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Agrément Certificate
11/4862
Product Sheet 1 Issue 4

CORDEK CELLULAR VOID FORMERS

CELLCORE HX

This Agrément Certificate Product Sheet(1) relates to Cellcore HX, 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 repair

Ongoing contractual Scheme elements†:

- regular assessment of production
- formal 3-yearly review

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

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 Fourth issue: 24 December 2024
Originally certified on 30 August 2011

Hardy Giesler
Chief Executive Officer

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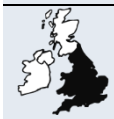
SUMMARY OF ASSESSMENT AND COMPLIANCE

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 Cellcore HX, 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.
Regulation:	**7(1)**	**Materials and workmanship**
Comment:		The product is acceptable. See sections 8 and 9 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**
Comment:	1.1(b)	Structure 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:	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 will 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 this 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(1)(a)(i) (iii)(b)(i)**	**Fitness of materials and workmanship**
Comment:		The product is acceptable. See sections 8 and 9 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.

Additional Information

NHBC Standards 2024

In the opinion of the BBA, Cellcore HX, 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,* 4.3 *Strip and trench fill foundations* and 4.4 *Raft, pile, pier and beam foundations*.

Fulfilment of Requirements

The BBA has judged Cellcore HX 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

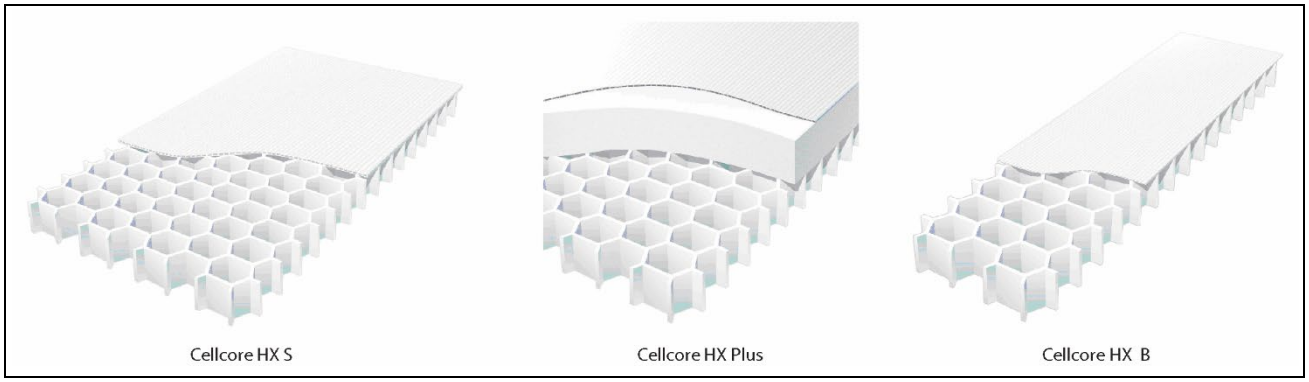
1.1 The Certificate holder provided the following description for the product under assessment. Cellcore HX consists of a moulded hexagonal cellular EPS compressible base in a range of different grades and depths. Each cell contains a drainage slot to prevent water becoming trapped within the cells. The shallowest panel depth incorporates drainage slots in the top face only of the cellular base. The two deeper panel depths include drainage slots in both faces of the cellular base.

1.2 There are three different options for the integrally bonded top (see Figure 1):

- Cellcore HX S — for use under reinforced concrete slabs, with a 10 mm thick top of twin-wall polypropylene (PP) sheet, available in a standard size of 2400 by 1200 mm and in overall depths of 90, 160 and 225 mm
- Cellcore HX Plus — for use under reinforced concrete slabs, with a top comprising a 2 mm PP sheet bonded to a 48 mm thick(1) EPS 100 insulation layer, which will contribute to the thermal insulation of the building, available in a standard size of 2400 by 1200 mm and in overall depths of 130, 200 and 265 mm
- Cellcore HX B — for use under reinforced concrete ground beams, with a 5 mm thick top of twin-wall PP sheet, available in strips 2400 mm long and widths from 300 to 1200 mm in increments of 25 mm to suit the associated beam and in overall depths of 85, 155 and 220 mm.

(1) Minimum thickness; other thicknesses are available on request.

Figure 1 Cellcore HX cellular void formers



1.3 The product is available in four grades (see Table 1). Each grade is designed to support its specified safe load for a period of 16 hours with compression limited to less than 5 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 Product grades of Cellcore HX and associated safe- and fail-loads

Product reference	Product grade	Safe-load ($kN \cdot m^{-2}$)	Fail-load ($kN \cdot m^{-2}$)
1	7/10[1]	7	10
2	9/13	9	13
3	13/18	13	18
4	18/24	18	24

(1) In this grade, Cellcore HX B is not available as standard.

1.4 Formwork sealing tape, typically 50 mm wide, is used to seal the joints between adjacent panels.

Applications

Cellcore HX 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.

Product assessment – key factors

The product was assessed for the following key factors, and the outcome of the assessment 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 characteristic.

1.1 Behaviour under loading

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

Table 2 Load carrying capacity tests

Product assessed	Assessment method	Requirement	Result
Cellcore HX	BBA Method	Deflection between 0 and 5 mm under safe-load[1]	Pass
		Deflection between 0 and 5 mm for 16 hours under safe-load[1]	
		Deflection under fail-load[1] achieves heave potential	

(1) See Table 1 for the safe-load and fail-load declarations for grades of the product.

