The project-specific configuration of the concrete beams shall be designed in accordance with BS EN 1992-1-1 by the 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 floor's response factor 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 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 infilled with a minimum strength class concrete of C25/30 to give unity of action.

Structural concrete toppings

The structural concrete topping thickness and reinforcement specification shall be determined by the Structural Engineer in accordance with:

- BS 8500-1;
- BS 8500-2;
- BS EN 206;
- BS EN 1992-1-1;
- MPA British Precast Flooring Federation: '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 relevant third-party guidance in respect of the use of reinforcement to structural concrete toppings above beam-and-block floors where appropriate.

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.

Steel macro-fibres, if used, shall be 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, if used, shall be 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 may not be accepted on sites with third-party requirements.

In all instances where fibres are used, their dosage rates shall include 15 % additional fibres above the rate required for 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 and communal areas in blocks of flats, using infill units 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**	**Durus S400**	**Adfil SF86**	**Fibrin X-T**	**Fibrin 23**
Fibre type		Macro-fibre		Steel fibre	Micro-fibre	
Fibre material		Polymer		Steel	Monofilament polypropylene	Polypropylene
Standard		BS EN 14889-2		BS EN 14889-1	BS EN 14889-2	
Fibre class		II			Ia	
Overall thickness above services (mm)		65				
Minimum Grade		C25/30				
Maximum aggregate size[i] (mm)	Self-compacting concrete[ii]	10				
	Standard concrete[ii]	20				
Dosage (kg/m^3)		3.00	5.00	13.33	0.91	0.90

[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, communal areas in blocks of flats and commercial buildings with the permitted imposed loads defined in Table 3.

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

Mesh		**A142**	**A142**	**Steel[i]**
Standard		BS 4483		
Overall thickness above services (mm)		75	65[ii]	75
Minimum Grade		C25/30	C20/25	C25/30
Maximum aggregate size[iii] (mm)	Self-compacting concrete[iv]	10		
	Standard concrete[iv]	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] 65 mm thick is for residential use only and, when installed over underfloor heating, a minimum thickness above services of 75 mm shall be maintained

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

[iv] 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	**Commercial buildings[i]**
Uniformly distributed load (UDL) q_k (kN/m^2)	1.5	5.0
Concentrated load Q_k (kN)	2.0	4.5
Partition loading, perpendicular and parallel to concrete beams (kN/m)	3.0	5.0
Allowance for moveable partitions (kN/m^2) when self-weight ≤ 3.0 kN/m	1.0	1.0

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

Imposed concentrated load:

- shall not be combined with imposed uniformly distributed load 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 line loads (self-weight of partition walls).

2.2.12 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 should 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.

2.2.13 CE marking

The harmonised European standards for the System are BS EN 15037-4 and BS EN 13163 as applicable.

2.3 - EXAMPLES OF TYPICAL DETAILS

Diagram 1 - Standard and extended toe infill profiles, for use with 150 mm by 100 mm concrete beams

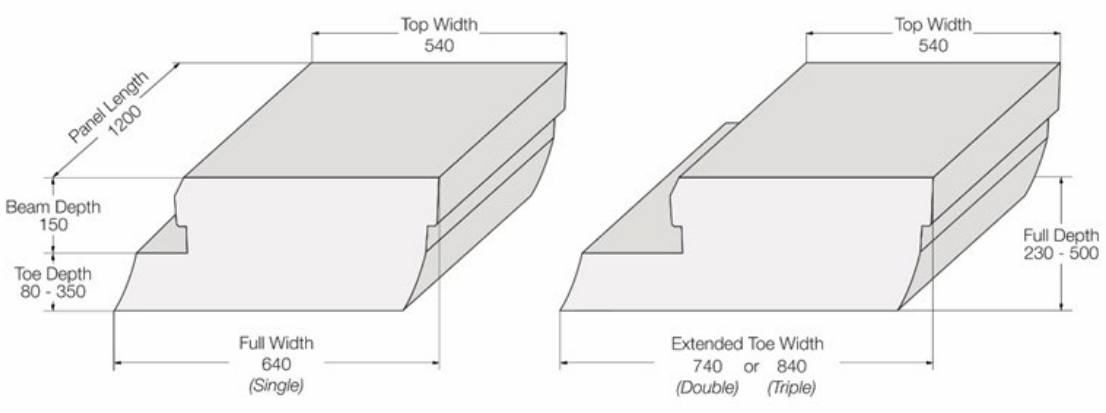


Diagram 2 - Starter and extended toe infill profiles, for use with 150 mm by 100 mm concrete beams

