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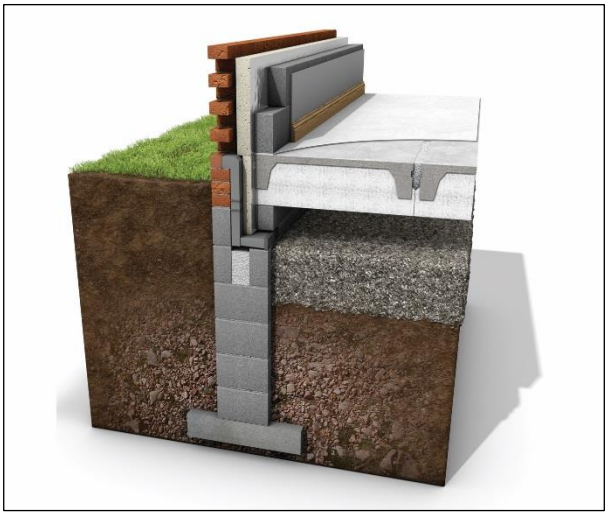
Agrément Certificate
19/5618
Product Sheet 1

FP McCANN PRECAST CONCRETE

THERMABEAM INSULATED PRECAST CONCRETE GROUND FLOOR SYSTEM

This Agrément Certificate Product Sheet(1) relates to Thermabeam Insulated Precast Concrete Ground Floor System, comprising precast concrete and expanded polystyrene insulation composite elements for use in conjunction with a non-structural sand/cement screed, self-levelling compound, timber batten or other suitable applied floor finishes and suitable for use as a suspended ground floor in domestic and residential buildings.



(1) Hereinafter referred to as 'Certificate'.

CERTIFICATION INCLUDES:

- factors relating to compliance with Building Regulations where applicable
- factors relating to additional non-regulatory information where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production
- formal three-yearly review.

KEY FACTORS ASSESSED

Structural performance — ground floors incorporating the system are suitable for domestic and residential applications, subject to the maximum imposed loads (see section 6).
Thermal performance — floors incorporating the system can contribute to meeting the national Building Regulation requirements (see section 7).
Condensation risk — floors incorporating the system can help minimise the risk of interstitial and surface condensation (see section 8).
Durability — floors incorporating the system will have adequate durability for the design life of the building (see section 10).

The BBA has awarded this Certificate to the company named above for the system described herein. This system has been assessed by the BBA as being fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of First issue: 30 January 2019

Paul Valentine
Technical Excellence Director

Claire Curtis-Thomas
Chief Executive

The BBA is a UKAS accredited certification body – Number 113.
The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at www.bbacerts.co.uk
Readers are advised to check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA direct
Any photographs are for illustrative purposes only, do not constitute advice and should not be relied upon.

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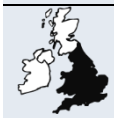
Regulations

In the opinion of the BBA, the Thermabeam Insulated Precast Concrete Ground Floor System, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements of the following Building Regulations (the presence of a UK map indicates that the subject is related to the Building Regulations in the region or regions of the UK depicted):



The Building Regulations 2010 (England and Wales) (as amended)

Requirement:	**A1(1)**	**Loading**
Comment:		Floors incorporating the system can be designed to sustain and transmit dead and imposed floor loads to the supporting structure. See sections 6.1 to 6.4, 6.7 and 6.8 of this Certificate.
Requirement:	**A2(a)**	**Ground movement**
Comment:		Floors incorporating the system can be designed to accommodate ground movement beneath the building due to swelling and shrinkage of the subsoil. See sections 6.5 to 6.7 of this Certificate.
Requirement:	**C2(a)(c)**	**Resistance to moisture**
Comment:		Floors incorporating the system can adequately limit the risk of surface and interstitial condensation. See sections 8.1, 8.4 and 8.5 of this Certificate.
Requirement:	**L1(a)(i)**	**Conservation of fuel and power**
Comment:		Floors incorporating the system can contribute to satisfying this Requirement. See sections 7.1 to 7.3 of this Certificate.
Regulation:	**7**	**Materials and workmanship (applicable to Wales only)**
Regulation:	**7(1)**	**Materials and workmanship (applicable to England only)**
Comment:		The system is acceptable. See section 10 and the *Installation* part of this Certificate.
Regulation:	**26**	**CO_2 emission rates for new buildings**
Regulation:	**26A**	**Fabric energy efficiency rates for new dwellings (applicable to England only)**
Regulation:	**26A**	**Primary energy consumption rates for new buildings (applicable to Wales only)**
Regulation:	**26B**	**Fabric performance values for new dwellings (applicable to Wales only)**
Comment:		Floors incorporating the system can contribute to satisfying these Regulations. See sections 7.1 to 7.3 of this Certificate.

