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**Agrément
Certificate
No 97/3371**
Third issue*

Designated by Government
to issue
European Technical
Approvals

DUROX FLOOR

Blocs de sol
Bodenklötze

Product



- THIS CERTIFICATE RELATES TO DUROX FLOOR, AUTOCLAVED, AERATED CONCRETE BLOCKS WITH A NOMINAL DENSITY OF 460 kgm^{-3} AND AN AVERAGE COMPRESSIVE STRENGTH OF 3.5 Nmm^{-2} .


- The blocks are for use as infill to precast concrete beams in beam and block floors in single occupancy dwellings, domestic garage floors and other buildings where the floor is designed to meet the required loading.

- The blocks have not been assessed for use in separating floors.

continued

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 infill blocks used in the construction of beam and block floors with the Building Regulations. In the opinion of the BBA, Durox Floor, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements.

Requirement: A1	Loading
Comment:	Floors built with the product will meet this Requirement provided the design and construction complies with the conditions set out in sections 7.1 to 7.3 of this Certificate.
Requirement: B3(3)	Internal fire spread (structure)
Comment:	The blocks are non-combustible. See sections 11.1 and 11.2 of this Certificate.
Requirement: E2(b)	Protection against sound within a dwelling-house etc
Comment:	The product can be used as part of the construction to meet this Requirement. See section 10 of this Certificate.
Requirement: L1(a)(i)	Dwellings
Comment:	Floors built with the product will contribute towards meeting the U value requirements. See section 9.1 of this Certificate.
Requirement: Regulation 7	Materials and workmanship
Comment:	The blocks form an acceptable material. See section 12 of this Certificate.

continued

- The blocks have been assessed for use with the finishes detailed in section 8 of this Certificate.
- It is essential that the blocks are specified, handled and installed strictly in accordance with the conditions set out in this Certificate.

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



In the opinion of the BBA, floors constructed from Durox Floor, if used in accordance with the provisions of this Certificate, will satisfy or contribute to satisfying the various Regulations and related Technical Standards as listed below.

Regulation:	10	Fitness of materials and workmanship
Standard:	B2.1	Selection and use of materials, fittings, and components, and workmanship
Comment:		The products can contribute to a construction meeting this Standard. See the <i>Installation</i> section of this Certificate.
Standard:	B2.2	Selection and use of materials, fittings, and components, and workmanship
Comment:		The product is an acceptable material. See section 12 of this Certificate.
Regulation:	11	Structure
Standard:	C2.1	Structure – Stability
Comment:		Floors built with the product will contribute towards satisfying this Standard provided the design and construction complies with the conditions set out in sections 7.1 to 7.3 of this Certificate.
Regulation:	12	Structural fire precautions
Standards:	D2.1 and D2.2	Structural protection – Principles
Standard:	D2.3	Structural protection – Non-combustible materials
Comment:		The blocks are non-combustible. See sections 11.1 and 11.2 of this Certificate.
Regulation:	22	Conservation of fuel and power
Standards:	J2.2 to J2.4	Rules for the use of Part J – Thermal conductivity and transmittance
Standard:	J3.1	Buildings in purpose group 1 – Building fabric
Comment:		Floors built with the product will contribute towards meeting these Standards. See section 9.1 of this Certificate.

3 The Building Regulations (Northern Ireland) 2000



In the opinion of the BBA, Durox Floor, if used in accordance with the provisions of this Certificate, will satisfy or contribute to satisfying the various Building Regulations as listed below.

Regulation:	B2	Fitness of materials and workmanship
Comment:		The blocks are acceptable. See section 12 of this Certificate.
Regulation:	D1	Stability
Comment:		Floors constructed with the blocks have sufficient strength and stiffness to transfer the floor loads to the supporting walls. See sections 7.1 to 7.3 of this Certificate.
Regulation:	E4	Internal fire spread – Structure
Comment:		The blocks are non-combustible. See sections 11.1 and 11.2 of this Certificate.
Regulation:	F2	Building fabric
Comment:		Floors built with the product will contribute towards meeting the U value requirement. See section 9.1 of this Certificate.

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

Information in this Certificate may assist the client, planning supervisor, designer and contractors to address their obligations under these Regulations.

See sections: 5 *Description* (5.2 and 5.3) and 6 *Delivery and site handling* (6.1).

5 Description

5.1 Durox Floor is manufactured to comply with BS 6073-1 : 1981.

5.2 The blocks are produced from cement, lime and sand in varying proportions. Aluminium powder is the aerating agent. The blocks are wire-cut and cured in high-pressure steam autoclaves to increase the physical and chemical stability.