1.1.2 On the basis of data assessed, the product has sufficient bearing-strength to support designed loads for the underside or side of foundations during construction.

2 Safety in case of fire

Not applicable.

3 Hygiene, health and the environment

Not applicable.

4 Safety and accessibility in use

Not applicable.

5 Protection against noise

Not applicable.

6 Energy economy and heat retention

Not applicable.

7 Sustainable use of natural resources

Data was assessed for the following characteristic.

7.1 Reuse and recyclability

The product is made from 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 remain effective as a compressible fill for the expected 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 use an 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 compression under fail-load is equal to, or greater than, the maximum anticipated ground movement owing to clay heave as established from site investigations (see Table 3). Further guidance on predicted ground movements in shrinkable soils is given in *NHBC Standards* 2024, Chapter 4.2.

Table 3 Product depth and compression under failure load

NHBC volume change potential(1)	Void required (minimum product compression at fail-load) (mm)	Overall product depth (mm)		
		Cellcore HX S	Cellcore HX Plus	Cellcore HX B
Low	50	90	130	85
Medium	100	160	200	155
High	150	225	265	220

(1) *NHBC Standards* 2024, Chapter 4.2, Table 7.

9.1.1.2 In addition to the normal downward-acting loads, the suspended floor slabs, the ground beams, the connection between the slab and ground beams and, where piles are used, the pile/ground 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}) should 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, 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 10 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 is proposed, or where the reinforcement will be subjected to significant point loads from foot traffic or other imposed loading, Cellcore HX B panels should 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 panel 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 experienced and competent 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 Workmanship

The product is designed to be installed by a contractor experienced with this type of product. It is usual practice to have the Certificate holder's specialist on site to ensure correct installation.

9.4 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.

10.1.5 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.

11 Delivery and site handling

11.1 The Certificate holder stated that the product is delivered to site shrink-wrapped in polythene but can be supplied unwrapped to order. Each unit carries a label bearing details of the product type, grade, length, width and overall depth, and the BBA logo incorporating the number of this Certificate.

11.2 Delivery and site handing 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 should be avoided.

11.2.3 The product must not be exposed to flame or ignition. 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 and ISO/IEC 14001 : 2015 by ISOQAR (Certificates 10991-QMS--001 and 10991-EMS-001 respectively).

Additional information on installation

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

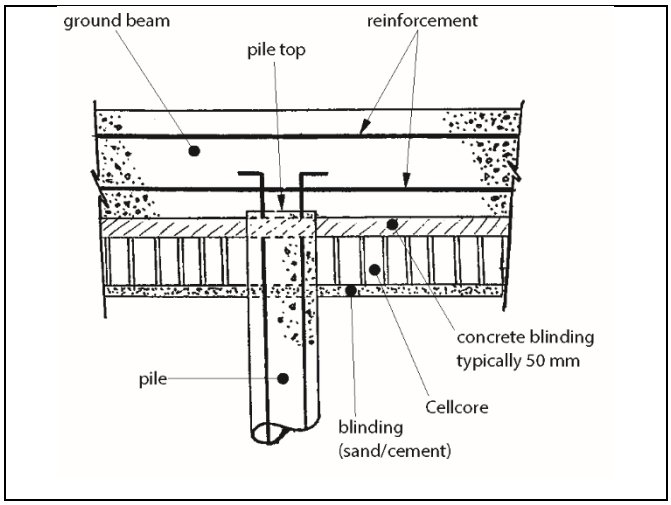
A.1 Adequate supervision must be maintained and, if required, the Certificate holder's specialists, experienced in site practice and installation of the product, will attend the site to provide demonstrations to ensure correct installation.

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 and the bottom of the excavation properly compacted and blinded with a layer of concrete or a sand/cement blinding.

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 penetrate the void former to allow for an approximate 50 mm thickness of concrete blinding on top where applicable, and a keying depth which is in accordance with the engineer's design.

Figure 2 Typical piled ground beam



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 stiffening 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 maximum imposed load beneath each support is appropriate to the grade of panel being used. The panels 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 panels.

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

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 panels should be sealed with formwork tape supplied by the Certificate holder.

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 maximum imposed load beneath each support is appropriate to the grade of panel being used. The panels 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 the imposed load transmitted to the panels.

A.15 Concrete should be placed with care to avoid overlading the panels.

Bibliography

BS EN 1990 : 2023 *Eurocode : Basis of structural and geotechnical design*
NA to BS EN 1990 : 2002 + A1 : 2005 UK National Annex to *Eurocode : Basis of structural design*

BS EN 1992-1-1 : 2023 *Eurocode 2: Design of concrete structures — General rules and rules for buildings, bridges and civil engineering structures*
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*

ISO/IEC 9001 : 2015 *Quality management systems — Requirements*

ISO/IEC 14001 : 2015 *Environmental management systems — Requirements with guidance for use*

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
- 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
- and any matter arising out of or in connection with it or its subject matter (including non-contractual disputes or claims) is governed by and construed in accordance with the law of England and Wales.
- the courts of England and Wales shall have exclusive jurisdiction to settle any matter arising out of or in connection with this Certificate or its subject matter (including non-contractual disputes or claims).

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 UKCA marking and 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.

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