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Agrément Certificate
98/3528
Product Sheet 1

DUFAYLITE VOID SYSTEMS

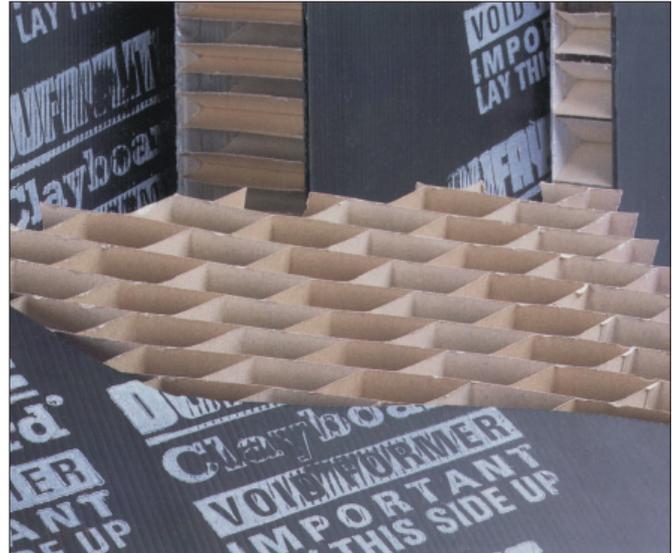
CLAYBOARD MARK 2 KN30 VOID SYSTEM

This Agrément Certificate Product Sheet⁽¹⁾ relates to Clayboard Mark 2 KN30 Void System. Panels incorporating a honeycomb core with top and bottom bonded facings for use to limit the pressure exerted on in-situ, reinforced concrete ground beams and suspended concrete floors in piled foundations caused by expansion of clay soils (clay heave) or ground recovery.

(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 design — the product has adequate strength to withstand short-term construction phase load bearing capability, required of in-situ suspended reinforced concrete floors and beams (see section 6).

Durability — the product is designed to have limited durability and the honeycomb core will collapse under pressure after saturation to perform effectively as a void former for the life of the building (see section 8).

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: 24 April 2013

Originally certificated on 29th October 1998

Brian Chamberlain

Head of Approvals — Engineering

Greg Cooper

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.

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Regulations

In the opinion of the BBA Clayboard Mark 2 KN30 Void System, if installed, used and maintained in accordance with this Certificate, will meet or contribute to meeting 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: A2	Ground movement
Comment:	The product prevents expansion of clay soils impairing the stability of any part of the building. See section 6 of this Certificate.
Requirement: Regulation 7	Materials and workmanship
Comment:	The product is acceptable. See section 8 and <i>installation</i> part of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation: 8(1)	Fitness and durability of materials and workmanship
Comment:	The product is an acceptable material. See section 8 and the <i>Installation</i> part of this Certificate.
Regulation: 9	Building standards applicable to construction
Standard: 1.1	Structure
Comment:	The product contributes to meeting the relevant requirements of this Standard. See section 6 of this Certificate.
Standard: 7.1(a)(b)	Statement of sustainability
Comment:	The product can contribute to meeting 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. (1) Technical Handbook (Domestic). (2) Technical Handbook (Non-Domestic).



The Building Regulations (Northern Ireland) 2012

In the opinion of the BBA, there are no requirements in these Regulations pertaining to the use of the product.

Construction (Design and Management) Regulations 2007

Construction (Design and Management) Regulations (Northern Ireland) 2007

Information in this Certificate may assist the client, CDM co-ordinator, designer and contractors to address their obligations under these Regulations.

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

Additional Information

NHBC Standards 2011

NHBC accepts the use of Clayboard Mark 2 KN30 Void System provided it is installed, used and maintained in accordance with this Certificate, in relation to *NHBC Standards*, Chapters 4.2 *Building near trees* (D5-D8) 4.4 *Strip and trench fill foundations* 4.5 *Raft, pile pier and beam foundations*, 5.1 *Substructure and ground bearing floors* and 5.2 *Suspended ground floors*.

