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Agrément Certificate

20/5828

Product Sheet 1 Issue 2

BEWI GROUND HEAVE PROTECTION PRODUCTS

BEWI GROUND HEAVE PROTECTION

This Agrément Certificate Product Sheet⁽¹⁾ relates to BEWI Ground Heave Protection an expanded polystyrene (EPS) cellular void former for use in limiting the pressure exerted on in-situ reinforced suspended concrete floors or piled ground beams by expansion of clay soils (clay heave) or ground recovery. Use of the product below the groundwater table, or on sites where hazardous gases such as methane or radon may be encountered, is outside the scope of this Certificate.

(1) Hereinafter referred to as 'Certificate'.

The assessment includes

Product factors:

- compliance with Building Regulations
- compliance with additional regulatory or non-regulatory information where applicable
- evaluation against technical specifications
- assessment criteria and technical investigations
- uses and design considerations

Process factors:

- compliance with Scheme requirements
- installation, delivery, handling and storage
- production and quality controls
- maintenance and

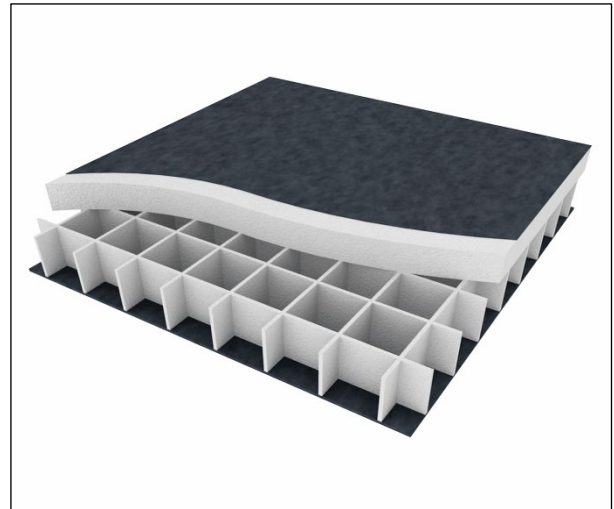
Ongoing contractual Scheme elements†:

- regular assessment of production
- formal 3-yearly review

The BBA has awarded this Certificate to the company named above for the product described herein. This product 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 Second issue: 30 April 2024
Originally certificated on 18 November 2020



KEY FACTORS ASSESSED

- Section 1. Mechanical resistance and stability
- Section 2. Safety in case of fire
- Section 3. Hygiene, health and the environment
- Section 4. Safety and accessibility in use
- Section 5. Protection against noise
- Section 6. Energy economy and heat retention
- Section 7. Sustainable use of natural resources
- Section 8. Durability

Hardy Giesler
Chief Executive Officer

This BBA Agrément Certificate is issued under the BBA's Inspection Body accreditation to ISO/IEC 17020. Sections marked with † are not issued under accreditation
The BBA is a UKAS accredited Inspection Body (No. 4345), Certification Body (No. 0113) and Testing Laboratory (No. 0357).
Readers MUST check that this is the latest issue of this Agrément Certificate by either referring to the BBA website or contacting the BBA directly.
The Certificate should be read in full as it may be misleading to read clauses in isolation.
Any photographs are for illustrative purposes only, do not constitute advice and should not be relied upon.

British Board of Agrément

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SUMMARY OF ASSESSMENT AND COMPLIANCE

This section provides a summary of the assessment conclusions; readers should refer to the later sections of this Certificate for information about the assessments carried out.

Compliance with Regulations

Having assessed the key factors, the opinion of the BBA is that BEWI Ground Heave Protection, 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 Building Regulations 2010 (England and Wales) (as amended)