5.3 Quality control of the process is operated automatically and continuously. Control of the block production satisfies the requirements for the special category of manufacturing control of BS 5628-1 : 1992. Basic materials are checked against chemical and physical specifications and the final product is checked to BS 6073-1 : 1981 for compressive strength, density and dimensional accuracy.

5.4 The blocks are manufactured to the dimensions and tolerances given in BS 6073-1 : 1981. The sizes (in mm) are:
540 x 620 x 100
215 x 620 x 100.

5.5 Durox Coursing Slip (40 mm high) or Durox Coursing Brick (70 mm high) are available and used to close gaps at the end of the beams, the products are used with 150 mm and 175 mm depth beams respectively.

5.6 The dry densities and compressive strengths of the block, tested in accordance with BS 6073-1 : 1981 and BS 6073-2 : 1981 are:

Nominal dry density (kgm^{-3})	460
Maximum dry density (kgm^{-3})	480
Average compressive strength (Nmm^{-2})	3.5
Minimum individual block compressive strength (Nmm^{-2})	2.8

6 Delivery and site handling

6.1 The blocks are supplied banded and shrink-wrapped, and may be off-loaded using mechanical grabs or, if on pallets, by fork-lift truck.

6.2 The blocks must be stored clear of the ground on a dry, level area and should be protected from moisture until required for building into the floor.

7 General



7.1 Durox Floor is suitable for use in the construction of beam and block floors in single-occupancy dwellings, domestic garages and other buildings where the floor is designed to meet the required loading (excluding separating floors). Where the floor is to be constructed above a basement, the ceiling should be provided with a suitable finish (see section 11.2).

7.2 The blocks should be specified in accordance with BS 6073-2 : 1981.

7.3 Loadspans should be determined in accordance with BS 8110-1 : 1997. The following partial safety factors should be included in these determinations:

dead load partial safety factor	1.4
imposed load partial safety factor	1.6

7.4 In laboratory tests, a grouted floor construction of Durox Floor with commercially available pre-stressed concrete floor beams achieved an ultimate load failure of 9.8 kN when subjected to point loading.

8 Flooring sub-bases

House floors

8.1 A minimum of 50 mm sand/cement (3:1) screed in accordance with BS 8204-1 : 2003.

8.2 The 50 mm sand/cement screed detailed for house floors can be laid directly onto the grouted floor and, unless it is particularly moisture sensitive (as described in CP 102 : 1973), a damp-proof membrane need not be laid over the precast floor.

8.3 Flooring grade insulation board and 19 mm thick particle board surface finish in accordance with BS EN 312 : 2003, may be used.

Domestic garages

8.4 For use in domestic garage floors, the screed should be a minimum of 50 mm thick concrete of minimum compressive strength 20 Nmm^{-2} . Reference should be made to beam manufacturers with particular regard to beam spacing and the need for reinforcement.

Other flooring sub-bases

8.5 Where flooring sub-bases other than those detailed in sections 8.2 and 8.4 are to be considered, advice must be sought from the Certificate holder.

9 Thermal transmittance and condensation risk



9.1 At ground-floor level over a ventilated void the extent of condensation forming on the upper surface of a floor system will depend upon the infill blocks, the finish used and its moisture permeability properties, as well as on the temperatures and relative humidities of the surfaces and the air in contact with them. For a sand/cement screed finish over Durox Floor, condensation is unlikely to occur. Provision for a water vapour control layer may be necessary in areas of high humidity where additional insulation and particleboard is used.

9.2 If the product is to be used in floors of rooms expected to have high humidities, care must be taken to provide adequate permanent ventilation to avoid possible problems from the formation of interstitial condensation in the floor.

9.3 For the purpose of calculating thermal transmittance (U values), the thermal conductivity (λ value) should be taken as $0.11 \text{ Wm}^{-1}\text{K}^{-1}$ for protected situations.

9.4 When designing floors, reference may be made to TSO publication *Limiting thermal bridging and air leakage : Robust construction details for dwellings and similar buildings* TSO 2002 and BR 262 *Thermal insulation : avoiding risks*.

10 Sound insulation



An intermediate floor comprising 100 mm deep Durox Floor, laid between 150 mm deep inverted, T precast concrete floor beams, at maximum 620 mm centres, with a minimum 40 mm thick sand-cement screed and finished with a 12.5 mm plasterboard ceiling, can meet the requirements of Table 2 to Approved Document E of the Building Regulations (England and Wales).