The Building (Scotland) Regulations 2004 (as amended)

Regulation:	**8(1)(2)**	**Durability, workmanship and fitness of materials**
Comment:		The system can contribute to a construction satisfying this Regulation. See section 10 and the *Installation* part of this Certificate.
Regulation:	**9**	**Building standards applicable to construction**
Standard:	1.1	Structure
Comment:		Floors incorporating the system can be designed to sustain and transmit dead and imposed floor loads to the supporting structure, with reference to clause 1.1.1[(1)(2)]. See sections 6.1 to 6.4, 6.7 and 6.8 of this Certificate.
Standard:	3.15	Condensation
Comment:		Floors incorporating the system can adequately limit the risk of surface and interstitial condensation, with reference to clauses 3.15.1[(1)(2)], 3.15.2[(1)(2)], 3.15.4[(1)(2)] and 3.15.5[(1)(2)]. See sections 8.1, 8.5 and 8.6 of this Certificate.
Standard:	6.1(b)	Carbon dioxide emissions

Standard: Comment:	6.2	Building insulation envelope Floors incorporating the system can contribute to satisfying the requirements of these Standards, with reference to clauses 6.2.1(1)(2) to 6.2.3(1)(2). See sections 7.1 to 7.3 of this Certificate.
Standard: Comment:	7.1(a)(b)	Statement of sustainability The system can contribute to satisfying the relevant requirements of Regulation 9, Standards 1 to 6, and therefore will contribute to a construction meeting a bronze level of sustainability as defined in this Standard. In addition, the system can contribute to a construction meeting a higher level of sustainability as defined in this Standard, with reference to clauses 7.1.4(1)(2) [Aspects 1(1)(2) and 2(1)], 7.1.6(1)(2) [Aspects 1(1)(2) and 2(1)] and 7.1.7(1)(2) [Aspect 1(1)(2)]. See sections 7.1 to 7.3 of this Certificate.
Regulation: Comment:	**12**	**Building standards applicable to conversions** Comments in relation to the system under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to clause 0.12.1(1)(2) and Schedule 6(1)(2). (1) Technical Handbook (Domestic). (2) Technical Handbook (Non-Domestic).

The Building Regulations (Northern Ireland) 2012 (as amended)

Regulation: Comment:	**23(a)(i) (iii)(b)(i)**	**Fitness of materials and workmanship** The system is acceptable. See section 10 and the *Installation* part of this Certificate.
Regulation: Comment:	**29**	**Condensation** Floors incorporating the system can adequately limit the risk of interstitial condensation. See section 8.1 of this Certificate.
Regulation: Comment:	**30**	**Stability** Floors incorporating the system can be designed to sustain and transmit dead and imposed floor loads to the supporting structure. See sections 6.1 to 6.4, 6.7 and 6.8 of this Certificate.
Regulation: **Regulation:** Comment:	**39(a)(i)** **40(2)**	**Conservation measures** **Target carbon dioxide emission rates** Floors incorporating the system can contribute to satisfying these Regulations. See sections 7.1 to 7.3 of this Certificate.

Construction (Design and Management) Regulations 2015
Construction (Design and Management) Regulations (Northern Ireland) 2016

Information in this Certificate may assist the client, designer (including Principal Designer) and contractor (including Principal Contractor) to address their obligations under these Regulations.

See section: 3 *Delivery and site handling* (3.2 and 3.4) of this Certificate.

Additional Information

NHBC Standards 2019

In the opinion of the BBA, Thermabeam Insulated Precast Concrete Ground Floor System, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements in relation to *NHBC Standards*, Chapter 5.2 *Suspended Ground Floors*.