Requirement:	A2(a)	Ground movement
Comment:		The product can contribute to satisfying this Requirement. See section 1 of this Certificate.
Requirement:	C2(c)	Resistance to moisture
Comment:		The product can contribute to limiting the risk of interstitial and surface condensation. See section 3 of this Certificate.
Requirement:	L1(a)(i)	Conservation of fuel and power
Comment:		The product can contribute to satisfying this Requirement. See section 6 of this Certificate.
Regulation:	7(1)	Materials and workmanship
Comment:		The product is acceptable. See sections 8 and 9 of this Certificate.
Regulation:	25B	Nearly zero-energy requirements for new buildings
Regulation:	26	CO₂ 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)
Regulation:	26C	Energy efficiency rating (applicable to Wales only)
Comment:		The product can contribute to satisfying these Regulations. See section 6 of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)	Fitness and durability of materials and workmanship
Comment:		The product can contribute to a construction satisfying this Regulation. See sections 8 and 9 of this Certificate.
Regulation:	9	Building standards - construction
Standard:	1.1(b)	Structure
Comment:		The product can contribute to satisfying the relevant requirements of this Standard, with reference to clause 1.1.4 ⁽¹⁾⁽²⁾ . See section 1 of this Certificate.
Standard:	3.15	Condensation
Comment:		The product can contribute to limiting the risk of surface and interstitial condensation, with reference to clauses 3.15.1 ⁽¹⁾ , 3.15.4 ⁽¹⁾ and 3.15.5 ⁽¹⁾ of this Standard. See section 3 of this Certificate.
Standard:	6.1(b)	Energy demand
Comment:		The product can contribute to satisfying the requirements of this Standard, with reference to clause 6.1.1 ⁽¹⁾ , but compensating fabric and/or services measures will be required. See section 6 of this Certificate.

Standard:	6.2	Building insulation envelope
Comment:		The product can contribute to satisfying the requirements of this Standard, with reference to clauses 6.2.1 ⁽¹⁾ and 6.2.3 ⁽¹⁾ , but compensating fabric and/or services measures may be required. See section 6 of this Certificate.
Standard:	7.1(a)	Statement of sustainability
Comment:		The product can contribute to satisfying the relevant requirements of Regulation 9, Standards 1 to 6, and therefore can contribute to a construction meeting a bronze level of sustainability as defined in this Standard. See section 6 of this Certificate.
Regulation:	12	Building standards - conversion
Comment:		Comments in relation to the product 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:	23(a)(i)	Fitness of materials and workmanship
Comment:	(iii)(b)(i)	The product is acceptable. See sections 8 and 9 of this Certificate.
Regulation:	29	Condensation
Comment:		The product can contribute to limiting the risk of interstitial condensation. See section 3 of this Certificate.
Regulation:	30	Stability
Comment:		The product can contribute to satisfying the relevant requirements of this Regulation. See section 1 of this Certificate.
Regulation:	39(a)(i)	Conservation measures
Comment:		The product can contribute to satisfying this Regulations, but compensating fabric and/or services measures may be required. See section 6 of this Certificate.
Regulation:	40(2)	Target carbon dioxide emission rate
Comment:		The product can contribute to satisfying this Regulation. See section 6 of this Certificate.
Regulation:	43B	Nearly zero-energy requirements for new buildings
Comment:		The product can contribute to satisfying this Regulation, but compensating fabric and/or services measures may be required. See section 6 of this Certificate.

Additional Information

NHBC Standards 2024

In the opinion of the BBA, BEWI, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements in relation to *NHBC Standards*, Chapters 4.2 *Building near trees* and 4.4 *Raft, pile, pier and beam foundations*.

Fulfilment of requirements

The BBA has judged BEWI Ground Heave Protection to be satisfactory for use as described in this Certificate. The product has been assessed as an EPS cellular void former for use in limiting the pressure exerted on in-situ reinforced suspended concrete floors or piled ground beams by expansion of clay soils (clay heave) or ground recovery. Use of the product below the groundwater table, or on sites where hazardous gases such as methane or radon may be encountered, is outside the scope of this Certificate.

ASSESSMENT

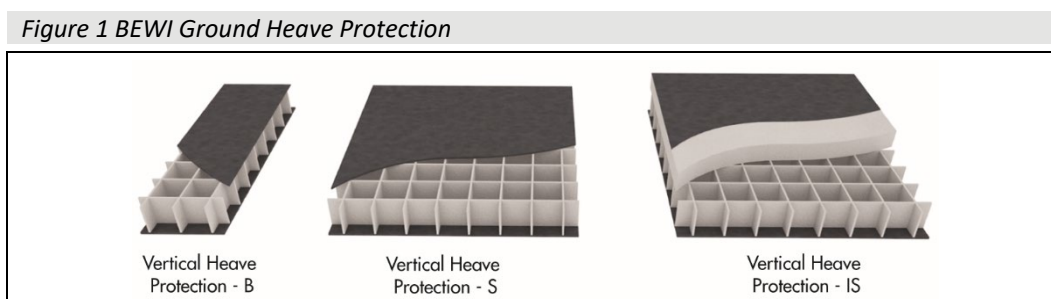
Product description and intended use

The Certificate holder provided the following description for the product under assessment. BEWI Ground Heave Protection consists of a cellular EPS compressible base in a range of different grades and depths. Each cell contains a drainage slot to prevent water becoming trapped within the cells.

