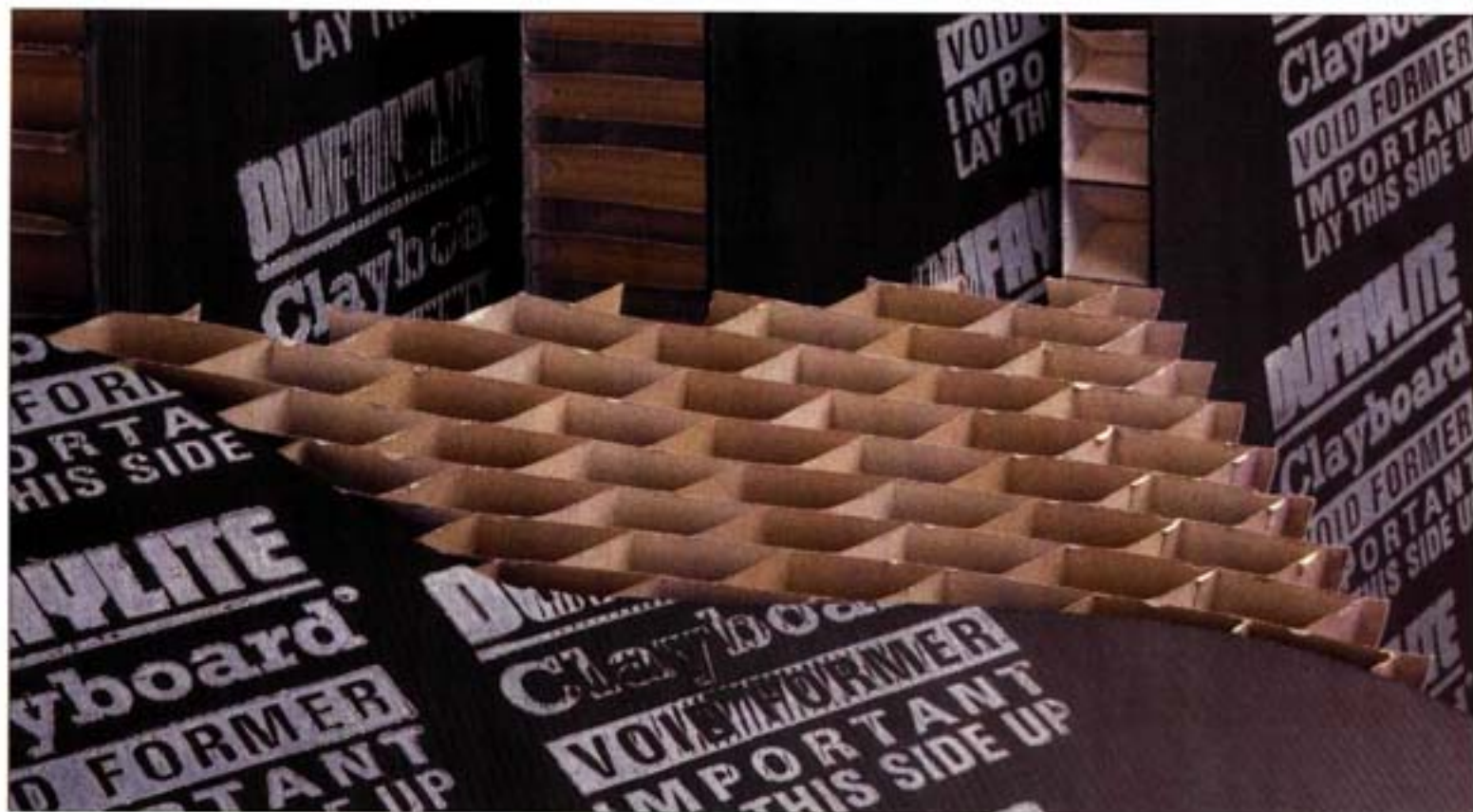


Designated by Government  
to issue  
European Technical  
Approvals

**CLAYBOARD MARK 2 KN30 VOID SYSTEM**

Réducteurs de pression pour sols  
Drückabschwächer für Boden

**Product**



• THIS CERTIFICATE RELATES TO THE CLAYBOARD MARK 2 KN30 VOID SYSTEM.

