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Agrément Certificate
90/2543
Product Sheet 1

CLAYMASTER COMPRESSIBLE FILL

CLAYMASTER COMPRESSIBLE FILL LOW DENSITY EXPANDED POLYSTYRENE BOARDS

PRODUCT SCOPE AND SUMMARY OF CERTIFICATE

This Certificate relates to Claymaster Compressible Fill Low Density Expanded Polystyrene Boards, for use below concrete groundbeams of a maximum depth of 600 mm, in piled foundation construction, and at the vertical face of deep trench foundations, to reduce pressure exerted on the concrete by expansion of the clay soils (clay heave) during the life of the structure.

AGRÉMENT 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

Resistance to pressure — the product has sufficient resistance to upward and lateral pressure to sustain the design load (see section 5).

Durability — the product will have adequate durability provided they can achieve a life comparable to that of other components of the foundation system (see section 7).



The BBA has awarded this Agrément 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 First issue: 17 September 2009

Originally certified on 31 October 1990

Handwritten signature of Brian Chamberlain in black ink.

Brian Chamberlain

Head of Approvals — Engineering

Handwritten signature of Greg Cooper in black ink.

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, Claymaster Compressible Fill Low Density Expanded Polystyrene Boards, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements of the following Building Regulations:



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

Requirement:	A2	Ground movement
Comment:		The fill prevents expansion of clay soils impairing the stability of the building. See sections 5.1 and 5.2 of this Certificate.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The product is acceptable. See section 7 and the <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 use of the product satisfies the requirements of this Regulation. See section 7 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building Standards – construction
Standard:	1.1	Structure
Comment:		The fill contributes to meeting the relevant requirements of this Standard. See sections 5.1 and 5.2 of this Certificate.



The Building Regulations (Northern Ireland) 2000 (as amended)

Regulation:	B2	Fitness of materials and workmanship
Comment:		The product is acceptable. See section 7 and the <i>Installation</i> part of this Certificate.
Regulation:	D1	Stability
Comment:		The fill contributes to meeting the relevant requirements of this Regulation. See sections 5.1 and 5.2 of this Certificate.

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: 2 *Delivery and site handling* (2.2 and 2.3).

Non-regulatory Information

NHBC Standards 2008

NHBC accepts the use of Claymaster Compressible Fill Low Density Expanded Polystyrene Boards, when installed and used in accordance with this Certificate, in relation to *NHBC Standards*, Chapter 4 *Foundations*, Sub-sections 4.2 *Building near trees*; 4.4 *Strip and trench fill foundations* and 4.5 *Raft, pile, pier and beam foundations*.

Zurich Building Guarantee Technical Manual 2007

In the opinion of the BBA, Claymaster Compressible Fill Low Density Expanded Polystyrene Boards, when installed and used in accordance with this Certificate, satisfies the requirements of the *Zurich Building Guarantee Technical Manual*, Section *Substructure*, Sub-section *Foundations*.

General

This Certificate relates to Claymaster Compressible Fill Low Density Expanded Polystyrene Boards for use below concrete groundbeams of a maximum depth of 600 mm, in piled foundation constructions, and at the vertical face of deep trench foundations to reduce the pressure exerted on the concrete by expansion of the clay soils (clay heave) during the life of the structure.

It is essential that the correct minimum thickness is calculated from the expected expansion in accordance with sections 3.3 and 3.4 of this Certificate, and the product is installed in accordance with BS 8000-1 : 1989, BS 8000-2.2 : 1990, BS 8004 : 1986 and the *Installation* part of this Certificate, and that storage and handling is in accordance with BS 6203 : 2003.

Technical Specification

1 Description

1.1 Claymaster Compressible Fill Low Density Expanded Polystyrene Boards consists of low-density expanded polystyrene boards to BS 3837-1 : 2004, coloured pink.

1.2 The boards are available in the standard sizes shown in Table 1.

Table 1 Board sizes (mm)

Thickness	Length ⁽¹⁾	Width ⁽¹⁾
50	2400	600 or 1200
75	2400	600 or 1200
100	2400	600 or 1200
150	2400	600 or 1200
200	2400	600 or 1200

(1) Non-standard sizes are available to special order.

1.3 Quality control checks are carried out during manufacture, on:

- density of the polystyrene beads
- weight of the boards
- load/deformation characteristics.

2 Delivery and site handling

2.1 The product is normally delivered to site polythene wrapped. Each pack carries a label bearing the manufacturer's name, product description, essential instructions for storage and the BBA identification mark incorporating the number of this Certificate.

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

2.3 Care must be taken to avoid contact with solvents and liquid bitumen or mastic products. The boards must not be exposed to open flame or other ignition sources.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Claymaster Compressible Fill Low Density Expanded Polystyrene Boards.