There are three different products with three options for the integrally bonded top-sheet (see Figure 1):

- Heave Protection – B (beam) — with 5 mm thick polypropylene (PP) top-sheet, and overall depths of 90, 155 and 220 mm, to provide final voids of 50, 100 and 150 mm respectively
- Heave Protection – S (slab) — with 10 mm thick PP top-sheet, and overall depths of 95, 160 and 225 mm, to provide final voids of 50, 100 and 150 mm respectively
- Heave Protection – IS (insulated slab) — with 98 mm thick EPS 70 insulation layer and 2 mm thick PP top-sheet, and overall depths of 185, 250 and 315 mm, to provide final voids of 50, 100 and 150 mm respectively.

Note: All product types can be supplied with an additional PP bottom-sheet.



The standard size for all variants of the product is 1200 by 1200 mm (other dimensions are available on request). The product is available in 7 grades (see Table 1). Each grade is designed to support its specified safe load for a period of 16 hours with total compression limited to less than 6 mm, and to collapse by a specified amount depending on the selected product depth under its specified failure load. No interpolation of test results between grades is permitted.

Table 1 Nominal grade of BEWI Ground Heave Protection

Product reference	Product grade	Safe-load (kN·m ⁻²)	Fail-load (kN·m ⁻²)
1	7/10	7	10
2	9/13	9	13
3	10/15	10	15
4	13/18	13	18
5	18/24	18	24
6	24/32	24	32
7	30/40	30	40

Ancillary Items

The Certificate holder recommends the following ancillary items for use with the product, but these materials have not been assessed by the BBA and are outside the scope of this Certificate:

- spacers — for supporting reinforcement steel

Applications

BEWI Ground Heave Protection has been assessed for use either under reinforced concrete ground beams or under suspended reinforced concrete floor slabs and is effective in limiting the pressure caused by expansion of clay soils (clay heave). The structural floor or beam must, in addition to normal design criteria, be designed to accommodate the maximum upward forces owing to clay heave exerted by the void former.

Product assessment – key factors

The product was assessed for the following key factors, and the outcome of the assessments is shown below. Conclusions relating to the Building Regulations apply to the whole of the UK unless otherwise stated.

1 Mechanical resistance and stability

Data were assessed for the following characteristics.

1.1 Behaviour under loading

1.1.1 Results of load carrying capacity tests are given in Table 1, in accordance with the test method given in Table 2.

Table 2 Load carrying capacity tests

Product assessed	Assessment method	Requirement	Results
BEWI Ground Heave Protection	BBA Method	Withstand a declared safe load as defined in Table 1 for a minimum of 16 hours, with a maximum deflection of 4 mm at the time of application of the safe load and with a maximum creep of 2 mm in the period between 15 minutes after the safe load is applied and the 16th hour	Pass ⁽¹⁾

(1) See Table1 For the test results and grades of the products.

1.1.2 Results of resistance of the top-sheet tested for puncture resistance, adequacy of the product against excessive deformation under construction load and other short-term loads commonly associated with installation are given in Table 3.

Table 3 Resistance of the top-sheet tested for puncture resistance and resistance to excessive deformation under construction load

Product assessed	Assessment method	Requirement	Results
BEWI Ground Heave Protection	BBA Method	Resistance of the top-sheet against puncture and excessive deformation under construction loads (concentrated load of 1 kN). The penetration of the top-sheet must not exceed 3 mm.	Pass

1.1.3 On the basis of data assessed, the product has sufficient resistance to withstand the safe and failure loads as defined in Table 1. The top-sheet also has sufficient resistance against puncturing and excessive deformation as defined in Table 3.

2 Safety in case of fire

Not applicable.