• The product is used to limit the pressure exerted on the soffit of in-situ, reinforced concrete ground beams and suspended concrete floors caused by expansion of clay soils (clay heave) or ground recovery.

• The product must not be used at depths greater than 2 m or in locations below the water table.

**Regulations**

**1 The Building Regulations 2000 (as amended) (England and Wales)**



The Secretary of State has agreed with the British Board of Agrément the aspects of performance to be used by the BBA in assessing the compliance of compressible fill with the Building Regulations. In the opinion of the BBA, the Clayboard Mark 2 KN30 Void System, if used in accordance with the provisions of the Certificate, will meet or contribute to meeting the relevant requirements.

Requirement: A2 Ground movement

Comment: The product prevents expansion of clay soils impairing the stability of the building. See section 7.1 of this Certificate.

Requirement: Regulation 7 Materials and workmanship

Comment: The product is acceptable.

**2 The Building Standards (Scotland) Regulations 1990 (as amended)**



In the opinion of the BBA, the Clayboard Mark 2 KN30 Void System, if used in accordance with the provisions of this Certificate, will satisfy or contribute to satisfying the various Regulations and related Technical Standards listed below.

Regulation: 10 Fitness of materials and workmanship

Standard: B2.1 Selection and use of materials, fittings, and components, and workmanship

Comment: The product can contribute to a construction meeting this Standard. See the *Installation* part of this Certificate.

Standard:	B2.2	Selection and use of materials, fittings, and components, and workmanship
Comment:		The product is an acceptable material.
Regulation:	11	Structure
Standard:	C2.1	Structure — Stability
Comment:		The product contributes to meeting the relevant requirements of this Standard. See section 7.1 of this Certificate.

### 3 The Building Regulations (Northern Ireland) 2000



In the opinion of the BBA, there are no requirements in these Regulations pertaining to the use of the Clayboard Mark 2 KN30 Void System.

### 4 Construction (Design and Management) Regulations 1994 (as amended) Construction (Design and Management) Regulations (Northern Ireland) 1995 (as amended)

In the opinion of the BBA there is no information in this Certificate which relates to the obligations of the client, planning supervisor, designer and contractors under these Regulations.

## Technical Specification

### 5 Description

5.1 The Clayboard Mark 2 KN30 Void System consists of a honeycomb cardboard core, bonded to polypropylene facing boards (see front page picture). The top face is black and the bottom face is white. Clayboard is supplied in panels 2440 mm long by 1000 mm wide for use below floors and 2440 mm long by varying widths for use below ground beams. Thicknesses of 60 mm, 85 mm, 110 mm and 160 mm are available for both uses.

5.2 When dry, the product has sufficient compressive strength to support the weight of wet concrete and steel reinforcement. When water is introduced after the concrete has set, the honeycomb loses its compressive strength and yields to ground heave without transmitting pressure to the building.

5.3 Water is introduced into the product by using the Clayboard Voidpak System. Polythene sheeting is used to wrap the Clayboard and joints sealed with Dufaylite waterproof tape. Pre-shaped pipes are pushed through the sheeting and into the top facing board to introduce water into the cardboard honeycomb core.

5.4 Continuous quality control is exercised during manufacture.

### 6 Delivery and site handling

6.1 The Clayboard Mark 2 KN30 Void System panels, for use under floors, are delivered to site on pallets, wrapped in polythene. When used under ground beams, standard length panels are supplied individually wrapped in 1000 gauge polythene bags with the joints sealed with Dufaylite waterproof tape. 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 sealing of end joints must be carried out in dry conditions using Dufaylite waterproof tape applied along the full length of the joint to avoid water penetration. 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. During off-loading, care must be taken to avoid piercing or tearing the polythene, or damaging the panels. Any site modifications should be limited to trimming and resealing the panel ends to achieve a close fit around pile heads. To minimise water penetration, taped joints should be kept to minimum and, where practicable, located on the upper face only.

6.2 Whether used under floor or ground beams panels must be stored flat and off the ground and wrapped in polythene, preferably on the delivery pallets. It is essential to protect the product from moisture whilst in storage.

