CI/SfB

(11.9) Rn7

BBA BRITISH BOARD OF AGRÉMENT
ASSESSMENT OF PRODUCTS FOR CONSTRUCTION

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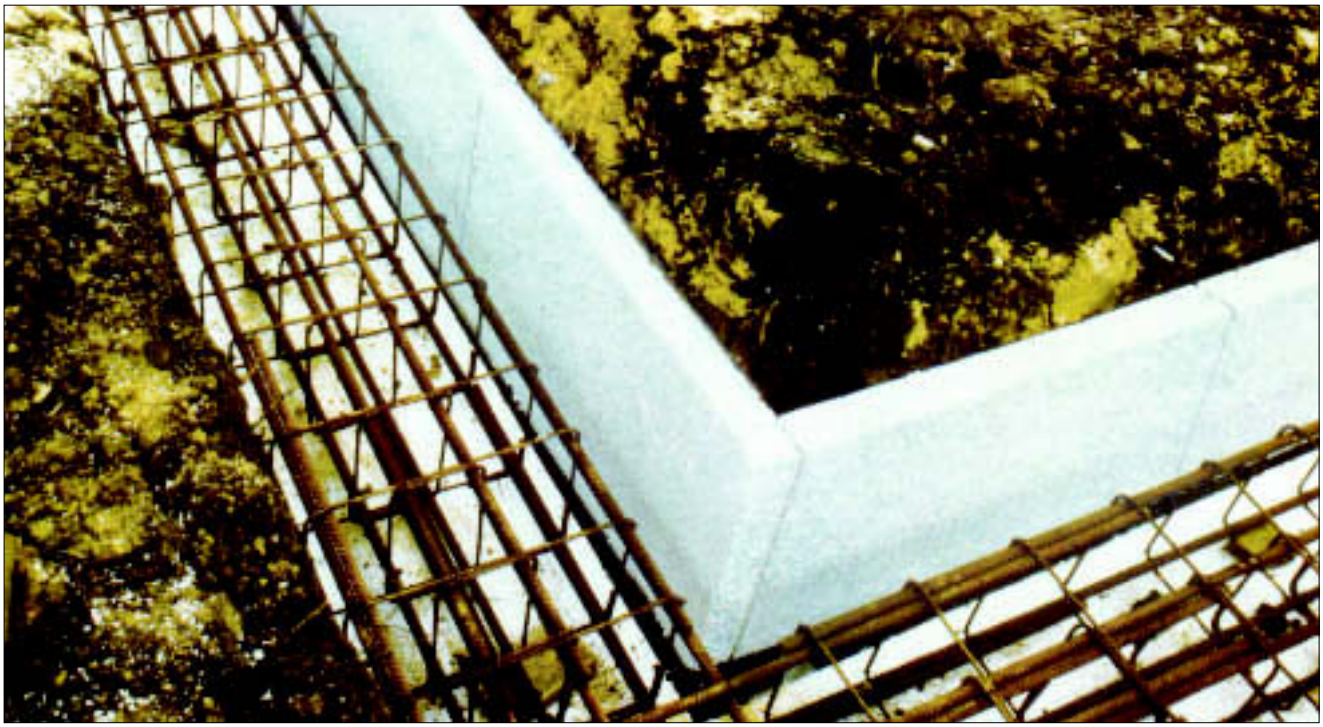
Agrément Certificate No 92/2797
*Third issue**

Designated by Government to issue European Technical Approvals

CLAYLITE COMPRESSIBLE FILL

Remblayage comprimable
Füllungs Komprimiebar

Product



- *THIS CERTIFICATE RELATES TO CLAYLITE COMPRESSIBLE FILL AND THE FIRM FIX SYSTEM.*
- *The product is used to reduce the pressure exerted on reinforced concrete ground beams or on the vertical face of concrete foundations, caused by the expansion of clay soils (clay heave) during the life of the structure.*
- *Claylite must not be used below in-situ concrete floor slabs.*
- *It is essential that the correct minimum thickness is calculated from the expected expansion and that the product is installed in accordance with the* Installation *part of this Certificate.*

Building Regulations

1 The Building Regulations 1991 (as amended 1994) (England and Wales)

The Secretary of State has agreed with the British Board of Agrément the requirements of the Building Regulations to which compressible fill will contribute in achieving compliance. In the opinion of the BBA, Claylite Compressible Fill, if used in accordance with the provisions of this Certificate, will contribute to meeting the relevant requirements.