3 Hygiene, health and the environment

Data were assessed for the following characteristics.

3.1 Interstitial condensation

3.1.1 Floors will adequately limit the risk of interstitial condensation when they are designed and constructed in accordance with BS 5250 : 2021 Annex F, and the relevant guidance.

3.1.2 The EPS 70 insulation has a water vapour resistivity of between 100 and 200 MN·s·g·m⁻¹. The least favourable value should be used for condensation risk assessment.

3.1.3 The PP top-sheet will act as an air and vapour control layer (AVCL) when no additional insulation is used. Joints between adjacent units must be sealed with formwork sealing tape. Where additional floor insulation is specified, a calculation in accordance with BS EN ISO 13788 : 2012 must be undertaken.

3.2 Surface condensation

3.2.1 Floors will adequately limit the risk of surface condensation when the thermal transmittance (U-value) does not exceed $0.7 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$ 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 for England and Wales.

3.2.2 Floors will adequately limit the risk of surface condensation when the thermal transmittance (U-value) does not exceed $1.2 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$ for Scotland at any point and they are designed and constructed to BS 5250 : 2021. Additional guidance can be found in BRE Report BR 262 : 2002.

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

4 Safety and accessibility in use

Not applicable.

5 Protection against noise

Not applicable.

6 Energy economy and heat retention

Data were assessed for the following characteristics.

6.1 Thermal conductivity

The EPS insulations were assessed for thermal conductivity and the results are given in Table 4.

Table 4 Thermal conductivities ($\text{W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$)

Product assessed	Assessment method	Requirement	Result ($\text{W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$)
EPS Grey	BS EN 12667 : 2001 and BS EN 13163 : 2012	Declared value (λ_D)	0.030
EPS White			0.038

6.2 Thermal performance

6.2.1 Calculations of the thermal transmittance (U-value) of a floor should be carried out in accordance with BS EN ISO 6946 : 2017, BS EN ISO 13370 : 2017 and BRE Report BR 443 : 2019 (excluding the EPS cells), using the declared thermal conductivity (λ_D) values given in Table 4 of $0.030 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ for grey EPS70 or $0.038 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ for white EPS70.

6.2.2 The U-value of a completed floor will depend on the insulation thickness, the perimeter/area ratio and the floor type. Calculated U-values for example constructions are given in Table 5. The product with the EPS 70 insulation layer (Heave Protection – IS) can be used for a floor satisfying the requirements of the national Building Regulations with a target U-value of 0.13 to $0.25 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$.

Table 5 Example U-values for Heave Protection – IS

Product assessed	Assessment method	Requirement	p/a ratio	Result	
				98 mm EPS and 2 mm PP top-sheet	
				White EPS 0.038 W·m ⁻¹ K ⁻¹	Grey EPS 0.030 W·m ⁻¹ K ⁻¹
Concrete slab (150 mm thickness)	BS EN ISO 6946 : 2017, BS EN ISO 13370 : 2017 and BRE Report BR 443 : 2019	Floor U-value	0.4	0.22	0.19
			0.6	0.25	0.21
			0.7	0.25	0.22
			0.9	—	0.23

6.2.3 Heave Protection – IS, which incorporates an EPS 70 insulation layer, will contribute to the thermal performance of the floor.

6.2.4 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.

6.2.5 The junction ψ -values given in Table 6 of this Certificate may be used in SAP calculations, or values can be modelled in accordance with the requirements and guidance in BRE Report BR 497 : 2016 and BRE Information Paper IP 1/06, and the provisions in the documents supporting the national Building Regulations relating to competency to perform calculations, determine robustness of design/construction and limiting heat loss by air infiltration.

Junction	ψ (W·m ⁻¹ K ⁻¹)
External wall	0.32 ⁽¹⁾
Internal wall	0.16 ⁽¹⁾

(1) Conservative defaults from SAP 2012, Appendix K.

6.2.6 The exact ψ -value for specific construction details must be modelled in accordance with to BS EN ISO 10211 : 2017 and BRE Report BR 497 : 2016.

6.3 On the basis of data assessed, the calculated values in Tables 5 and 6 can be used in energy and carbon emission rate calculations.

7 Sustainable use of natural resources

Data were assessed for the following characteristics.

7.1 Reuse and recyclability

The product contains EPS and PP, which can be recycled.