Technical Specification

1 Description

1.1 The Clayboard Mark 2 KN30 Void System consists of a honeycomb cardboard core, bonded to polypropylene facing boards (the top face is black and the bottom face is white). The boards are supplied in thicknesses of 60 mm, 85 mm, 110 mm and 160 mm with panels supplied in 2440 mm lengths by 1000 mm widths for use below suspended floors and below ground beams.

1.2 Clayboard Voidpak System is used to introduce water into the honeycomb core, once the concrete is set sufficiently and self-supporting. This system requires polythene sheeting to wrap the Clayboard and joints sealed with Dufaylite waterproof tape to keep the boards dry during the installation and construction phase. Pre-shaped pipes are pushed through the sheeting and into the top facing board to introduce water into the cardboard honeycomb core.

2 Manufacture

2.1 The product is manufactured from cardboard into a honeycomb structure with polypropylene facings to create a sandwich panel.

2.2 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.

3 Delivery and site handling

3.1 The panels are delivered to site on a lightweight 'transit pad' board and must be stored flat and off the ground, preferably on the delivery pallets. It is essential to protect the product from moisture ingress whilst in storage.

3.2 The standard length panels are supplied in pack quantities with the bottom boards shrink-wrapped around the base and a pack cover for protection. Where greater single lengths are required, panels can be extended by use of the Certificate holder's tube bag system; applied prior to delivery, or on site. The tubes and bags are either coloured and marked with the legend 'This side up' or transparent to show the top face of the Clayboard.

3.3 During off loading, care must be taken to avoid piercing or tearing the polythene, or damaging the panels.

3.4 As the panels consist of paper, storage areas must be well away from any possible source of ignition such as welding or angle grinding operations.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Clayboard Mark 2 KN30 Void System.

Design Considerations

4 General

4.1 The Clayboard Mark 2 KN30 Void System when installed in accordance with the recommendations of this Certificate, is effective in limiting the pressure exerted on the soffit of in-situ, reinforced concrete ground beams and suspended concrete floors in piled foundations.

4.2 The product must not be used at depths greater than 2 m or in locations below the water table, nor has it been assessed for use in areas where soil gas protection is required. A site survey, taking into account seasonal variations, must be carried out to establish the water table level before the decision is made to use Clayboard.

4.3 The thickness of Clayboard to be used depends on the required void, but should be not less than the required void plus 10 to 15 mm (see Table 1). The maximum likely ground movement due to clay heave, and hence required void, is established from site investigations.

Table 1 Thickness of Clayboard Mark 2 KN30 Void System

Required void (max) (mm)	50	75	100	150
Clayboard thickness (mm)	60	85	110	160

5 Practicability of installation

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

6 Structural design



6.1 When dry, the product has a nominal compressive strength of $30 \text{ kN}\cdot\text{m}^{-2}$ and is designed to; support the weight of fresh concrete pour up to 1 m thick, withstand foot traffic, and support steel reinforcement during the construction phase.

6.2 When water is introduced through the Voidpak system after the concrete is set, the honeycomb core structure of the panel loses its compressive strength and partially collapses.

6.3 In situations where ground heave occurs, the Clayboard core further collapses yielding to compressive loads of $<3 \text{ kN}\cdot\text{m}^{-2}$ and limits pressure exerted on the concrete structure above.

7 Maintenance

No maintenance is required.

8 Durability



The panels are robust and will offer short-term load life required during the construction phase as a temporary formwork in piled foundations.

Installation

9 General

9.1 The Clayboard Mark 2 KN30 Void System must be kept dry until the concrete is set and totally self-supporting. The period between laying the panels and pouring the concrete should be kept to a minimum to reduce the risk of the Clayboard getting wet.