CE marking

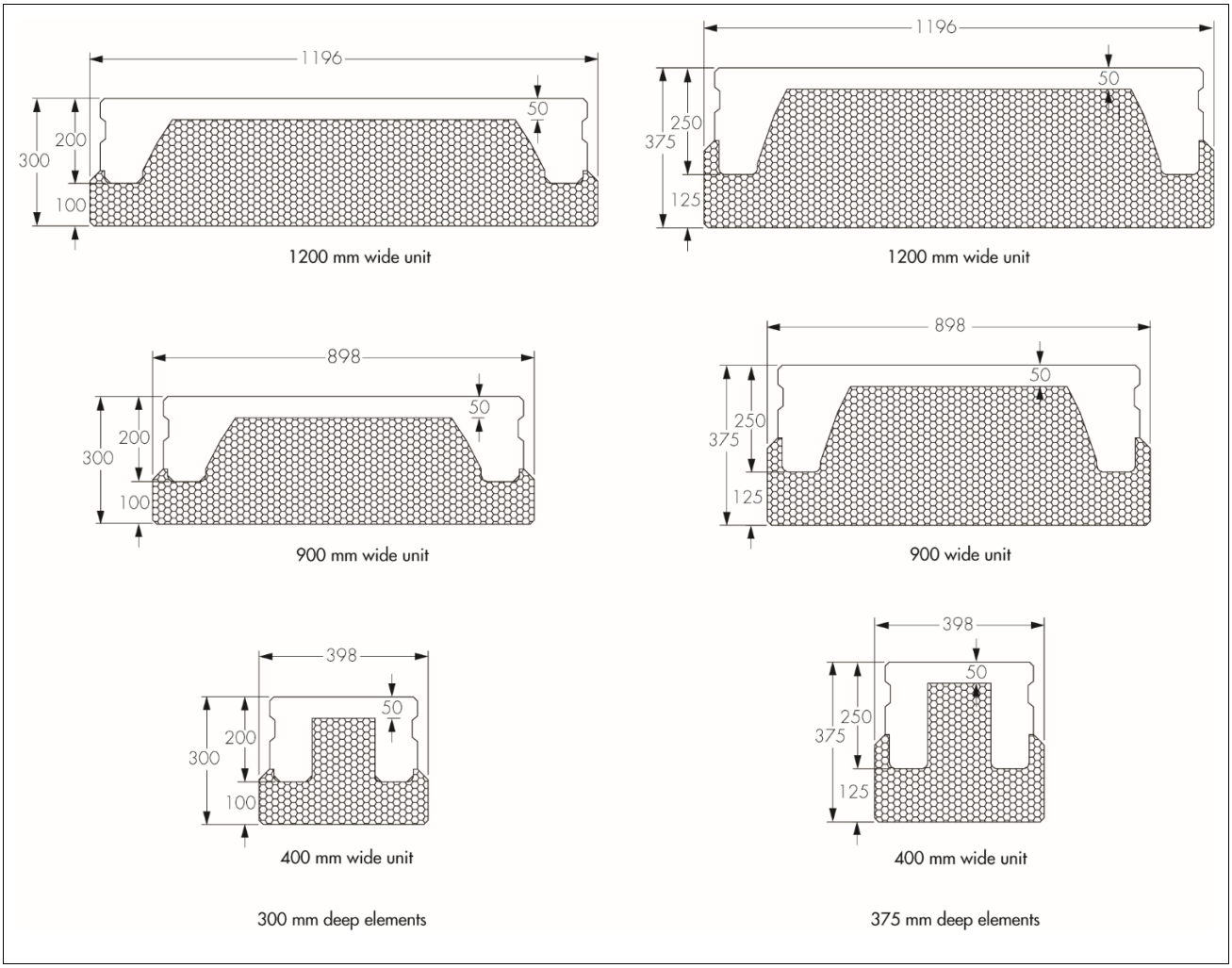
The Certificate holder has taken the responsibility of CE marking the system in accordance with harmonised European Standard BS EN 13224 : 2011.

Technical Specification

1 Description

1.1 Thermabeam is a pre-insulated ground floor system comprising ribbed floor elements of precast reinforced concrete and expanded polystyrene (EPS) insulation. The elements are available in two depths (300 and 375 mm) and three nominal widths (400, 900 and 1200 mm). See Figure 1.

Figure 1 Element profiles (all dimensions in mm)



1.2 The specification for the components of the system are:

- EPS – moulded rigid boards in two grades [white, $\lambda_{90/90}$ = 0.038 and grey, $\lambda_{90/90}$ = 0.030) in accordance with BS EN 13163 : 2012
- Concrete – minimum grade C45/55 to BS EN 206 : 2013, BS 8500-1 : 2015 and BS 8500-2 : 2015
- Steel reinforcement – to BS 4449 : 2005.

1.3 Ancillary items that can form part of the overall floor construction but which are outside the scope of this Certificate, include:

- joint filling — concrete or sand-cement mortar with a strength class C25/30[(1)] and maximum aggregate size of 10 mm[(2)].

- concrete floor screed – typically between 25 and 100 mm thick
- self-levelling compound
- timber battens – to receive floor finishes
- other suitable non-structural applied floor finishes
- damp-proof courses (dpcs), damp-proof membranes and gas barrier membranes (with third-party approval and compatible with EPS).
- telescopic ventilators.

(1) Cement to comply with BS EN 197-1 : 2011.
(2) Gravel and sand to comply with BS EN 12620 : 2002 and BS 882 : 1992.

2 Manufacture

2.1 The concrete component of the floor elements is manufactured in accordance with the requirements of BS EN 13224 : 2011.

2.2 The moulded EPS component is manufactured in accordance with BS EN 13163 : 2012.

2.3 As part of the assessment and ongoing surveillance of product quality, the BBA has:

- agreed with the manufacturer the quality control procedures and product testing to be undertaken
- assessed and agreed the quality control operated over batches of incoming materials
- monitored the production process and verified that it is in accordance with the documented process
- evaluated the process for management of nonconformities
- checked that equipment has been properly tested and calibrated
- undertaken to carry out the above measures on a regular basis through a surveillance process, to verify that the specifications and quality control operated by the manufacturer are being maintained.