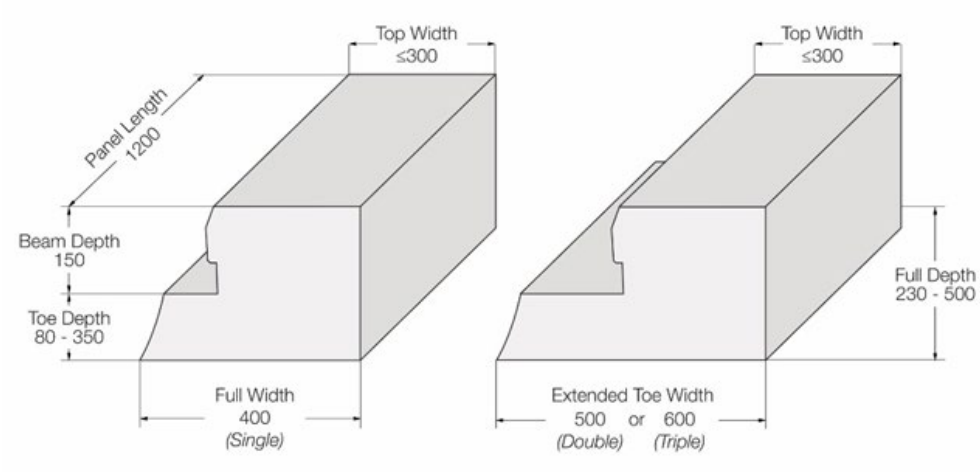


Diagram 3 - Half and extended toe infill profiles, for use with 150 mm by 100 mm concrete beams