## Design Data

### 7 General

7.1 The Clayboard Mark 2 KN30 Void System, when designed and 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.

7.2 The product must not be used 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.

7.3 The product has a nominal compressive strength of  $30 \text{ kNm}^{-2}$  when dry, and is designed to support the weight of concrete up to 1 m thick. When the core is wetted, Clayboard will collapse under a nominal compressive load of approximately  $3 \text{ kNm}^{-2}$ .

7.4 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

## Installation

### 8 General

8.1 The Clayboard Mark 2 KN30 Void System must be kept dry until the concrete achieves self-supporting strength. The time between laying the product and pouring the concrete should be kept to a minimum to reduce the risk of the Clayboard getting wet.

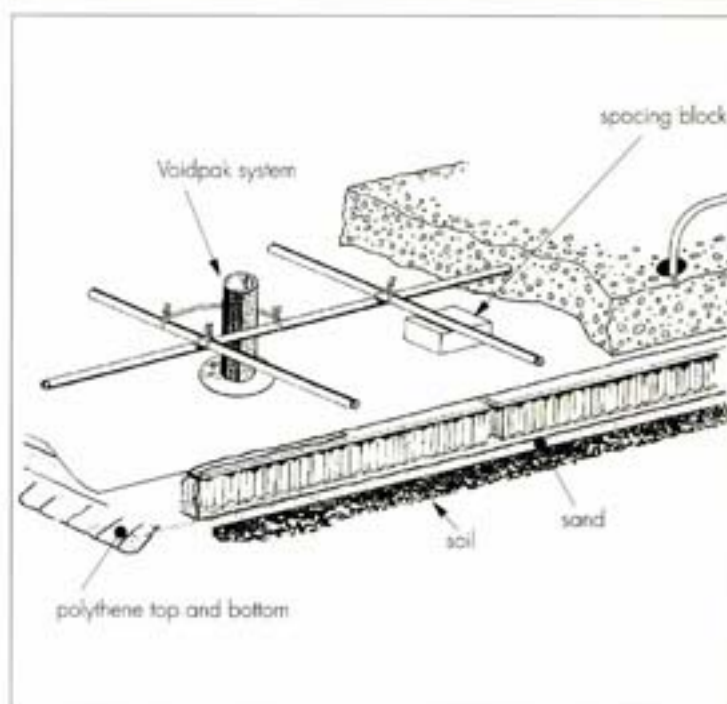
8.2 Provision should be made for the removal of all surface water from the foundation zone prior to placement of the Clayboard. This may necessitate forming a sump nearby, with facilities for pumping to a suitable drain. The product must not be placed in waterlogged ground.

### 9 Procedure

9.1 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 and underside of the Clayboard.

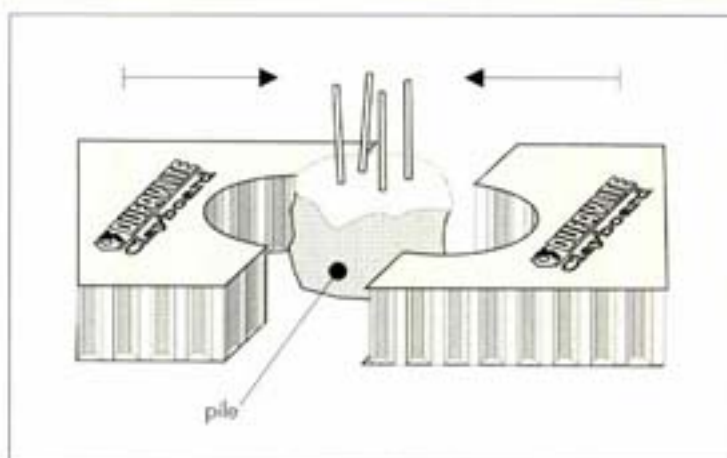
9.2 When used under floors (see Figure 1), polythene sheeting is first laid onto the blinding ensuring there is sufficient sheeting to fold over the top of the Clayboard once laid. The Clayboard is placed white face down on top of the polythene, ensuring adjoining panels butt closely together. Further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

Figure 1 Installation



9.3 When used under ground beams, factory wrapped panels must be placed with the top side uppermost — the panels are clearly marked (see section 6.1). 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 6.1. When placing, panel ends must be closely butted to each other to avoid concrete penetrating the joints. To form a close seal around pile heads, panel ends are either factory profiled or, where necessary, trimmed and resealed on site.