Design Considerations

3 General

3.1 Claymaster Compressible Fill Low Density Expanded Polystyrene Boards, when designed and installed in accordance with the recommendations of BS 8000-1 : 1989, BS 8000-2.2 and -5 : 1990, BS 8004 : 1986 and this Certificate, are 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.

3.2 It is important that the whole of the underside of concrete members be protected with the product to prevent differential loading on the member.

3.3 Each installation must be designed from the following information:

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 kN·m⁻²) as used in the concrete design.

For trench-fill foundation

- (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 in the concrete design (W kN·m⁻² — W must not exceed 40 kN·m⁻²).

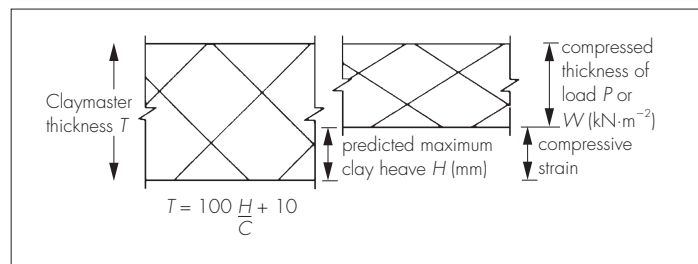
3.4 The thickness of the product is then established by (see Figure 1):

(1) finding the value of the compressive strain (C%) from Graph 1 (using design value for P or W — see section 3.3), and

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

$$T = 100 \frac{H}{C} + 10$$

Figure 1 Determination of thickness required



4 Practicability of installation

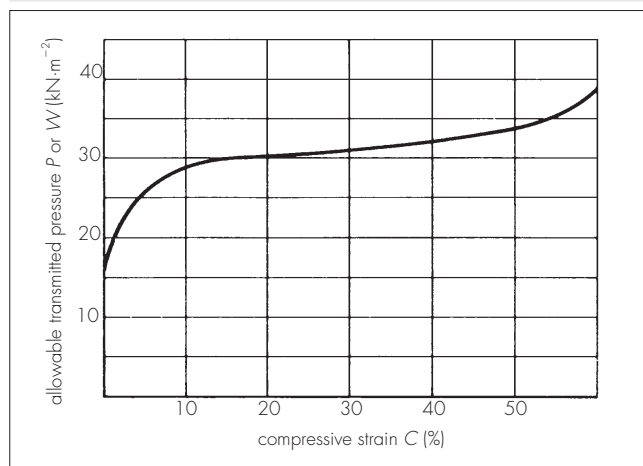
The product is designed to be installed by a contractor experienced with this type of product. It is usual practice to have the Certificate holder's specialists on site to supervise the installation (see section 8).

5 Resistance to pressure



5.1 The pressure transmitted/strain relationship of Claymaster Compressible Fill is given in Graph 1, which is based on a strain rate of 2% per day.

Graph 1 Relationship of pressure to compressive strain



5.2 The product must not be used where the depth of in-situ concrete is greater than 600 mm in a single pour.

6 Maintenance

As the product is confined below concrete groundbeams and it has suitable durability (see section 7), maintenance is not required.

7 Durability



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 life of the building.

8 Supervision

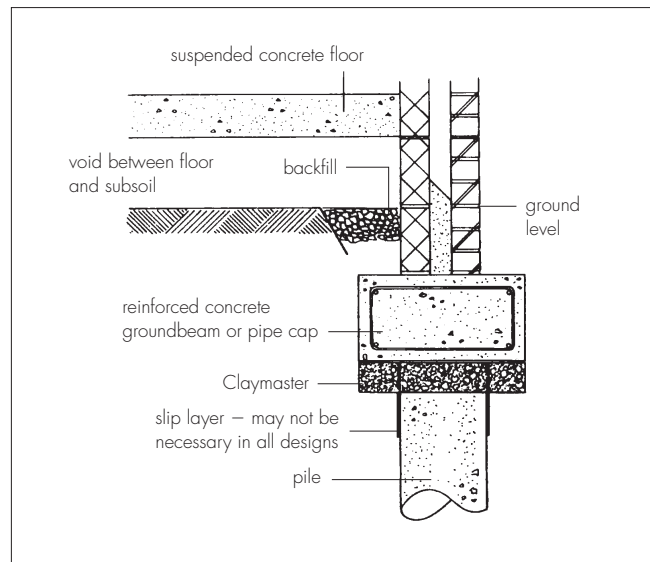
8.1 If required, the Certificate holder's specialists, experienced in site practice and installation of the material, will attend the site to provide demonstrations to ensure correct installation.

8.2 Adequate supervision of the installation must be maintained and the Certificate holder's specialists must have right of access to the site to ensure their product is being installed correctly.

9 Procedure

Under groundbeams and pile caps in piled construction (see Figure 2)

Figure 2 Detail of pile and groundbeam



9.1 The trenches are excavated as normal, but taking account of the required thickness of the product.

9.2 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.

