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Agrément Certificate
10/4778
Product Sheet 1

MARMOX INSULATING BUILDING BLOCKS

MARMOX THERMOBLOCK

This Agrément Certificate Product Sheet⁽¹⁾ relates to Marmox Thermoblock⁽²⁾, an insulated loadbearing block comprising PIR or XPS insulation with concrete cylinder cores and a top and bottom reinforced concrete finish layer. The blocks are for use on the inner leaf of external masonry walls to minimise heat loss through the junction between floor/wall (XPS version) or roof parapet/wall (PIR version).

(1) Hereinafter referred to as 'Certificate'.

(2) Thermoblock is a registered trademark.

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

Strength and stability — the product has adequate compressive strength (see section 6).

Thermal performance — the product will reduce linear heat loss (psi value) at floor/external wall and roof parapet/external wall junctions (see section 7).

Resistance to moisture — the product has satisfactory resistance to moisture (see section 9).

Durability — the product has adequate durability and should have a life equal to that of the wall in which it is installed (see section 12).



The BBA has awarded this Certificate to the company named above for the product described herein. The 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

A handwritten signature in black ink that reads 'B Chamberlain'.

Date of Second issue: 25 November 2014

Brian Chamberlain

Originally certificated on 15 September 2010

Head of Approvals — Engineering

A handwritten signature in black ink that reads 'Claire'.

Claire Curtis-Thomas

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, Marmox Thermoblock, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying 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: A1	Loading
Comment:	The product can safely carry and transmit loads to the ground. See section 6 of this Certificate.
Requirement: C2(a)(c)	Resistance to moisture
Comment:	The product will adequately resist ground moisture and can contribute to meeting this Requirement and contribute to minimising surface condensation. See sections 8 and 9 of this Certificate.
Requirement: L1(a)(i)	Conservation of fuel and power
Comment:	The product reduces external wall/floor junction psi values. See section 7 of this Certificate.
Regulation: 7	Materials and workmanship
Comment:	The product is an acceptable material. See section 12 and the <i>Installation</i> part of this Certificate.
Regulation: 26	CO₂ emission rates for new buildings
Regulation: 26A	Fabric energy efficiency rates for new buildings (applicable to England only)
Regulation: 26A	Primary energy consumption rates for new buildings (applicable to Wales only)
Regulation: 26B	Fabric performance values for new dwellings (applicable to Wales only)
Comment:	The product reduces external wall/floor junction psi values. See section 7 of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation: 8(1)	Durability, workmanship and fitness of materials
Comment:	The use of the product satisfies the requirements of this Regulation. See sections 11 and 12 and the <i>Installation</i> part of this Certificate.
Regulation: 9	Building standards applicable to construction
Standard: 1.1(a)(b)	Structure
Comment:	The product can safely carry and transmit loads to the ground, with reference to clauses 1.1.2 ⁽¹⁾⁽²⁾ and 1.1.3 ⁽¹⁾⁽²⁾ . See section 6 of this Certificate.
Standard: 3.4	Moisture from the ground
Comment:	The product will adequately resist ground moisture and can contribute to meeting this Requirement, with reference to clauses 3.4.1 ⁽¹⁾⁽²⁾ and 3.4.5 ⁽¹⁾⁽²⁾ . See section 9 of this Certificate.
Standard: 3.15	Condensation
Comment:	The product will adequately limit the risk of surface condensation in accordance with section 8 of this Certificate and comply with this Standard, with reference to clauses 3.15.1 ⁽¹⁾ and 3.15.4 ⁽¹⁾ .
Standard: 6.1	Carbon dioxide emissions
Standard: 6.2	Building insulation envelope
Comment:	The product reduces external wall/floor junction psi values, with reference to clauses 6.1.1 ⁽¹⁾ , 6.1.2 ⁽¹⁾⁽²⁾ , 6.1.3 ⁽²⁾ , 6.1.5 ⁽²⁾ , 6.1.6 ⁽¹⁾ , 6.2.1 ⁽¹⁾⁽²⁾ , 6.2.3 ⁽¹⁾⁽²⁾ and 6.2.10 ⁽¹⁾⁽²⁾ respectively, provided construction is in accordance with a solution detailed in section 7 of this Certificate.
Standard: 7.1(a)	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.
Regulation: 12	Building standards applicable to conversions
Comment:	All comments given for this product under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to clause 0.12.1 ⁽¹⁾⁽²⁾ and Schedule 6 ⁽¹⁾⁽²⁾ . (1) Technical Handbook (Domestic). (2) Technical Handbook (Non-Domestic).