Figure 2 Floor and ground beam details



9.4 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

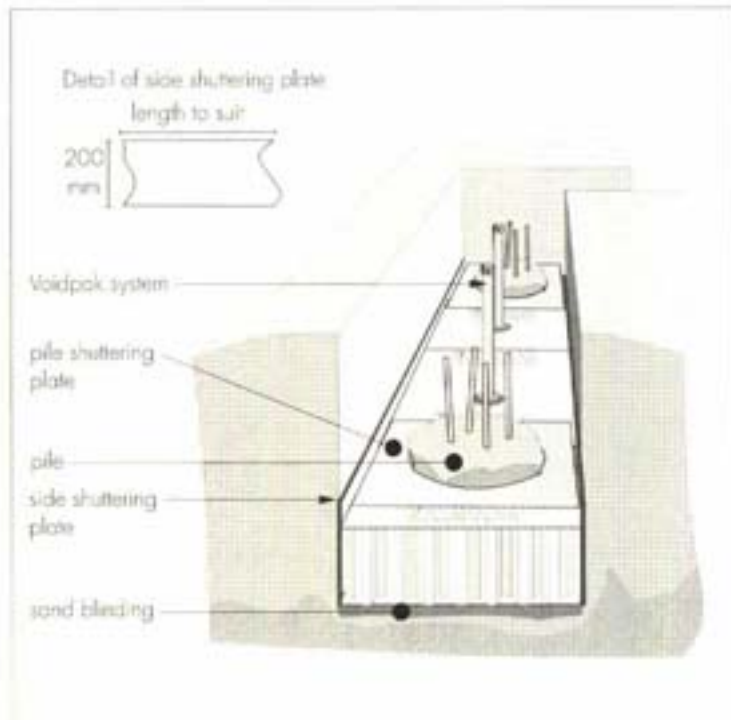
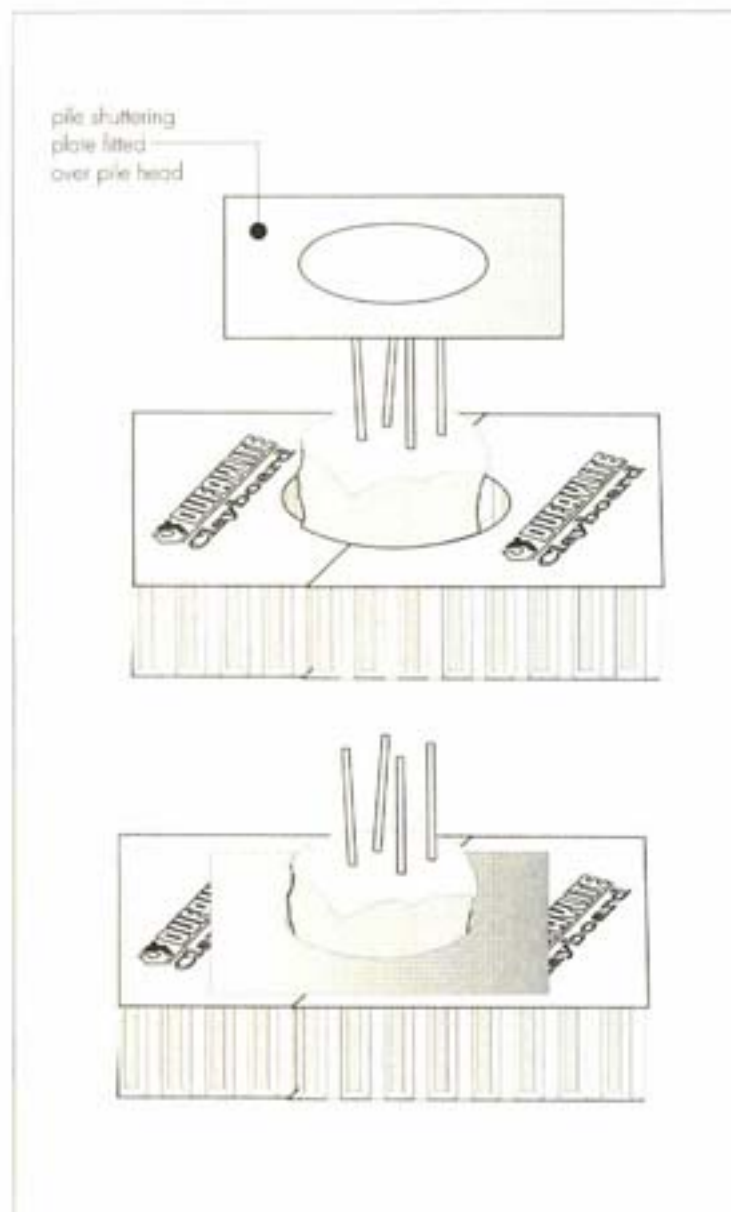