11 Behaviour in relation to fire



11.1 Durox Floor is non-combustible and has a Class 0 or 'low risk' surface.

11.2 When used above a basement or at upper floor levels, the ceiling finish must provide fire resistance capable of meeting the requirements of the Building Regulations.

12 Durability



The exposure conditions beneath a suspended floor over a ventilated void and soil with no oversite concrete or other surface

seal are classified as mild in accordance with BS 8110-1 : 1997 (Table 3.2). The product will have adequate durability for these exposure conditions.

Installation

13 Site preparation

13.1 The ground beneath the floor should be free from topsoil and vegetable matter. Oversite concrete or other surface seal is not normally required.

13.2 Damp-proofing and ventilation arrangements must be in accordance with normal good practice, for example, provision of damp-proof sleeves to ventilators and adequate drainage of the sub-floor (see also section 13.6).

13.3 A continuous damp-proof course should be laid along the support wall below the floor in accordance with CP 102 : 1973.

13.4 A void at least 75 mm deep must be provided between the underside of the floor and the ground surface. With heavy clay soil, the depth should be increased to at least 150 mm to prevent problems associated with heave. With good natural drainage or site drains provided to prevent water collecting and standing, the ground level beneath the floor does not need to be raised to the external ground level but, where the levels differ, the ability of the perimeter walls to act as retaining walls must be checked.

13.5 In Scotland it is considered to be good practice [and is an NHBC (Scotland) requirement] that the solum area beneath all suspended floors be brought up at least to the level of the adjoining ground, except where an arrangement of damp-proof membranes or damp-proof courses is installed to prevent the ingress of groundwater to the solum set at a lower level.

13.6 Ventilators must be provided to the void beneath the floor by openings every three metres of the external wall giving a minimum open area per metre run of 600 mm^2 .

14 Floor installation

14.1 When deciding on the suitability and specification of any beam to be used with Durox Floor, reference should be made to pre-stressed concrete beam flooring systems which carry current BBA Certification⁽¹⁾ and the Certificate holder should be consulted. Reference should also be made to BS 8110-1 : 1997.

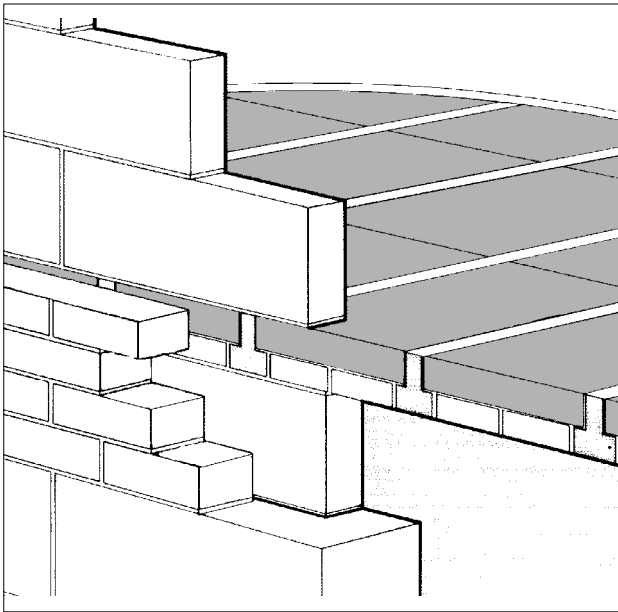
(1) Users are advised to check the BBA website for current Certificates.

14.2 The beam manufacturer's recommendations for placement and fixing should be followed.

14.3 The blocks should be placed between the ends of the beam units as they are positioned to

ensure correct spacing (see Figure 1). Where transmission of sound via a cavity is a consideration, infill blocks should be fully bedded and levelled, and vertical joints filled with mortar.

Figure 1 Typical floor arrangement



14.4 Normally, a whole block is used to bear on the first beam and the outside wall of a bay (except when a beam is laid alongside the wall). When this occurs, the block should be bedded on the wall with a normal mortar joint.

14.5 The blocks must be provided with adequate bearing by clearing the joist flanges of debris and ensuring adjacent blocks are abutted as close as possible.

14.6 The joints between the blocks and beams must not exceed 5 mm and must be grouted. The grout should be a mix of sharp sand/cement (4:1) and with sufficient water added to produce a plastic consistency. The recommended method of application is by brushing into the joints.

14.7 Where the infill is of a non-standard block size (eg next to services), the void can be filled by cutting the blocks to fit. Cutting can be easily undertaken using a masonry handsaw (specialist equipment is not required). The blocks must not be cut or drilled in such a way as to impair their structural performance.