The Building Regulations (Northern Ireland) 2012

Regulation: 23(a)(i)(iii)(b)(i)(ii)	Fitness of materials and workmanship
Comment:	The product is acceptable. See section 12 and the <i>Installation</i> part of this Certificate.
Regulation: 28(a)	Resistance to moisture and weather
Comment:	The product will adequately resist ground moisture and can contribute to meeting this Regulation and contribute to minimising surface condensation. See sections 8 and 9 of this Certificate.
Regulation: 29	Condensation
Comment:	The product will adequately limit the risk of surface condensation in accordance with section 8 of this Certificate and can satisfy this Regulation.
Regulation: 30	Stability
Comment:	The product can safely carry and transmit loads to the ground and is deemed to satisfy this Regulation. See section 6 of this Certificate.
Regulation: 39(a)(i)	Conservation measures
Regulation: 40(1)(2)	Target carbon dioxide Emissions Rate
Comment:	The product reduces external wall/floor junction psi values and contribute to satisfying these Regulations. See section 7 of this Certificate.

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

See section: 1 Description (1.2) of this Certificate.

Additional Information

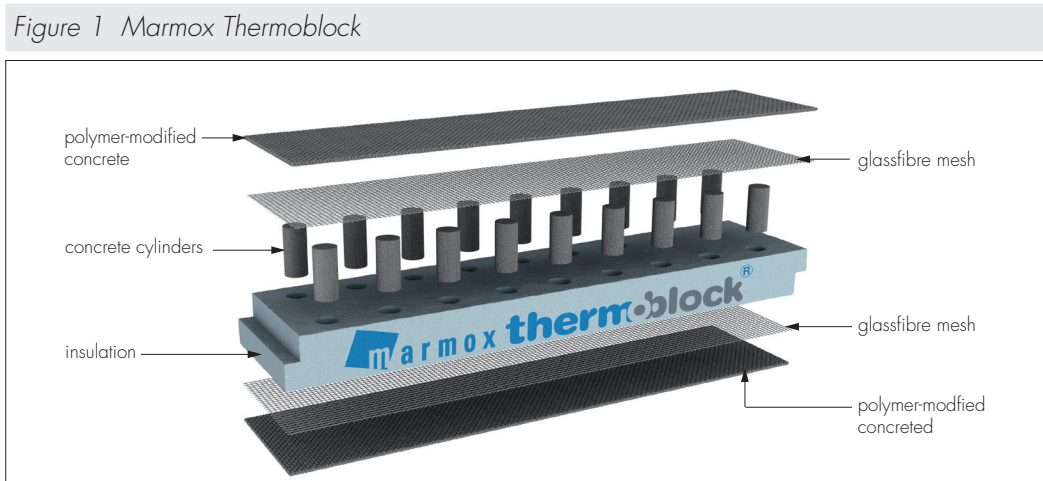
NHBC Standards 2014

NHBC accepts the use of Marmox Thermoblock, when installed, used and maintained in accordance with this Certificate, as meeting Technical Requirement R3 in relation to *NHBC Standards, Chapter 6.1 Exterior masonry walls.*

Technical Specification

1 Description

1.1 Marmox Thermoblock units (See Figure 1) consist of an extruded polystyrene (XPS) or polyisocyanurate (PIR) insulation core block reinforced with polymer-modified concrete loadbearing vertical cylinders distributed at defined intervals. The blocks are finished with top and bottom layers of 3 mm thick polymer-modified concrete reinforced with alkali-resistant glassfibre mesh and bonded core block. Both ends of the block are rebated for adjacent block connection.



1.2 The blocks are supplied in the dimensions given in Table 1, and the cylinder distribution and dimensions given in Table 2.