2.4 The management system of FP McCann Ltd has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2015 and/or BS EN ISO 14001 : 2015 by BSI (Certificates FM 97367 and FM 97370 respectively).

3 Delivery and site handling

3.1 When the system is delivered to site, each floor element is marked with the Certificate holder's product reference code and, if requested, the customer's own reference code.

3.2 The elements should be handled with care during off loading, storage and installation. Elements are provided with cast-in lifting eyes for mechanical handling.

3.3 The floor elements should be stacked on a flat base and protected from direct sunlight and high winds.

3.4 The expanded polystyrene component must not be exposed to flame or ignition. Careful consideration should also be given to the management of fire risk when in storage. Contact with solvents and organic-based materials should also be avoided.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on the Thermabeam Insulated Precast Concrete Ground Floor System.

Design Considerations

4 General

4.1 Thermabeam, when used in conjunction with concrete screeds, self-levelling compound, timber floor battens or other suitable applied floor finishes as specified in this Certificate (see section 1.3) is satisfactory for use in forming insulated suspended ground floors in domestic and residential buildings.

4.2 An appropriately qualified and experienced engineer must perform a site-specific assessment to ascertain the suitability of the system for the intended use and the required construction detailing, including the following considerations:

- a geotechnical assessment of the site to identify the potential for shrinkable soils and clay heave
- a geo-environmental assessment to identify the potential for ground contamination and ground gases, including radon gas and volatile organic compounds (VOCs). Where contamination or gases are present, a suitably qualified and experienced person must assess the compatibility of the insulation with any potential emissions and specify a suitable arrangement of membranes, compatible with EPS, below the Thermabeam elements. Where required, drainage of any subfloor void and provision for services must also be taken into account
- provision, if required, of ventilation to any sub-floor voids and an appropriate construction detailing for the protection of the building from moisture, including detailing of dpcs, damp-proof membranes and ventilated voids
- if the precast elements are to be placed adjacent to the ground, preparation and levelling of the ground, and avoidance of high-points or raised levels of fill, to ensure the integrity of any membranes placed on the ground and avoidance of unintended structural actions on the Thermabeam elements. If necessary, a membrane may be protected from damage during construction by sand or lean concrete blinding
- requirements for lateral restraint to wall elements
- if fixings are to be made to the elements, for example, for timber sole plates or suspended pipe hangers, the type and location of such fixings must be agreed in advance with the Certificate holder in order that the reinforcement can be designed to suit.

5 Practicability of installation

This system is designed to be installed by contractors/builders experienced with this type of flooring system.

6 Structural performance

6.1 The Certificate holder undertakes structural calculations for the structural adequacy of the system. Individual designs are verified by calculation in accordance with BS EN 1992-1-1 : 2004 and its UK National Annex or BS EN 13224 : 2011, Annex B. All calculations take account of the floor loading requirements and load category A and C limitations set out in BS EN 1991-1-1 : 2002 and its UK National Annex.

6.2 The precast floor elements, to the Certificate holder's design and specification, are suitable for use in domestic and residential applications subject to the following maximum imposed loadings, the arrangement of which must be verified by the Certificate holder's design department:

Domestic and residential properties:

- Uniformly distributed load of 1.5 kNm^{-2}, together with an allowance of 1 $kN{\cdot}m^{-2}$ for lightweight partitions and 0.5 $kN{\cdot}m^{-2}$ for floor finishes
- Imposed line loads of 6 $kN{\cdot}m^{-1}$ from load-bearing walls, both perpendicular and parallel to the span
- Point load of 2 kN

Communal areas in residential properties:

- Uniformly distributed load of 5 $kN{\cdot}m^{-2}$, together with an allowance of 1 $kN{\cdot}m^{-2}$ for lightweight partitions and 0.5 $kN{\cdot}m^{-2}$ for floor finishes
- Imposed line loads of 6 $kN{\cdot}m^{-1}$ from load-bearing walls, both perpendicular and parallel to the span
- Point load of 4.5 kN.

6.3 The Thermabeam elements are fully supported by the concrete end and side stools, which are cast integrally with the concrete slab and protrude through the EPS to bear on the supporting structure (see Figure 2 in the Installation section of this Certificate). No contribution to the structural performance should be attributed to the EPS, nor should the EPS be considered as load-bearing.

6.4 The Thermabeam elements are available in lengths up to 7500 mm. The Certificate holder's design department will specify the appropriate element design and reinforcement according to the floor layout, floor finishes, partition layout and imposed loading. The Thermabeam elements are designated as either Standard or Heavy, according to the reinforcement configuration.

Void depth and clay heave

6.5 The void depth beneath the ground floor required for each project will vary according to site conditions and should be carefully considered as part of the design of the floor construction, so as not to exceed one metre.