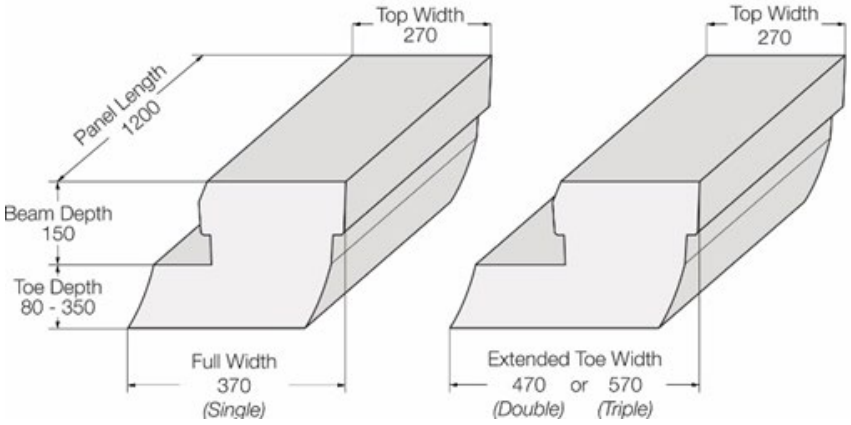


Diagram 4 - End infill profile, for use with 150 mm by 100 mm concrete beams

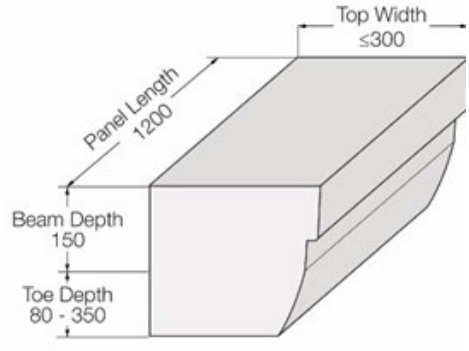


Diagram 5 - Starter infill unit wall junction

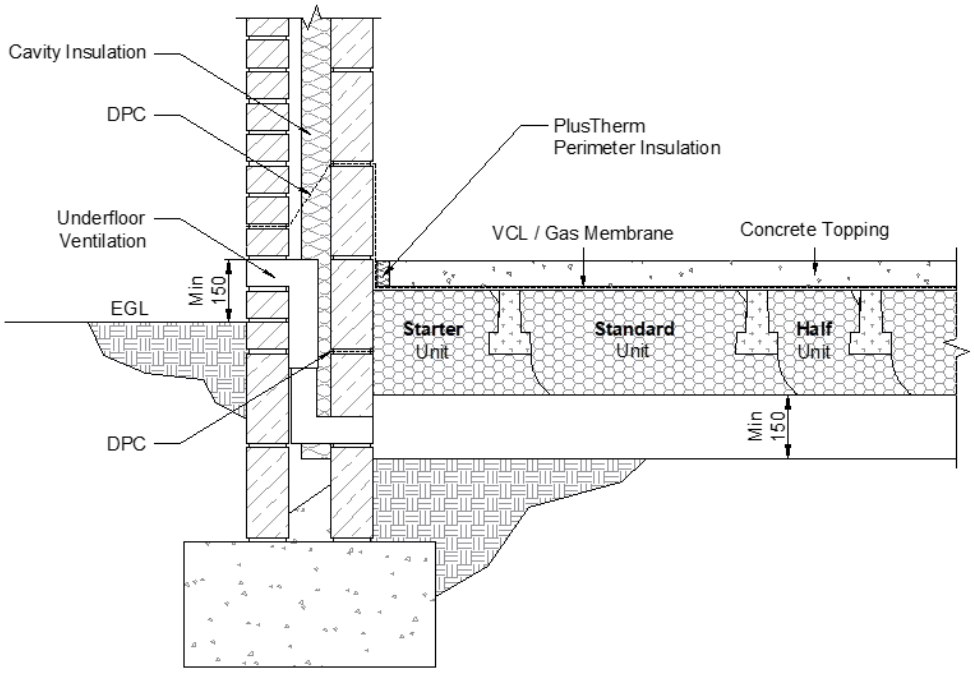


Diagram 6 - End infill unit wall junction

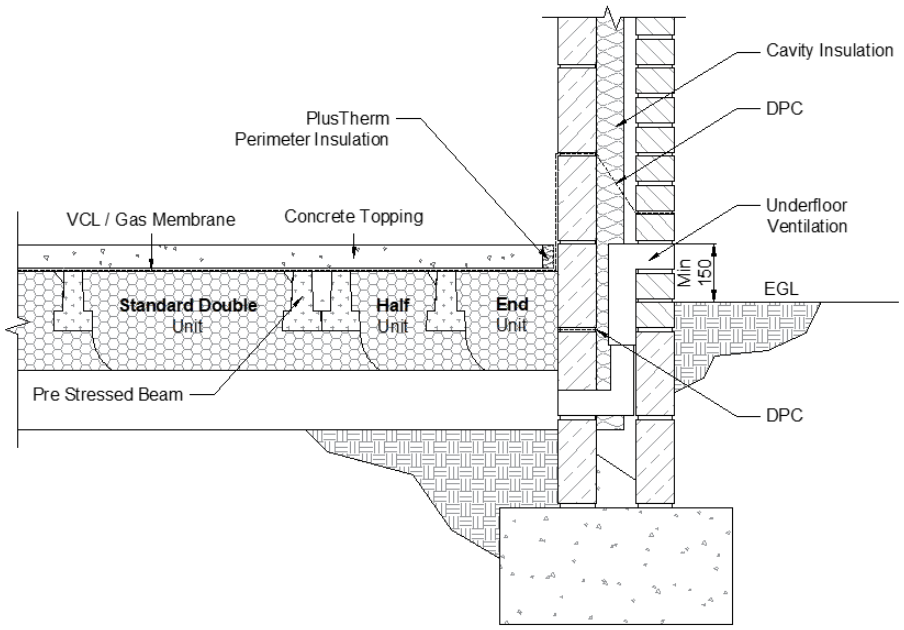
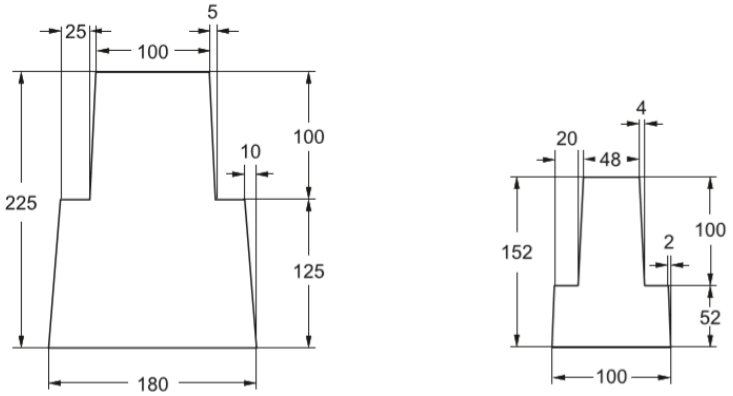