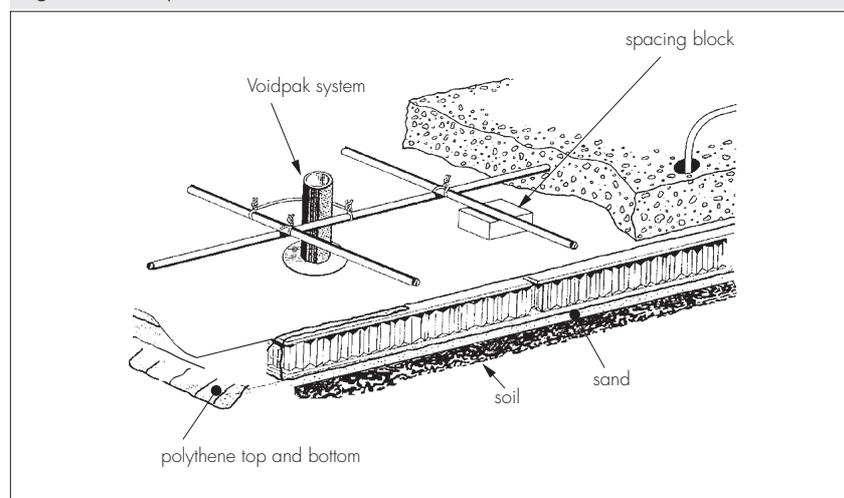
9.2 Provision should be made for the removal of all surface water from the foundation zone prior to placement of the Clayboard. This may necessitate forming a sump nearby, with facilities for pumping to a suitable drain. The product must not be placed in waterlogged ground.

10 Procedure

10.1 The bottom of the excavation must be flat, even, properly compacted, and blinded with a 25 mm dry sand layer to prevent pressure points damaging the polythene wrapping.

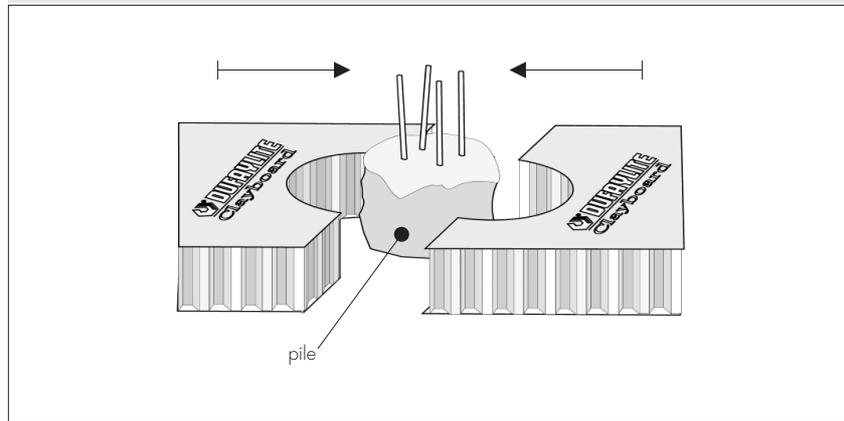
10.2 When used under floors (see Figure 1), polythene sheeting is first laid onto the blinding ensuring there is sufficient sheeting to fold over the top of the Clayboard once laid. The Clayboard is placed white face down on top of the polythene, ensuring adjoining panels butt closely together. Further polythene sheeting is laid on top of the Clayboard, overlapping the bottom sheeting, and the joints taped using Dufaylite waterproof tape. To minimise water penetration, taped joints should be kept to minimum and, where practicable, located on the upper face only.

Figure 1 Clayboard Installation



10.3 When used under ground beams, factory wrapped panels must be placed with the top side uppermost as marked on the panels (see section 3.2). Where panels are site wrapped or need to be trimmed and resealed, this should be undertaken with care in dry conditions and away from the excavations to avoid the possibility of water penetration as described in section 9.2. The sealing of end joints must be carried out using Dufaylite waterproof tape being applied along the full length of the joint to avoid water penetration. Such site modifications should only be limited to resealing the panel ends when trimming to achieve a close fit around pile heads and where extending panel length. When placing, panel ends must be closely butted to each other to avoid concrete penetrating into the joints.