6.6 Should a site investigation indicate the presence of shrinkable soils, the potential for clay heave must be assessed and a void depth sufficient to accommodate the possible expansion of the ground beneath the floor must be provided in addition to ventilation requirements. In cases where the risk of clay heave has been confirmed by geotechnical investigations, a total void depth of up to 300 mm including provision for ventilation (refer to NHBC Standards 2019) may be required, as follows:

- high volume change potential (300 mm total void)
- medium volume change potential (250 mm total void)
- low volume change potential (200 mm total void).

Bearing on the supporting structure

6.7 Thermabeam precast floor elements are considered as minor floor elements in accordance with BS EN 13224 : 2011 and the minimum bearing lengths defined in Table 1, below, are required:

Table 1 Minimum bearing lengths

Support	Minimum bearing length (mm)
Masonry	100
Concrete	80
Steel	70

6.8 A suitably qualified and experienced engineer must ensure the adequacy of the supporting structure to resist the permanent and variable actions imposed by the Thermabeam elements, in accordance with BS EN 1992-1-1 : 2004, BS EN 1993-1-1 : 2005 or BS EN 1996-1-1 : 2005 and their UK National Annexes, for concrete, steel or masonry structures as appropriate. For masonry structures, guidance in relation to wall thickness and strength of masonry units and mortar given in Approved Document A can also be followed.

Services

6.9 Openings for services are provided in the precast element during manufacture. The requirements for service openings must be communicated to the Certificate holder in advance, as elements should not be altered on site without the prior agreement of the Certificate holder.

7 Thermal performance

7.1 The overall floor U value will depend significantly on the element choice (deck U value), the ratio of the exposed (and semi-exposed) floor perimeter length to floor area (p/a), the amount of underfloor ventilation and the ground thermal conductivity. Each floor U value, therefore, should be calculated to BS EN ISO 13370 : 2017 and BRE Report 443 : 2006.

7.2 A suspended floor deck U value (from inside to the underfloor void) or floor slab resistance will depend on the chosen element, element width and internal floor finish. The suspended floor deck U-values and floor slab resistances for each element and element width have been numerically modelled to BS EN ISO 10211 : 2017, and are shown in Tables 2 and 3 respectively. Where floors contain a combination of floor elements and/or element widths, the aggregate floor deck U value may then be taken as an area-weighted average and the overall floor U value calculated as described in section 7.1.

Table 2 Suspended floor deck U values ($W \cdot m^{-2} \cdot K^{-1}$)

Element	Element width (mm)	Using EPS 70 k = 0.038		Using EPS 70 Platinum k = 0.030	
		Internal finish		Internal finish	
		No screed(1)	100 mm screed	No screed(1)	100 mm screed
300 mm depth element	1200	0.201	0.198	0.162	0.160
	900	0.220	0.216	0.178	0.176
	400	0.295	0.288	0.240	0.235
375 mm depth element	1200	0.164	0.162	0.132	0.130
	900	0.180	0.178	0.145	0.144
	400	0.240	0.235	0.195	0.192

(1) Additional internal floor finishing layers may be added to the deck build-up as required.

Table 3 Floor slab resistances ($m^2 \cdot K \cdot W$)

Element	Element width (mm)	Using EPS 70 k = 0.038		Using EPS 70 Platinum k = 0.030	
		Internal finish		Internal finish	
		No screed(1)	100 mm screed	No screed(1)	100 mm screed
300 mm depth element	1200	4.6129	4.7031	5.8135	5.9019
	900	4.1902	4.2771	5.2757	5.3602
	400	3.0651	3.1459	3.8465	3.9252
375 mm depth element	1200	5.7280	5.8313	7.2129	7.3168
	900	5.1875	5.2887	6.5263	6.6278
	400	3.8370	3.9229	4.8124	4.8973

7.3 Example suspended floor, and slab on ground floor, U-values are given in Tables 4 and 5 and indicate that the system can enable a floor to meet, or improve upon, design floor U values of between 0.13 and 0.25 $W \cdot m^{-2} \cdot K^{-1}$ specified in the documents supporting the national Building Regulations.

Table 4 Example suspended floor U-values ($W \cdot m^{-2} \cdot K^{-1}$)

p/a ratio m/m^2	Using EPS 70 k = 0.038		Using EPS 70 Platinum k = 0.030	
	300 mm depth element	375 mm depth element	300 mm depth element	375 mm depth element
0.4	0.15	0.13	0.13	0.11
0.6	0.16	0.14	0.14	0.11
0.7	0.17	0.14	0.14	0.12
0.9	0.17	0.14	0.14	0.12

Notes: These calculations are in accordance with sections 7.1 and 7.2 of this Certificate and assume:

- 1200 mm wide elements
- 100 mm screed internal finish
- a 300 mm thick perimeter wall with a U value of 0.35 $W \cdot m^{-2} \cdot K^{-1}$
- underfloor ventilation area is 0.0015 $m^2 \cdot m^{-1}$
- ground conductivity is 1.5 $W \cdot m^{-1} \cdot K^{-1}$
- all other parameters are default values from BRE Report BR 443 : 2006.