Requirement:	A2	Ground movement
Comment:		The fill prevents expansion of clay soils impairing the stability of the building.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The system is acceptable.

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

In the opinion of the BBA, Claylite Compressible Fill, if used in accordance with the provisions of this Certificate, will satisfy or contribute to satisfying the various Regulations and Technical Standards listed below.

Regulation:	10	Fitness of materials
Standard:	B2.1	Selection and use of materials and components
Comment:		The system is acceptable.
Regulation:	11	Structure
Standard:	C2.1	Construction
Comment:		The system contributes to meeting the relevant requirements of this Technical Standard.

3 The Building Regulations (Northern Ireland) 1994 (as amended 1995)

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

Technical Specification

4 Description

4.1 Claylite Compressible Fill consists of green coloured low density expanded polystyrene boards. It is an inert, non-toxic material and free from CFC gases.

4.2 The boards are available in standard sizes* (mm) of:

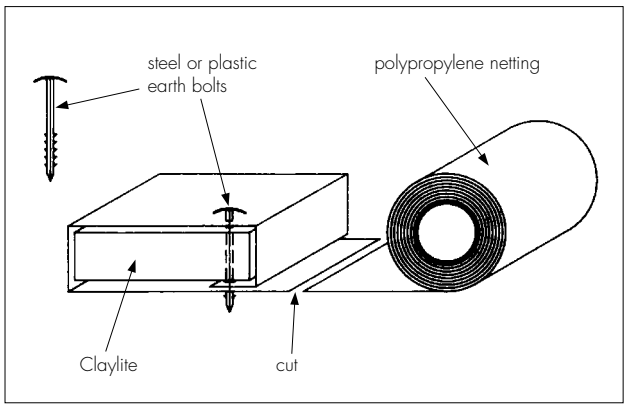
thickness	50, 75, 100, 125, 150, 175, 200
length	2440
width	600, 1220

*The boards are also available on request in lengths of 1830 mm and 3660 mm and in special sizes to suit an individual foundation.

4.3 Claylite can be installed either with, or without use of the Firm Fix system.

4.4 The Firm Fix system consists of 300 mm and 380 mm long polypropylene and steel earth bolts and heavy duty polypropylene netting, used to hold the boards in position during installation (see Figure 1).

Figure 1 Claylite and Firm Fix system



4.5 Factory production control is exercised during manufacture and checks are carried out on:

bulk density of the expanded bead
density of the boards
appearance of the boards.

5 Delivery and site handling

5.1 Claylite board packs are normally delivered to site wrapped in polythene. Each pack carries a label bearing the manufacturer's name, product description, installation instructions and the BBA identification mark incorporating the number of this Certificate.

5.2 The boards must be stored flat and protected from high winds and prolonged exposure to sunlight.

Design Data

6 General

6.1 Claylite Compressible Fill, when designed and installed in accordance with the recommendation of this Certificate, is effective in reducing the pressure exerted on groundbeams in piled foundation construction, and on the sides of trench-fill foundations up to two metres deep.

6.2 It is important that the whole of the underside of concrete members be protected with Claylite to prevent differential loading on the member and that the Claylite boards are carefully trimmed around the piles.

6.3 The following information is neccessary to enable the required thickness of Claylite to be calculated:

For groundbeams and pile caps

(1) The maximum likely vertical ground movement due to clay heave (H mm) established from the site investigation.

(2) The acceptable upward pressure on the concrete (P kNm^{-2}) as used in the design of the concrete foundation.

For trench-fill foundations

(1) The expected lateral movement due to clay heave (H mm) established from the site investigation.

(2) The maximum acceptable lateral pressure on the foundation as used by the designer of the foundation, W kNm^{-2} (W must not normally exceed 40kNm^{-2}).

6.4 The thickness of Claylite is established by (see Figure 2):

(1) finding the value of the compressive strain (C %) from the graph shown in Figure 3 (using design value for P or W — see section 6.3), and

(2) calculating the thickness of Claylite required (T mm) from the formula

$$T = 100 \frac{H}{C} + I$$

(see section 7).