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

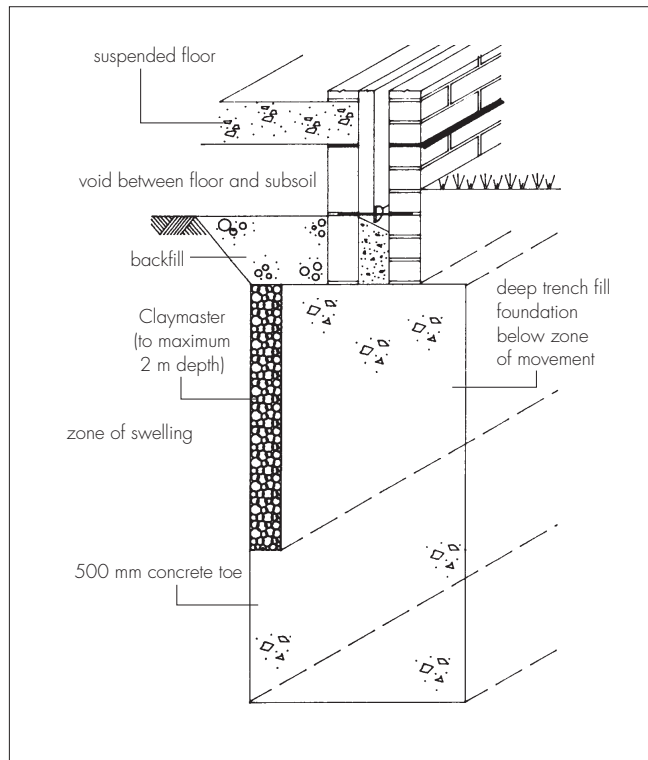
9.4 Where concrete piles protrude into the trench, the product boards should be cut to suit with a fine-toothed saw.

9.5 Sufficient 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 product does not exceed $15 \text{ kN}\cdot\text{m}^{-2}$, to prevent penetration into the product (typically 75 mm by 75 mm blocks at 500 mm centres).

Vertical faces of trench-fill foundations

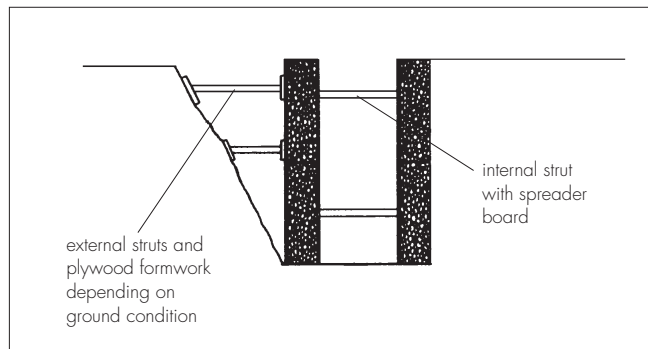
9.6 The excavation must be founded below the movement zone of the clay and the product board positioned in accordance with NHBC requirements, ie 500 mm above the bottom of the trench on the zone-of-swelling side of the excavation (see Figure 3).

Figure 3 Details of deep trench fill



9.7 To ensure that the product remains in the correct position and to prevent breakage, the product should be adequately supported on both faces prior to concreting (see Figure 4).

Figure 4 Typical installation



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

9.9 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 4).

9.10 The product must be adequately restrained to prevent uplift during concrete placement.

9.11 Small infill panels must be securely fixed in position.

10 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.

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 and durability of the product.

Bibliography

BS 3837-1 : 2004 *Expanded polystyrene boards — Boards and blocks manufactured from expandable beads — Requirements and test methods*

BS 6203 : 2003 *Guide to fire characteristics and fire performance of expanded polystyrene materials (EPS and XPS) used in building applications*

BS 8000-1 : 1989 *Workmanship on building sites — Code of practice for excavation and filling*

BS 8000-2.2 : 1990 *Workmanship on building sites — Code of practice for concrete work — Sitework with in-situ and precast concrete*

BS 8000-5 : 1990 *Workmanship on building sites — Code of practice for carpentry, joinery and general fixings*

BS 8004 : 1986 *Code of practice for foundations*

12 Conditions

12.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is granted only to the company, firm or person named on the front page — no other company, firm or person may hold or claim any entitlement to this Certificate
- 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.

12.2 Publications and documents referred to in this Certificate are those that the BBA deems to be relevant at the date of issue or re-issue of this Certificate and include any: Act of Parliament; Statutory Instrument; Directive; Regulation; British, European or International Standard; Code of Practice; manufacturers' instructions; or any other publication or document similar or related to the aforementioned.

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

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

- 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
- individual installations of the product/system, including the nature, design, methods and workmanship of or related to the installation
- the actual works in which the product/system is installed, used and maintained, including the nature, design, methods and workmanship of such works.

12.5 Any information relating to the manufacture, supply, installation, use and maintenance 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 and maintained. It does 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; 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. 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 manufacture, supply, installation, use and maintenance of this product/system.