Table 5 Example slab on ground floor U-values ($W \cdot m^{-2} \cdot K^{-1}$)

p/a ratio m/m^2	Using EPS 70 k = 0.038		Using EPS 70 Platinum k = 0.030	
	300 mm depth element	375 mm depth element	300 mm depth element	375 mm depth element
0.4	0.15	0.13	0.13	0.11
0.6	0.16	0.14	0.14	0.11
0.7	0.17	0.14	0.14	0.12
0.9	0.17	0.14	0.14	0.12

Notes: These calculations are in accordance with sections 7.1 and 7.2 of this Certificate and assume:

- 1200 mm wide elements
- 100 mm screed internal finish
- a 300 mm thick perimeter wall with a U value of 0.35 $W \cdot m^{-2} \cdot K^{-1}$
- ground conductivity is 1.5 $W \cdot m^{-1} \cdot K^{-1}$
- all other parameters are default values from BRE Report BR 443 : 2006.

Junction ψ-values

7.4 Care must be taken in the overall design and construction of junctions between the floor and external, internal and party walls, to limit excessive heat loss and air infiltration.

7.5 The junction ψ-values given in Table 6 may be used in SAP calculations. Alternatively, values can be modelled in accordance with the requirements and guidance in BRE Report BR 497 : 2007, BRE Information Paper IP 1/06 and the provisions in the documents supporting the national Building Regulations relating to competency to perform calculations, robustness of design/construction and limiting heat loss by air infiltration.

Table 6 Junction ψ values

Junction	Ψ ($W \cdot m^{-1} \cdot K^{-1}$)
External wall	0.32(1)
Party wall	0.16(1)

(1) Conservative defaults from SAP 2012.

8 Condensation risk

Interstitial condensation

8.1 The risk of interstitial condensation should be assessed in accordance with BS EN ISO 13788 : 2012 and BS 5250 : 2011, Annex D.3, accounting for the slab construction, dwelling humidity class, dwelling type, dwelling location and use of any VCL and/or gas membranes placed between the unit and the floor finish. When there is no underfloor void or the void is not ventilated in accordance with section 8.2 of this Certificate, a VCL must be used, unless a calculation to BS EN ISO 13788 : 2012 indicates otherwise.

8.2 To help minimise the risk of condensation, the void space beneath the lowest point of the floor construction should 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 should be sized at not less than 1500 $mm^2 \cdot m^{-1}$ run of external wall or 500 $mm^2 \cdot m^{-2}$ of floor area, whichever is greater. Where pipes are used to carry ventilating air, these should be at least 100 mm diameter.

8.3 To minimise the risk of interstitial condensation at junctions with external walls, specifiers should ensure that wall insulation extends to at least 150 mm below the bottom of the concrete stool.

Surface condensation

8.4 Floors will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed 0.7 $W \cdot m^{-2} \cdot K^{-1}$ at any point and the junctions with walls are in accordance with the relevant requirements of *Limiting thermal bridging and air leakage : Robust construction details for dwellings and similar buildings TSO 2002* or BRE Information Paper IP 1/06.

8.5 Junction designs are acceptable when the temperature factor (fRsi) modelled in accordance with BS EN ISO 10211 : 2017 and BR 497 : 2016 meets or exceeds the critical temperature factors (fCRsi) detailed in tables 1 and 2 of BRE Information Paper IP1/06 for the relevant building type.

8.6 Floors will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed 1.2 $W \cdot m^{-2} \cdot K^{-1}$ at any point and the floors are designed and constructed to BS 5250 : 2011. Additional guidance can be found in BRE Report BR 262 : 2002.

8.7 To minimise the risk of surface condensation at service penetrations, care should be taken to minimise gaps in the insulation layer.

9 Maintenance

The elements are contained within the floor construction and therefore will not require maintenance.

10 Durability

Thermabeam elements are manufactured in accordance with BS EN 206 : 2013 and BS EN 13369 : 2018 for the requirements for exposure class XC3 (beam sections) and XC1 (top slabs) and will have adequate durability for a 60-year design life, when designed and installed in accordance with the requirements of this Certificate.

11 Reuse and recyclability

The system contains precast concrete, steel and EPS components, all of which can be recycled.

Installation

12 General

12.1 Typical installation details used in the design of floors incorporating the system are shown in Figure 2.

12.2 The ground beneath the floor should be free of topsoil and vegetation. Oversite concrete or other surface seal is not required, but material added to bring the solum to an even surface must be hard and dry.

12.3 If required, a damp-proof, gas-resistant membrane can be installed over the whole ground area beneath the floor in accordance with the membrane manufacturer's instructions (see Figure 2). Care must be taken not to comprise the integrity of the membrane. If required, the membrane may be laid on a sand blinding.