8 Durability

8.1 The potential mechanisms for degradation and the known performance characteristics of the materials in the product were assessed.

8.2 The product is dimensionally stable under varying conditions of temperature and humidity. It is rot-proof and water-resistant and will continue to perform effectively as a void former (and thermal insulation, where the product incorporating the EPS 70 insulation layer is used) for the life of the building in which it is installed.

8.3 Service life

Under normal service conditions, the product will have a life equivalent to the structure in which it is incorporated, provided it is designed, installed and maintained in accordance with this Certificate and the Certificate holder's instructions.

PROCESS ASSESSMENT

Information provided by the Certificate Holder was assessed for the following factors:

9 Design, installation, workmanship and maintenance

9.1 Design

9.1.1 The Certificate holder must perform a site-specific assessment and design method using the appropriate structural design method considering the following:

9.1.1.1 The appropriate product depth must be selected based on three variations of height corresponding to the requirements for low, medium and high shrinkage potential soils such that its specified deformation under the fail-load to be equal to, or greater than, the void required according to the maximum anticipated ground movement owing to clay heave as established from site investigations (see Table 7). Further guidance on predicted ground movements in shrinkable soils is given in *NHBC Standards 2024*, Chapter 4.2.

Table 7 Product depth and deformation under failure load

Volume change potential	Void required (minimum product deformation at fail-load) (mm)	Overall product depth (mm)		
		Heave Protection - B	Heave Protection - S	Heave Protection – IS
Low	50	90	95	185
Medium	100	155	160	250
High	150	220	225	315

9.1.1.2 In addition to the normal gravity loads, the suspended floor slabs, ground beams, connection between the slab and substructure, and, where piles are used, piles and pile/beam connections, must be designed to take account of the upward pressure that will be transferred through the product during periods of clay heave.

9.1.1.3 The ultimate upward pressure to be resisted (P_{ult}) must be determined as:

$$P_{ult} = (\gamma_Q \times PFL) - (\gamma_G \times G_k)$$

where:

PFL is the product fail-load (see Table 1)

G_k is the self-weight of the slab or beam or piled structure, including concrete blinding (when used)

γ_Q and γ_G are partial factors in accordance with BS EN 1992-1-1 : 2004 and BS EN 1990 : 2002 and their UK National Annexes, where $\gamma_Q = 1.5$ and $\gamma_G = 0.9$.

9.1.1.4 The compression of the product during concrete pouring must be less than 4 mm, depending on the depth of the concrete and the method and rate of placement. Once the concrete has been poured, subsequent creep deflections will be minimal.

9.1.1.5 Where heavy reinforcement (greater than $1 \text{ kN}\cdot\text{m}^{-2}$) is proposed, or where the reinforcement will be subjected to significant point loads from foot traffic or other imposed loading, the product must first be covered with a 50 mm thick concrete blinding.

9.1.1.6 Reinforcement must be supported on proprietary spacers selected to have a base area of sufficient size, and positioned at appropriate centres, to ensure that the maximum imposed load beneath each spacer is appropriate to the grade of product used. Advice, if required, about suitable reinforcement spacers may be obtained from the Certificate holder but such advice is outside the scope of this Certificate.

9.1.1.7 The product must not be used on the vertical faces of concrete foundations.

9.1.1.8 Use of the product below the groundwater table, or on sites where hazardous gases such as methane or radon may be encountered, is outside the scope of this Certificate. If site investigations indicate the presence of volatile organic compounds (VOCs), a suitability competent and experienced individual must assess the compatibility of the EPS with the likely emissions, especially for the product intended to perform an insulator function.

9.2 Installation

9.2.1 Installation instructions provided by the Certificate holder were assessed and judged to be appropriate and adequate.

9.2.2 Installation must be carried out in accordance with this Certificate and the Certificate holder's instructions. A summary of instructions and guidance are provided in Annex A of this Certificate.

9.3 Maintenance and repair

As the product is confined within the structure of the floor or foundation and has suitable durability, maintenance is not required.

10 **Manufacture**

10.1 The production processes for the product have been assessed, and provide assurance that the quality controls are satisfactory according to the following factors:

10.1.1 The manufacturer has provided documented information on the materials, processes, testing and control factors.

10.1.2 The quality control operated over batches of incoming materials has been assessed and deemed appropriate and adequate.