Table 1 Standard characteristics

Block insulation material	Length (mm)	Thickness (mm)	Width (mm)	Weight (±5%) (g)
XPS	600	65	100	1600
	600	65	140	1900
	600	65	215	2500
	600	100	100	2200
	600	100	140	2600
	600	100	215	4000
PIR	600	53	100	1400
	600	53	140	1700

Table 2 Cylinder distribution and dimensions

Block width (mm)	Quantity of rows	Spacing between columns (centres) (mm)	Spacing between rows (centres) (mm)	Cylinder quantity per row/total	Cylinder diameter (mm)
100	2	64 ± 3%	45 ± 3%	9/18	25.3 ± 0.2
140	2	64 ± 3%	80 ± 3%	9/18	29.9 ± 0.2
215	2	64 ± 3%	150 ± 3%	9/18	37.0 ± 0.2

1.3 Ancillary items necessary for installation of the blocks include Marmox Multibond, a one-part ready-to-use sealant to BS EN 15651 : 2012 for waterproofing the joints between Marmox Thermoblock units.

1.4 Other items or components which may be used with the product, but which are outside of the scope of this Certificate, are:

- damp proof membrane
- mortar
- perimeter/cavity/floor insulation
- sealants.

2 Manufacture

2.1 PIR or XPS boards are delivered at the required thickness. The boards are mechanically bored at the determined dimensions and spacings as required for the concrete cylinders.

2.2 A sheet of alkali-resistant glassfibre mesh with a nominal weight of 110 g·m⁻² is fixed to one face of the XPS/PIR with polymer-modified concrete and left to cure for 24 hours at ambient temperature. The holes are filled and compacted with the high strength polymeric compound. Another layer of fiberglass mesh is fixed to the other face of the XPS/PIR with polymer-concrete and left to cure for another 24 hours at ambient temperature.

2.3 After curing the block boards are cut to the required block dimensions.

2.4 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.

2.5 The management system of Marmox Egypt Ltd has been assessed and registered as meeting the requirements of ISO 9001 : 2008 by SGS (Certificate EG11/2879).

2.6 The product is manufactured in Egypt and is marketed in the UK by Marmox UK Ltd, Caxton House 101-103 Hopewell Drive, Chatham, Kent, ME5 7NP; tel: 01634 835290; fax: 01634 835299; website: www.marmox.co.uk

3 Delivery and site handling

3.1 The product name is printed on the side of each block. The blocks are delivered to site packaged in labelled cardboard boxes.

3.2 The blocks should be stored on a dry, level area and the cardboard wrapping should be kept in place until the blocks are required for use.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Marmox Thermoblock.

Design Considerations

4 Use

4.1 Marmox Thermoblock is suitable for use at the base of external loadbearing and non-loadbearing walls, above or below the damp-proof course in the inner leaf of external cavity masonry walls, to minimise the heat flux through the junction between floor/wall and roof parapet/wall.

4.2 The PIR version is designed to withstand the application of hot-applied bitumen finishes and detailing around parapets adjacent to the wall when used in accordance with BS 8217 : 2005. The XPS version is not suitable in such situations.

4.3 The product is not non-combustible.

5 Practicability of installation

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

6 Strength and stability

6.1 The values for compressive strength of Marmox Thermoblocks, when tested in accordance with the method given in BS EN 772-1 : 2011, are given in Table 3. The 215 mm wide blocks will have a compressive strength equal to, or greater than, that of the 140 mm wide blocks.

Table 3 Strength characteristics

Block width (mm)	Mean compressive strength (N·mm ⁻²)	Characteristic compressive strength (N·mm ⁻²)
100	8.78	6.56
140	9.57	8.00
215	>9.57	>8.00

6.2 For design of residential buildings of up to three storeys, the guidance given in BS 8103-2 : 2005 should be used.

6.3 Compressive design strengths of the walls incorporating the thermal blocks should be calculated in accordance with BS EN 1996-1-1 : 2005, BS EN 1996-2 : 2006 and BS EN 1996-3 : 2006.

7 Thermal performance



7.1 The blocks limit the heat loss around the junction between the external wall and floor or parapet roof by allowing the insulation to be maintained through the junction.