12.4 The ventilated void must be in accordance with the requirements of BS 5250 : 2011 and *NHBC Standards 2019*, Chapter 5.2 *Suspended Ground Floors*, with respect to provision and positioning of ventilators and provision for adequate drainage of the sub-floor.

12.5 A continuous dpc should be laid along the support wall below the floor in accordance with BS 8215 : 1991.

12.6 Under-floor services should be accurately set out and installed on the ground prior to the installation of the floor.

12.7 Normal precautions for handling expanded polystyrene materials should be taken to avoid damaging the system elements during off-loading, storage, handling and installation. Any damaged parts of the system elements must be either repaired or replaced before installation.

13 Procedure

13.1 Installers should confirm that the precast elements supplied to site are in accordance with the details shown on the engineer's drawing and that the supporting structure for the floor is correctly built, level, and of suitable straightness and squareness to provide the correct bearing for each element.

13.2 The precast elements are lifted into place using at least four chain-lifting connectors, in accordance with the Certificate holder's instructions.

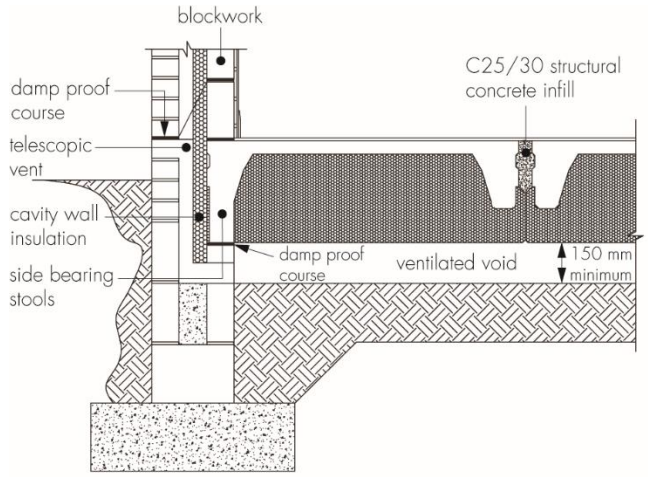
13.3 With the first system element accurately in place, the subsequent elements are then positioned.

13.4 The remaining elements must then be fitted tightly against each other. Care should be taken to ensure the correct location of service openings. Elements are supplied to site with service openings cast-in – no cutting or drilling of the elements should be undertaken on site without first consulting the Certificate holder.

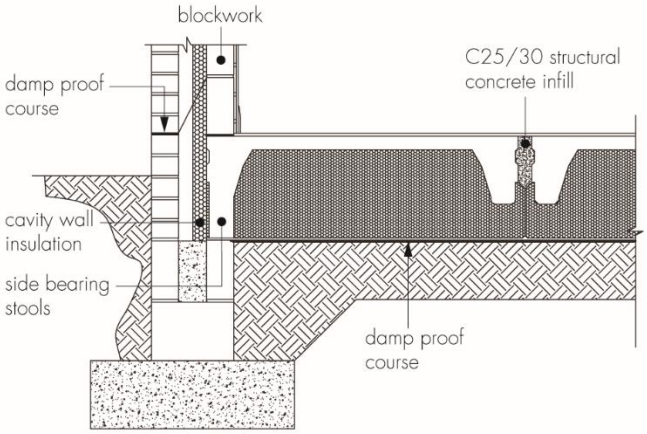
13.5 The joints between the floor elements must be filled with C25/30 concrete or sand/cement mortar.

13.6 A concrete screed or other suitable floor finish is applied, to the design specification. When using a concrete pump, truck or skip, concrete should not be discharged onto the system from heights greater than 300 mm and concrete heaps must not be formed over 150 mm.