10.1.3 The quality control procedures and product testing to be undertaken have been assessed and deemed appropriate and adequate.

10.1.4 The process for management of non-conformities has been assessed and deemed appropriate and adequate. An audit of each production location was undertaken, and it was confirmed that the production process was in accordance with the documented process, and that equipment has been properly tested and calibrated.

† 10.2 The BBA has undertaken to review 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.

Delivery and site handling

11.1 The Certificate holder stated that the product is delivered to site shrink-wrapped in polythene. Each unit carries a label bearing details of the product type, grade, length, width and overall depth.

11.2 Delivery and site handling must be performed in accordance with the Certificate holder's instructions and this Certificate, including:

11.2.1 The product must be stored flat and protected from high winds and prolonged exposure to sunlight.

11.2.2 Contact with solvents and organic-based materials must be avoided.

11.2.3 The product must not be exposed to flame or ignition sources. Careful consideration should also be given to the management of fire risk when in storage; detailed guidance is given in the health and safety data sheet packaged with the product.

ANNEX A – SUPPLEMENTARY INFORMATION †

Supporting information in this Annex is relevant to the product but has not formed part of the material assessed for the 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.

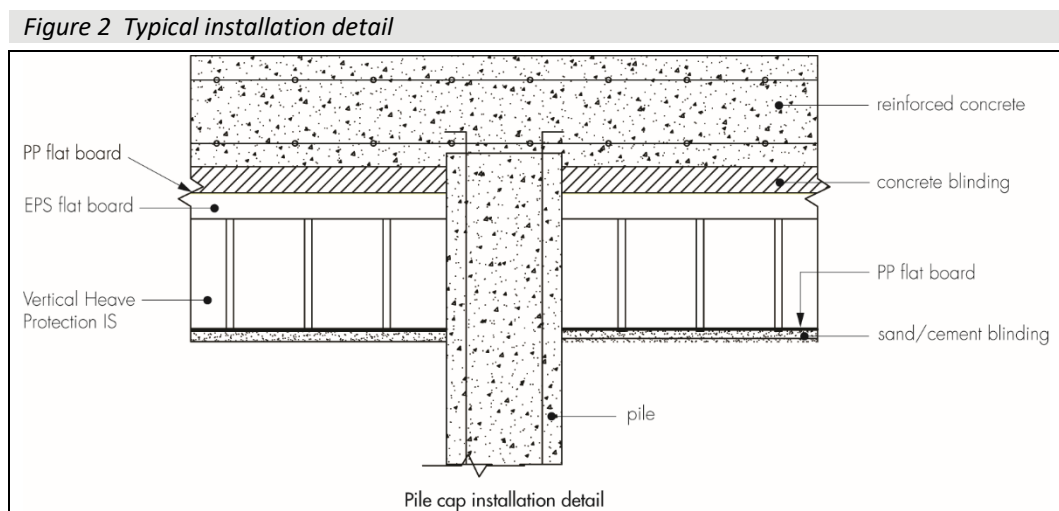
Management Systems Certification for production

The management system of the manufacturer has been assessed and registered as meeting the requirements of ISO/IEC 9001: 2015 by CQS Ltd (Certificate GB2005746).

Additional information on installation

Installation must be in accordance with the Certificate holder's instructions and this Certificate. A summary of precautions and ancillary product components is provided below:

- A.1 Adequate supervision must be maintained and, if required, the Certificate holder's specialists, experienced in site practice and installation of the product, will attend the site to provide demonstrations to ensure correct installation.
- A.2 Normal precautions for handling EPS materials should be taken to avoid damaging the product during off-loading, storage, handling and installation. Any damaged areas should be repaired or replaced before pouring the concrete.
- A.3 The product must be placed on a firm, level surface with the bottom of the excavation properly compacted and blinded. A layer of sand blinding may be used when the product incorporates a PP bottom-sheet; otherwise a concrete blinding is required.
- A.4 For piled ground beams, the top of each pile should be trimmed so that it extends slightly above the proposed underside of the ground beam (see Figure 2). Each pile should protrude above the level of the void former, allowing for the thickness of concrete blinding (if used) and a keying depth into the ground beam. Care should be taken to ensure that the void former is cut to fit tightly around the pile and that any gaps are sealed to prevent loss of concrete into the void.