7.2 The psi value for a specific construction should be determined in accordance with BRE Report 497 : 2007 and BS EN ISO 10211 : 2007 and should not exceed values given in BRE information Paper IP 1/06.

7.3 The effective conductivities of the blocks, when modelled using the thermal conductivities in Table 4, are given in Table 5.

Table 4 Thermal conductivities of block components/materials

Component	Material	Conductivity (W·m ⁻¹ ·K ⁻¹)
Block	XPS	0.028 ⁽¹⁾
Block	PIR	0.026 ⁽¹⁾
Columns	Modified concrete	0.13 ⁽¹⁾
Screed	Concrete and glassfibre mesh	1.15 ⁽²⁾

(1) Declared thermal conductivity

(2) Value obtained from BS EN ISO 10456 : 2007

Table 5 Effective thermal conductivities of the blocks

Insulation material	Effective thermal conductivity (W·m ⁻¹ ·K ⁻¹)
XPS	0.047
PIR	0.048

7.4 As an example, using a computer model, the psi values of a full-fill cavity wall/floor junction and a full-fill cavity wall/roof parapet junction (Accredited Construction Details MCI-GF-01 and MCI-RF-02 respectively) incorporating the product and maintaining the insulation continuity between wall and floor/roof, are given in Table 6 for different internal concrete inner leaf densities.

Table 6 Psi values

Junction	Type of wall block	Conductivity inner leaf block (W·m ⁻¹ ·K ⁻¹)	psi value (ψ) (W·m ⁻¹ ·K ⁻¹)	UK requirement psi value (W·m ⁻¹ ·K ⁻¹)
Full-fill cavity wall ground floor ⁽¹⁾	High density concrete	1.2	0.069	0.16
	lightweight concrete	0.2	0.034	0.16
Full-fill cavity wall roof parapet ⁽²⁾	High density concrete	1.2	0.128	0.56
	lightweight concrete	0.2	0.101	0.56

(1) Notes for the full-fill cavity wall – ground floor junction

- an effective conductivity of 0.047 W·m⁻¹·K⁻¹ for the Thermoblock (100 mm width and 65 mm height) has been used (see Table 4)
- wall insulation (100 mm) – $\lambda = 0.025$ W·m⁻¹·K⁻¹. Floor insulation (50 mm) – $\lambda = 0.025$ W·m⁻¹·K⁻¹
- perimeter insulation strip with a minimum resistance value of 1 m²·K·W⁻¹ and installed up to floor finish
- external leaf (102.5 mm) – $\lambda = 0.77$ W·m⁻¹·K⁻¹
- the psi values for UK requirements are extracted from BRE Information Paper IP 1/06.

(2) Notes for the full-fill cavity wall – roof parapet junction

- an effective conductivity of 0.048 W·m⁻¹·K⁻¹ for the Thermoblock (100 mm width and 53 mm height) has been used (see Table 4)
- full-fill wall insulation (100 mm) – $\lambda = 0.025$ W·m⁻¹·K⁻¹. Roof insulation (100 mm) – $\lambda = 0.025$ W·m⁻¹·K⁻¹
- external leaf (102.5 mm) – $\lambda = 0.77$ W·m⁻¹·K⁻¹
- the psi values for UK requirements are extracted from BRE Information Paper IP 1/06.

8 Condensation risk



The product, if installed in a wall/floor junction and maintaining the insulation continuity, will achieve the temperature factor exceeding the values given in BRE information Paper IP 1/06 and will adequately limit the risk of surface condensation.

9 Resistance to moisture



9.1 The thermal blocks can adequately resist moisture.

9.2 Walls incorporating the blocks are acceptable in accordance with the relevant details given in:

England and Wales — Approved Document C, Section 5

Scotland — Mandatory Standards 3.4 and 3.15

Northern Ireland — Technical Booklet C, Section 6.

10 Maintenance

As the blocks are confined and have suitable durability (see section 11), maintenance is not normally required.

11 Durability



11.1 The blocks have adequate durability and should have a life equal to that of the wall in which they are installed.

11.2 The PIR version is designed to withstand the application of hot-applied bitumen finishes and detailing around parapets adjacent to the wall.