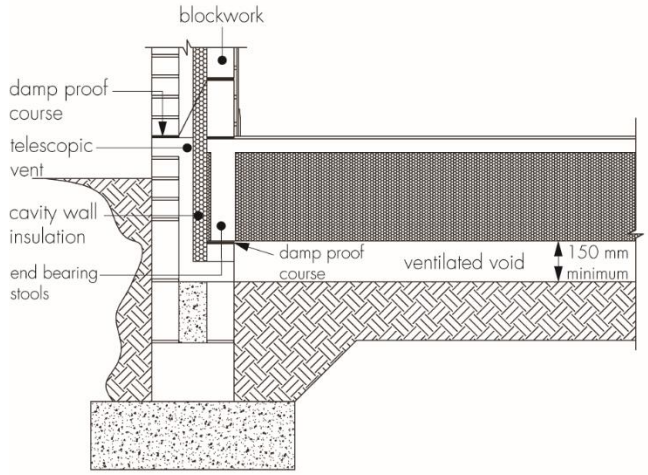
Figure 2 Typical construction details



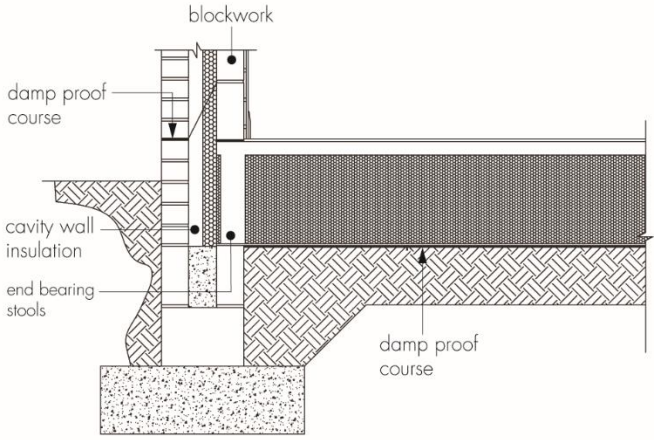
side bearing detail – masonry with ventilated void



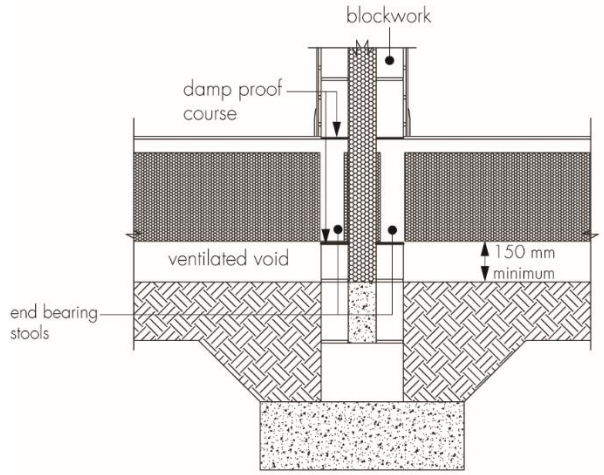
side bearing detail – masonry without ventilated void



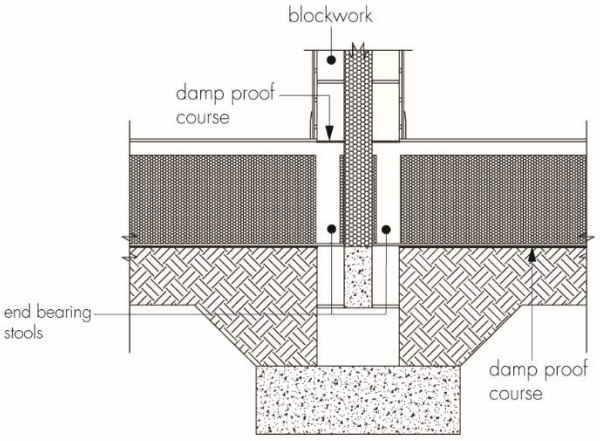
end bearing detail – masonry with ventilated void



end bearing detail – masonry without ventilated void



end bearing detail – masonry with ventilated void



end bearing detail – masonry without ventilated void

Similar details may be adopted for timber frame construction.
The Certificate holder can be contacted for project-specific advice

Technical Investigations

14 Tests

Tests were carried out and the results assessed to determine:

- the compressive strength of the concrete
- the adequacy of the lifting eyes.

15 Investigations

15.1 The manufacturing process was evaluated, including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.

15.2 An examination was made of existing data relating to:

- the structural resistance of the system
- thermal properties and condensation risk
- durability.

15.3 A site visit was carried out to assess the practicability of installation of the system.

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BRE Information Paper IP 01/06 *Assessing the effects of thermal bridging at junctions and around openings*

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BRE Report (BR 443 : 2006) *Conventions for U-value calculations*

BRE Report (BR 497 : 2007) *Conventions for calculating linear thermal transmittance and temperature factors*

16 Conditions

16.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page – no other company, firm, organisation or person may hold or claim that this Certificate has been issued to them
- is valid only within the UK
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- is copyright of the BBA
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16.3 This Certificate will remain valid for an unlimited period provided that the product/system and its manufacture and/or fabrication, including all related and relevant parts and processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

16.4 The BBA has used due skill, care and diligence in preparing this Certificate, but no warranty is provided.

16.5 In issuing this Certificate the BBA is not responsible and is excluded from any liability to any company, firm, organisation or person, for any matters arising directly or indirectly from:

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- actual installations of the product/system, including their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the product/system is installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the product/system, including its manufacture, supply, installation, use, maintenance and removal
- any claims by the manufacturer relating to CE marking.

16.6 Any information relating to the manufacture, supply, installation, use, maintenance and removal of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used, maintained and removed. It does not purport in any way to restate the requirements of the Health and Safety at Work etc. Act 1974, or of any other statutory, common law or other duty which may exist at the date of issue or reissue of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care.

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