Figure 2 Determination of thickness

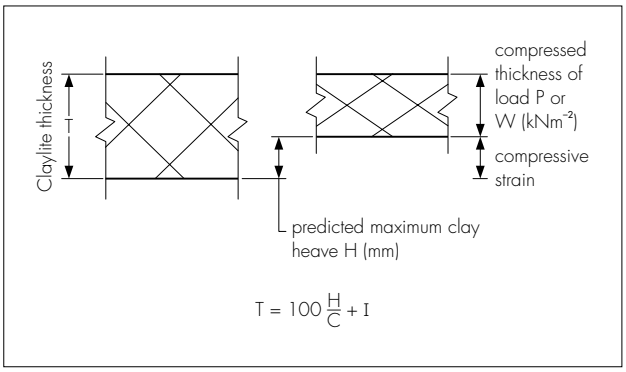
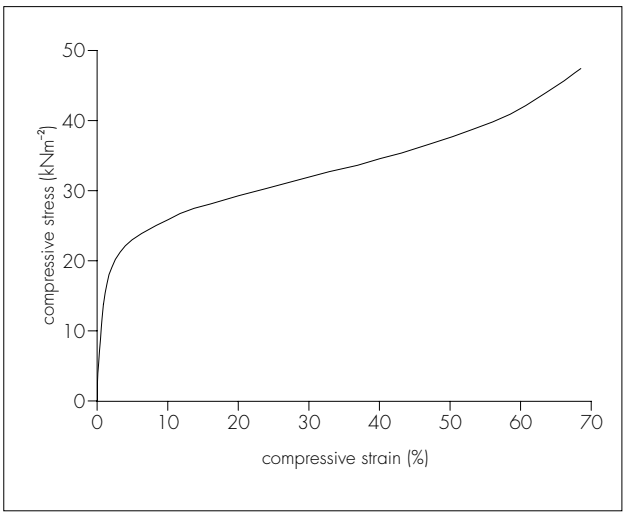


Figure 3 Compressible fill



7 Resistance to pressure

7.1 The pressure transmitted/strain relationship of Claylite Compressible Fill is given in the graph shown in Figure 3, based on a strain rate of 2% per day.

7.2 Claylite Compressible Fill must not be used where the depth of in situ concrete is greater than 600 mm in ground beam construction.

7.3 Test data indicates that, when loaded to 22.5 kNm^{-2} (ie the maximum depth of concrete plus a 300 mm allowance for concrete heaping), for a period of 15 minutes, a 200 mm thick board of Claylite compresses by 3%. When selecting the thickness using the procedures given in section 6, an instantaneous deflection allowance (I) of 10 mm should be added to the thickness if T is greater than 100 mm.

7.4 Test data indicates that when a 200 mm thick specimen is loaded to 15 kNm^{-2} (ie 600 mm of concrete), the deflection from 15 minutes after applying the load to 16 hours is less than 2 mm.

8 Durability

Claylite 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 life of the building.

Installation

9 General

9.1 The excavations for the groundbeams or foundations must be carried out generally in accordance with BS 6031 : 1981 paying particular attention to safety procedures.

9.2 All fixing should be carried out from outside the trench. Precautions should be taken to ensure the face of the excavation does not collapse during installation of the Claylite, for example by bridging the trench.

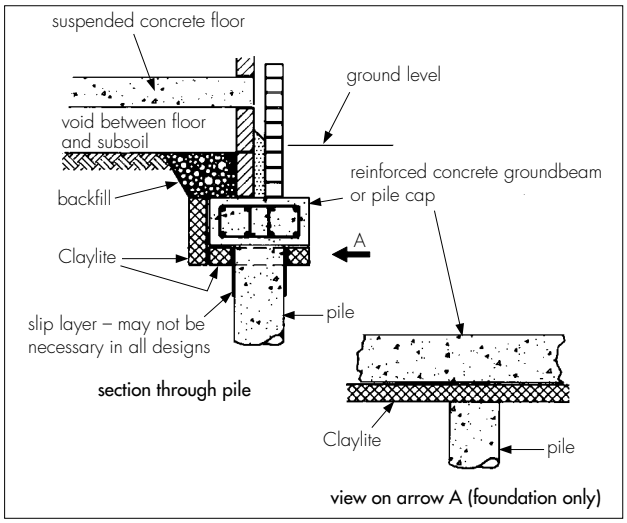
9.3 If required, Kay Metzeler Ltd's specialists, experienced in site practice and installation of the material, will attend the site to provide demonstrations to ensure correct installation.

9.4 Adequate supervision of the installation must be maintained and Kay Metzeler Ltd's specialists must have right of access to the site to ensure their product is being installed correctly.