Figure 2 Floor and ground beam details



10.4 To avoid overspill of concrete along the long edges of the ground beam panels, side shuttering plates (supplied by the Certificate holder) are positioned as shown in Figure 3. Care should be taken when installing these plates to avoid damaging the polythene wrapping and exposing the honeycomb core. A pile shuttering plate (supplied by the Certificate holder) is also fitted around the pile head (see Figure 4) as additional shuttering during the concrete pour.

Figure 3 Side shuttering plate

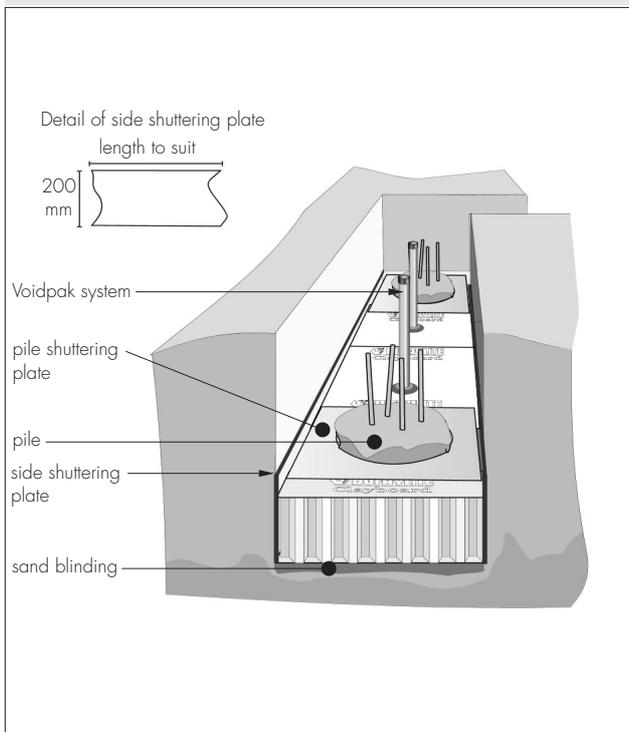
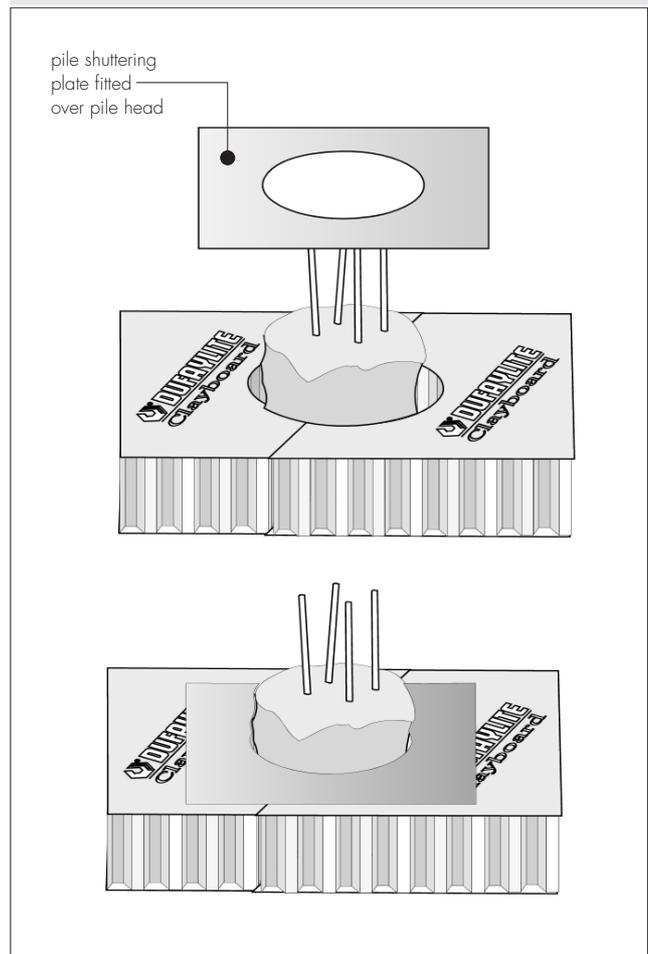