Figure 4 Pile shuttering plate



9.5 Sufficient spacing blocks 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  $30 \text{ kNm}^{-2}$  and this is accomplished by selecting the types and quantities of spacing blocks.

9.6 The steel reinforcement is laid.

9.7 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



9.8 For floors, a minimum of one pipe must be provided for each isolated area of Clayboard, otherwise one pipe per  $24 \text{ m}^2$  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, the Certificate holder recommends the use of a proprietary marking spray to clearly mark the location of each pipe position on the ground nearby or on the formwork.

9.9 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.

9.10 The concrete is poured and when it is totally self-supporting, a hose is inserted into each pipe and water introduced into the product. To ensure total saturation of the Clayboard, further water should be introduced at least twice over the next 48 hours.

9.11 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

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

### 10 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  $0.5 \text{ Nm}^{-2}\text{min}^{-1}$  and held at  $30 \text{ kNm}^{-2}$  for 16 hours
- load capacity after 24 hours' immersion in water — was below  $3 \text{ kNm}^{-2}$ .

### 11 Investigations

11.1 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.

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

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

## Conditions of Certification

### 12 Conditions

12.1 This Certificate:

- (a) relates only to the product that is named, described, installed, used and maintained as set out in this Certificate;
- (b) is granted only to the company, firm or person identified on the front cover — no other company, firm or person may hold or claim any entitlement to this Certificate;
- (c) is valid only within the UK;
- (d) has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective;
- (e) is copyright of the BBA;
- (f) is subject to English law.

12.2 References in this Certificate to any Act of Parliament, Regulation made thereunder, Directive or Regulation of the European Union, Statutory Instrument, Code of Practice, British Standard, manufacturers' instructions or similar publication, are references to such publication in the form in which it was current at the date of this Certificate.

12.3 This Certificate will remain valid for an unlimited period provided that the product and the manufacture and/or fabrication including all related and relevant processes thereof:

- (a) are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA;

(b) continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine; and

(c) are reviewed by the BBA as and when it considers appropriate.

12.4 In granting this Certificate, the BBA is not responsible for:

- (a) the presence or absence of any patent, intellectual property or similar rights subsisting in the product or any other product;
- (b) the right of the Certificate holder to market, supply, install or maintain the product; and
- (c) the actual works in which the product is installed, used and maintained, including the nature, design, methods and workmanship of such works.

12.5 Any recommendations relating to the use or installation of this product which are contained or referred to in this Certificate are the minimum standards required to be met when the product is used. They do not purport in any way to restate the requirements of the Health & Safety at Work etc Act 1974, or of any other statutory, common law or other duty which may exist at the date of this Certificate or in the future; nor is conformity with such recommendations to be taken as satisfying the requirements of the 1974 Act or of any present or future statutory, common law or other duty of care. In granting this Certificate, the BBA does not accept responsibility to any person or body for any loss or damage, including personal injury, arising as a direct or indirect result of the installation and use of this product.



In the opinion of the British Board of Agrément, the Clayboard Mark 2 KN30 Void System is fit for its intended use provided it is installed, used and maintained as set out in this Certificate. Certificate No 98/3528 is accordingly awarded to Dufaylite Developments Limited.

On behalf of the British Board of Agrément

A handwritten signature in black ink, appearing to read 'P. C. Hewitt', written over a light-colored background.

Date of Fourth issue: 23rd February 2005

Chief Executive

*\*Original Certificate issued 29th October 1998. This amended version includes clarification of use under concrete ground beams and suspended floors, reference to the revised Building Regulations and new Conditions of Certification.*

Blank page