- A.5 When required, the product can be cut to shape with a fine-toothed saw. Care should be taken to ensure that, after cutting, exposed ends of the cellular ribs do not exceed 50 mm in length.

A.6 Reinforcement should be fixed and adequately supported to ensure that the correct depth of concrete cover is achieved, and to ensure that the load beneath each support is appropriate to the grade of product being used. The void former should be covered with a 50 mm thickness of concrete blinding where heavy reinforcement is proposed, or where the reinforcement will be subjected to significant point loads from foot traffic or other imposed loading.

A.7 During construction, spreader boards are recommended, to reduce localised imposed load transmitted to the product.

A.8 Concrete should be placed with care to avoid overloading the product.

A.9 The product is designed to be installed by a competent general builder, or a contractor, experienced with this type of product.

A.10 Adequate supervision must be maintained to ensure correct installation.

Procedure

A.11 Joints between adjacent void formers should be sealed with formwork sealing tape (supplied by the Certificate holder covered by section 3.1.3).

A.12 Reinforcement should be fixed and adequately supported to ensure that the correct depth of concrete cover is achieved, and to ensure that the load beneath each support is appropriate to the grade of product being used (see section 6.14). The product should be covered with a 50 mm thickness of concrete blinding where heavy reinforcement is proposed, or where the reinforcement will be subjected to significant point loads from foot traffic or other imposed loading.

A.13 Reinforcement should be supported on proprietary spacers selected to have a base area of sufficient size, and positioned at appropriate centres, to ensure that the maximum imposed load beneath each spacer is appropriate to the grade of product used. Advice, if required, about suitable reinforcement spacers may be obtained from the Certificate holder.

A.14 During construction, spreader boards are recommended, to reduce localised imposed load transmitted to the void formers.

A.15 Concrete should be placed with care to avoid overloading the product.

Bibliography

BRE Report BR 262 : 2002 *Thermal Insulation: Avoiding Risks*

BRE Report BR 443 : 2019 *Conventions for U-value calculations*

BRE Report BR 497 : 2016 *Conventions for calculating linear thermal transmittance and temperature factors*

BRE Information Paper IP 1/06 *Assessing the effects of thermal bridging at junctions and around openings*

BS 5250 : 2021 *Management of moisture in buildings — Code of practice*

BS EN 1990 : 2002 + A1: 2005 *Basis of structural design*

NA to BS EN 1990 : 2002 + A1 : 2005 UK National Annex to *Basis of structural design*

BS EN 1992-1-1 : 2004 + A1 : 2014 *Eurocode 2 : Design of concrete structures — General rules*

NA + A2 : 14 to BS EN 1992-1-1 : 2004 + A1 : 2014 UK National Annex to *Eurocode 2 : Design of concrete structures — General rules*

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 ISO 9001 : 2015 *Quality management systems — Requirements*

BS EN ISO 6946 : 2017 *Building components and building elements — Thermal resistance and thermal transmittance — Calculation methods*

BS EN ISO 10211 : 2017 *Thermal bridges in building construction — Heat flows and surface temperatures — Detailed calculations*

BS EN ISO 13370 : 2017 *Thermal performance of buildings — Heat transfer via the ground — Calculation methods*

BS EN ISO 13788 : 2012 *Hygrothermal performance of building components and building elements — Internal surface temperature to avoid critical surface humidity and interstitial condensation — Calculation methods*

Limiting thermal bridging and air leakage: Robust construction details for dwellings and similar buildings TSO 2002

Conditions of Certificate

Conditions

1 This Certificate:

- relates only to the product 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
- has to be read, considered and used as a whole document – it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English Law.

2 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

3 This Certificate will be displayed on the BBA website, and the Certificate Holder is entitled to use the Certificate and Certificate logo, provided that the product 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.

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

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:

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product or any other product
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product
- actual installations of the product, including their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the product is installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the product, including its manufacture, supply, installation, use, maintenance and removal
- any claims by the manufacturer relating to CE marking.

6 Any information relating to the manufacture, supply, installation, use, maintenance and removal of this product which is contained or referred to in this Certificate is the minimum required to be met when the product 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.

British Board of Agrément

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