Diagram 7 - Typical concrete beams



2.4 - INSTALLATION

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

2.4.1 Installer competence level
See section 2.2.6.

2.4.2 Delivery, storage and site handling
See section 2.2.7.

2.4.3 Project-specific installation considerations
No pre-installation survey is required.

2.4.4 Preparation
The following considerations apply before starting the work:

- the underfloor void shall be a minimum of 150 mm and, where the substrate has clay heave potential, the void shall be increased accordingly;
- the ground level beneath the floor does not need to be raised to the external ground level where there are either land drains or good natural drainage;
- 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. A concrete or other proprietary surface seal is not required;
- 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 shall in turn 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 the installation of the System:

- a continuous DPC shall be laid along the support wall below the floor, in accordance with BS 8102. The wall shall be constructed in advance of the floor being installed, to allow the mortar to reach its full design strength;
- underfloor ventilation shall be used above ground and in conjunction with the DPC. Wall ties shall also be incorporated to ensure structural integrity.

2.4.5 Outline installation procedure
The detailed installation sequence can be found in full in the Agrément holder's Installation Manual.

The key sequence for installation is:

- bring up perimeter blockwork running parallel to the concrete beams by laying an additional course above DPC level to allow the starter infill unit to rest against the blockwork;
- lay all concrete beams in accordance with site/plot-specific beam layout drawings;
- where two or more concrete beams are placed side by side, infill the spaces between the beam webs using an appropriate material;
- install a full row of starter infill units up against the perimeter wall;
- install the first concrete beam against the starter infill unit to ensure lateral tightening;
- install standard infill and half infill units between the concrete beams as required. If the EPS units require cutting, this can be carried out using a fine-tooth handsaw or hot wire cutter. The minimum length of EPS unit that shall be used is 300 mm. Infill units can also be cut to accommodate any service penetrations;
- continue installation until the last concrete beam and then install an end infill unit, ensuring a tight fight against the perimeter blockwork;
- take care not to walk unnecessarily over the infill units. If a temporary working platform is required, use spreader boards;
- it may be necessary to trim the end infill unit using a fine-tooth handsaw or hot wire cutter;
- ensure that the starter or end infill units are never wider than 300 mm from the concrete beam to the perimeter blockwork;
- bed the coursing blocks around the perimeter to provide a screed rail to facilitate the pouring of sufficient concrete to achieve the correct floor construction depth;
- install a VCL directly over the infill units and concrete beams if required;
- install PlusTherm perimeter edge strips prior to installation of structural concrete topping;
- before pouring the structural concrete topping, ensure that the infill units are centrally located between the concrete beams with a maximum gap of 5 mm between the infill unit and the concrete beam face. These gaps may be due to normal construction or manufacturing tolerances. If any gaps greater than 5 mm occur, these shall be filled using expanding foam to prevent displacement during the main concreting operation;
- pour the specified structural concrete topping carefully, from a height no greater than 500 mm, ensuring heaping is no higher than 300 mm;
- when using a wheelbarrow, planks shall be placed to spread the wheel load to the pre-stressed concrete beams and spot boards shall be used when tipping and shovelling.

2.4.6 Finishing
The following finishing is required on completion of the installation:

- finish the structural concrete topping as required. Temporary weather protection may be required.