14.8 Care must be taken to avoid overloading the floor during construction. Once it has been fully grouted it should only be used for short-term materials storage and construction traffic. Planks should be laid across the joists and as close as possible to the floor bearings, before stacking materials.

14.9 The floor should be thoroughly examined prior to the application of the finish and any damaged blocks must be replaced.

14.10 Application of the screed should be strictly in accordance with the relevant recommendations of BS 8204-1 : 2003.

14.11 In areas where there might be landfill gas or methane, and in areas where full radon precautions are required, a gas-proof barrier must be used. Full details are given in BRE Guidance Documents *Construction of new buildings on gas contamination land and Radon : guidance on protective measures for new dwellings*.

15 Incorporation of services

15.1 Services must not be attached to beams or blocks in such a way as to impair their durability or strength.

15.2 Services must be protected from potential damage due to floor movement, eg by wrapping in flexible materials or by ducting. Consideration must be given to the differential movements between the floor beams and other parts of the building and between adjacent beams, particularly where adjacent beams are of different spans.

15.3 Blocks must not be cut to accommodate horizontal services. Horizontal services and conduit can be installed within the depth of the floor finish.

15.4 Vertical service pipes can be accommodated between infill blocks by reinstating the floor with in-situ concrete.

Technical Investigations

The following is a summary of the technical investigations carried out on Durox Floor.

16 Tests

As part of the assessment leading to the issue of the original Certificate:

- tests were carried out to BS 6073-1 : 1981 and BS 6073-2 : 1981, to determine:
 - dimensional accuracy
 - dry density
 - compressive strength.
- a floor of dimensions 3 m by 3 m of the grouted blocks with commercially available pre-stressed concrete floor beams designed in accordance with BS 8110-1 : 1997 and BS 8110-2 : 1985 and constructed under surveillance by the BBA was subjected to point loading to destruction. The sub-bases tested were:
 - 50 mm thick sharp sand/cement (3:1) screed
 - 40 mm thick of flooring grade polystyrene board with 19 mm thick chipboard surface finish.
- the results of tests on the Florblocs subjected to static and impact loads were examined.

17 Investigations

17.1 As part of the assessment leading to the issue of the original Certificate:

- the manufacturing process for the blocks was examined, including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.
- a site visit was carried out to assess:
 - practicability of installation
 - resistance to site handling and site traffic
 - requirements for maintenance and repairs.
- an assessment was made of the risk of condensation.

17.2 As part of the assessment leading to the reissue of this Certificate, test reports were examined relating to resistance to airborne sound transmission of completed intermediate floor constructions.

Additional Information

The management systems of Tarmac Topblock Limited have been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2000 by the British Standards Institution Quality Assurance (Certificate No KM24021).

Bibliography

BS 5628-1 : 1992 *Code of practice for use of masonry — Structural use of unreinforced masonry*

BS 6073-1 : 1981 *Precast concrete masonry units — Specification for precast concrete masonry units*

BS 6073-2 : 1981 *Precast concrete masonry units — Method for specifying precast concrete masonry units*

BS 8110-1 : 1997 *Structural use of concrete — Code of practice for design and construction*

BS 8110-2 : 1985 *Structural use of concrete — Code of practice for special circumstances*

BS 8204-1 : 2003 *Screeds, bases and in-situ floorings — Concrete bases and cement sand levelling screeds to receive floorings — Code of practice*

BS EN 312 : 2003 *Particleboards — Specifications*

BS EN ISO 9001 : 2000 *Quality management systems — Requirements*

CP 102 : 1973 *Code of practice for protection of buildings against water from the ground*

Conditions of Certification

18 Conditions

18.1 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.

18.2 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.

18.3 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.

18.4 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.

18.5 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, Durox Floor is fit for its intended use provided it is installed, used and maintained as set out in this Certificate. Certificate No 97/3371 is accordingly awarded to Tarmac Topblock Limited.

On behalf of the British Board of Agrément

Date of Third issue: 3rd February 2005

A handwritten signature in black ink, appearing to read 'P. Q. Newson', is written over a light grey background.

Chief Executive

**Original Certificate was issued on 23rd May 1997. This amended Certificate includes references to the revised national Building Regulations and Standards, additional Sound insulation and Additional Information sections, and new Conditions of Certification.*

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British Board of Agrément

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For technical or additional information,
contact the Certificate holder (see
front page).
For information about the Agrément
Certificate, including validity and
scope, tel: Hotline 01923 665400,
or check the BBA website.