10 Procedure

Under groundbeams and pile caps in piled construction (see Figure 4)

Figure 4 Detail of pile and groundbeam



10.1 The trenches are excavated as normal, but taking account of the required thickness of Claylite.

10.2 The bottom of the excavation must be flat, even and properly compacted. In certain situations this may require blinding the trench bottom with concrete or granular material.

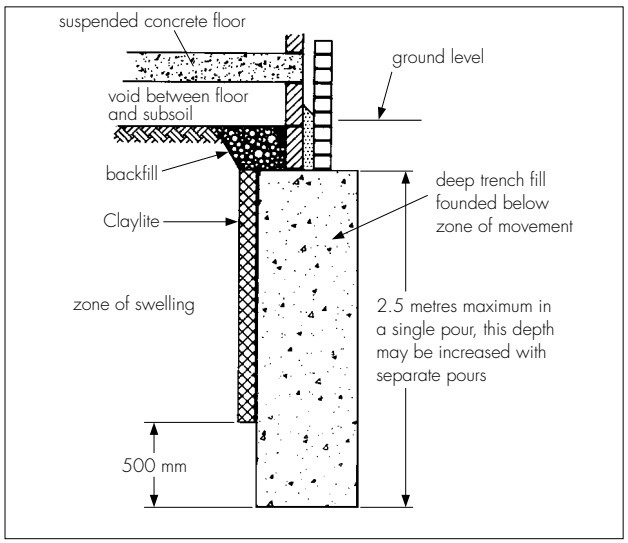
10.3 The Claylite is laid closely butted on the prepared excavation, ensuring that the whole area of the groundbeam is covered. Small gaps between boards should be filled with polystyrene pieces or must be backfilled with as-dug or granular material.

10.4 Where concrete piles protrude into the trench, Claylite boards should be cut to suit with a fine-toothed saw.

10.5 Sufficient brick or concrete spacing blocks must be used to ensure that the correct depth of concrete cover to the reinforcement is achieved. The quantity and type of spacers must ensure that the load transmitted to the Claylite does not exceed 15 kNm^{-2}, to prevent penetration into the Claylite (typically 75 × 75 mm blocks at 500 mm centres).

Vertical faces of trench-fill foundations (see Figure 5)

Figure 5 Detail of trench fill



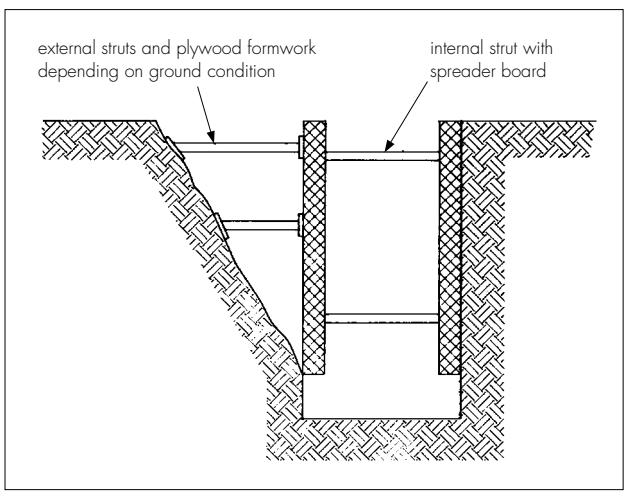
10.6 The excavation must be founded below the movement zone of the clay and the Claylite board positioned, in accordance with NHBC requirements, 500 mm above the trench bottom.

10.7 To ensure the Claylite remains in the correct position and to prevent breakage, the boards should be adequately supported on both faces prior to concreting (see Figure 6).

10.8 Internal support must be provided in the form of struts with adequate spreader plates.

10.9 External support may be provided by the face of the excavation except in flinty or boulder clay, where sharp projections may cause damage and/or where the trench sides do not provide adequate support (see Figure 6).