Figure 4 Pile shuttering plate

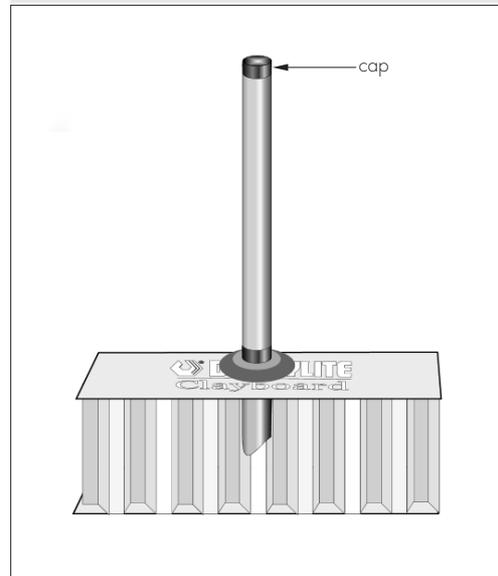


10.5 Sufficient spacing blocks (in accordance with Certificate holder's instructions) must be used to make sure that the correct depth of concrete cover to the reinforcement is achieved. It must be ensured that the load transmitted to the Clayboard does not exceed $30 \text{ kN}\cdot\text{m}^{-2}$ and this is accomplished by selecting the types and quantities of spacing blocks.

10.6 The steel reinforcement is fabricated or laid.

10.7 Provision for the introduction of water into the product is made using the Clayboard Voidpak System (see Figure 5). The pipe is positioned with the raked end to the Clayboard face. A small cross is cut into the polythene sheet and the top board of each panel and the Voidpak pipe pushed in until the flange is flush with the Clayboard surface. A quarter turn will help lock the pipe in place. The pipe must not penetrate the bottom face of the Clayboard.

Figure 5 Voidpak System



10.8 For floors, a minimum of one pipe must be provided for each isolated area of Clayboard, otherwise one pipe per 24 m² will suffice. When under ground beams, one pipe per panel must be used, positioned at or near the centre of each panel. For ground beams, to ensure that the Voidpak pipes are positioned correctly, it is recommended the use of a proprietary marking spray to clearly mark the location of each pipe position on the ground nearby or on the formwork.

10.9 Checks should be made to ensure all the pipes are secure and have caps securely fitted. If necessary, the pipes can be kept vertical during the pouring of the concrete by cross-tying to adjacent reinforcement.

10.10 When the concrete has been poured and is totally self-supporting, a hose is inserted into each pipe and water introduced into the core of the panel. To ensure total saturation of the Clayboard panel, further water should be introduced at least twice over the next 48 hours.

10.11 After 48 hours, the hoses are removed and the bottom facing of the Clayboard and underlying polythene struck through to allow the water to drain away. When operations are completed, pipes should be sealed with stiff cement/sand mortar or waterproof sealant.

Technical Investigations

11 Tests

An examination was made of test data and tests were conducted to determine:

- dimensional accuracy
- load capacity (when dry) — samples loaded at rate of 0.5 N·m⁻²·min⁻¹ and held at 30 kN·m⁻² for 16 hours
- load capacity after 24 hours' immersion in water — was below 3 kN·m⁻².

12 Investigations

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

12.2 Site visits were carried out to assess the practicability of installation.

12.3 An assessment was made of the performance characteristics of the product.

13 Conditions

13.1 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
- 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.

13.2 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.

13.3 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.

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

13.5 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/system or any other product/system
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product/system
- 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.

13.6 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.