2.5 - INDEPENDENTLY ASSESSED SYSTEM CHARACTERISTICS

2.5.1 Thermal performance

Test	Standard	Result	
		Stylite T-Beam	Stylite T-Beam Plus
Thermal conductivity λ_D (W/mK)	BS EN 12667	0.036	0.030

2.5.2 Moisture control

Test	Standard	Result	
		Stylite T-Beam	Stylite T-Beam Plus
Water vapour diffusion resistance factor μ	BS EN 12086	30 - 70	
Water vapour permeability δ (mg/(Pa.h.m))	BS EN 13163	0.009 - 0.020	

2.5.3 Strength

Test	Standard	Result	
		Stylite T-Beam	Stylite T-Beam Plus
Mechanical resistance	BS EN 15037-4	R1	
Compressive stress at 10% deformation (kPa)	BS EN 826	100	
Bending strength σ_b (kPa)	BS EN 12089	150	

2.5.4 Fire performance

Characteristic	Standard	Result	
		Stylite T-Beam	Stylite T-Beam Plus
Reaction to fire classification	BS EN 13501-1	F	E

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 - THE NATIONAL BUILDING REGULATIONS

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

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

3.2.1 - ENGLAND
THE BUILDING REGULATIONS 2010 AND SUBSEQUENT AMENDMENTS

- A1(1) Loading - the System can sustain and transmit design temporary 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 23(1) Requirements relating to thermal elements - the System can contribute to a floor complying with the requirements of L1(a)(i)
- Regulation 26 CO_2 emission rates for new buildings - the System will contribute to a building not exceeding its CO_2 emission rate
- Regulation 26A 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(1) Loading - the System can sustain and transmit design temporary 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 23(1) Requirements relating to thermal elements - the System can contribute to a floor complying with the requirements of L1(a)(i)
- Regulation 26 CO_2 emission rates for new buildings - the System will contribute to a building not exceeding 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

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, 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 design temporary loads to the ground
- 3.15 Condensation - the System will contribute to limiting the risk of surface and interstitial condensation
- 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)(a)(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
- 28(a)(b) Resistance to moisture and weather - the System can be constructed so as to prevent any harmful effect on the building or the health of the occupants caused by the passage of moisture to any part of the building from the ground and the weather
- 29 Condensation - the System will contribute to limiting the risk of surface and interstitial condensation
- 30 Stability - when installed and used in accordance with this Agrément, the System can sustain and transmit design temporary 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

In the opinion of Kiwa Ltd. if installed, used, and maintained in accordance with this Agrément, this System can satisfy the appropriate structural, fire, moisture, thermal, acoustic and durability requirements of a Structural Warranty provider. Please contact the relevant Structural Warranty provider to ascertain their project specific design requirements and to confirm their acceptance on a case-by-case basis.

CHAPTER 4 - SOURCES

- BS EN ISO 10211:2017 Thermal bridges in building construction. Heat flows and surface temperatures. Detailed calculations
- BS EN ISO 13370:2017 Thermal performance of buildings. Heat transfer via the ground. Calculation methods
- BS EN 206:2013+A1:2016 Concrete. Specification, performance, production and conformity
- BS EN 312:2010 Particleboards. Specifications
- 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
- 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+A2:14 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 12086:2013 Thermal insulating products for building applications. Determination of water vapour transmission properties
- BS EN 12089:2013 Thermal insulating products for building applications. Determination of bending behaviour
- BS EN 12620:2013 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 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 5250:2011+A1:2016 Code of practice for control of condensation in buildings
- BS 8000-9:2003 Workmanship on building sites. Cementitious levelling screeds and wearing screeds. Code of practice
- BS 8102:2009 Code of practice for protection of below ground structures against water from the ground
- 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 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
- 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
- PAS 2030:2019 Specification for the installation of energy efficiency measures in existing dwellings
- SAP 2012 The Government's Standard Assessment Procedure for Energy Rating of Dwellings
- 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 kept in the Technical Assessment File of this Agrément. The Installation Manual for the System may be subject to change, and the Agrément holder should be contacted for clarification of revisions.

CHAPTER 5 - AMENDMENT HISTORY

Revision	Amendment description	Author	Approver	Date
-	Issue for Client approval	P Oakley	C Forshaw	December 2017
A	Issue for NHBC acceptance	P Oakley	C Forshaw	February 2018
B	First issue	P Oakley	C Forshaw	March 2018
C	Update of concrete fibre data	C Devine	C Vurley	May 2021
D	Re-issue following successful 3 Year Renewal	C Devine	C Vurley	May 2021
E	Updates to third-party acceptance	A Chapman	C Devine	November 2024

CHAPTER 6 - CONDITIONS OF USE

This Agrément may only be reproduced and distributed in its entirety.

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