Figure 6 Typical installation

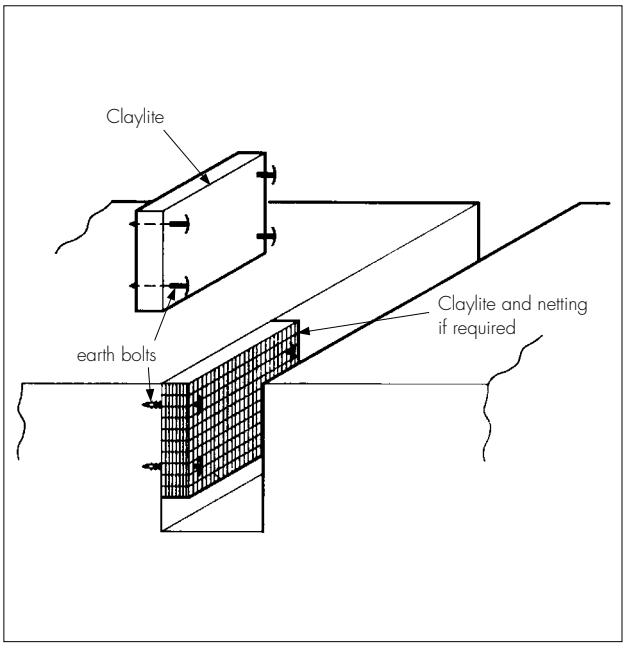


10.10 The Claylite must be adequately restrained to prevent uplift during concrete placement.

10.11 Small infill panels must be securely fixed in position.

Vertical faces of trench-fill foundations using the Firm Fix system (see Figure 7)

Figure 7 Vertical faces of trench fill using the Firm Fix system



10.12 The Firm Fix system consists of earth bolts and polypropylene netting. In neat, smooth-walled trenches, the bolts can be used alone to replace the internal struts.

10.13 The earth bolts are inserted through the Claylite boards at a distance 300 mm from each corner, with additional earth bolts at the centre if necessary. The boards are positioned against the trench walls and the bolts are hammered into the trench walls.

10.14 The plastic earth bolts are for use in soft clays. Where these are unsuitable, ie in dry, hard clay, the metal bolts should be used.

10.15 Where trench walls are uneven or friable, the complete Firm Fix system should be used. This prevents fractured Claylite boards dislodging and uplifting during concrete placement.

10.16 Prior to installation of the boards into the trench, the netting is wrapped around the board leaving an overlap. The netting should be cut with scissors or snips. The bolts are pushed through the boards (300 mm from each corner) securing the netting and overlap. The bolts should protrude approximately 75 mm beyond the overlapped netting to ensure the netting is fully tensioned.

10.17 The boards are positioned against the trench wall and the bolts are driven into earth.

Technical Investigations

The following is a summary of the technical investigations carried out on Claylite Compressible Fill.

11 Tests

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

density
dimensional accuracy
effect of density on pressure transmitted
the pressure transmitted through the board when subjected to constant strain of 2% per day
load capacity
reduction in pressure transmitted when subjected to 50% compression
compression under sustained loading.

12 Other investigations

12.1 The manufacturing process was examined, including the methods adopted for quality control, and details 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 and durability of the product.

Bibliography

BS 6031 : 1981 *Code of practice for earthworks*

Conditions of Certification

13 Conditions

13.1 Where reference is made in this Certificate to any Act of Parliament, Regulation made thereunder, Statutory Instrument, Code of Practice, British Standard, manufacturer's instruction or similar publication, it shall be construed as reference to such publication in the form in which it is in force at the date of this Certificate.

13.2 The quality of materials and the method of manufacture have been examined and found satisfactory by the BBA and must be maintained to this standard during the period of validity of this Certificate. This Certificate will remain valid for an unlimited period provided:

(a) the specification of the product is unchanged; and

(b) the manufacturer continues to have the product checked by the BBA.

13.3 This Certificate will apply only to the product that is installed, used and maintained as set out in this Certificate.

13.4 In granting this Certificate, the BBA makes no representation as to:

(a) the presence or absence of patent or similar rights subsisting in the product; and

(b) the legal right of the Certificate holder to market, install or maintain the product; and

(c) the nature of individual installations of the product, including methods and workmanship.

13.5 It should be noted that any recommendations relating to the safe use 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 or Common Law duties of care, or of any duty of care which 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 or Common Law duties 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 use of this product.

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ASSESSMENT OF PRODUCTS FOR CONSTRUCTION

In the opinion of the British Board of Agrément, Claylite Compressible Fill is fit for its intended use provided it is installed, used and maintained as set out in this Certificate. Certificate No 92/2797 is accordingly awarded to Kay Metzeler Ltd.

On behalf of the British Board of Agrément

Date of Third issue: 16th October 1996

Director

**The original Certificate was awarded to Cemoss Ltd and issued on 20th August 1992. Ths amended version includes reference to the revised Building Regulations and mention of special sizes to order for individual foundations.*

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