Installation

12 General

12.1 Installation of Marmox Thermoblock should be carried out strictly in accordance with the provisions detailed in this Certificate. If required, technical advice should be sought from the Certificate holder for particular installations.

12.2 The level of supervision during installation of the blocks and the associated structure must be sufficient to meet the requirements of BS EN 1996-1-1 : 2005, BS EN 1996-2 : 2006 and BS 8000-3 : 2001.

12.3 The width of the blocks must be always equal to the width of the wall on which they are installed.

12.4 The mortar used in laying the blocks should be of the appropriate designation class in accordance with BS EN 998-2 : 2003 and be of traditional mortar based on 9 parts sand and 3 parts cement. The mortar should be of appropriate consistency, ie not too wet (water/cement-factor = 0.7), as the bedding layer is thicker than a regular masonry joint.

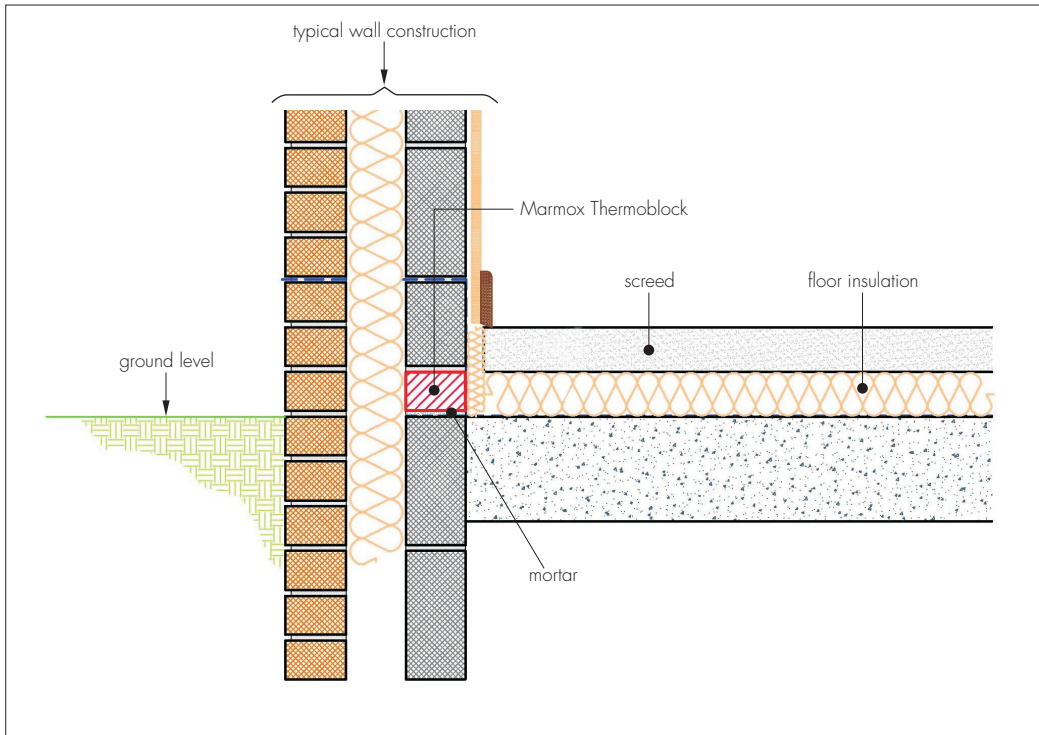
13 Procedure

Floors

13.1 The blocks are laid onto a full levelled bed of standard bricklaying mortar spread on the foundation layer of solid blocks, bricks or concrete. Both the foundation layer and the layer above must cover the full surface of the block, and have a uniform minimum thickness of 20 mm and a flat surface to ensure full contact.

13.2 The blocks should be incorporated into the base of a wall to ensure that the top surface is below the level of the adjoining floor, and laid to coincide with the layer of ground-floor insulation, as shown in Figure 2.

Figure 2 Wall to floor applications



13.3 Using the same technique used with brickwork, the blocks are pressed into position and tapped down until level and stable.

13.4 The blocks should be laid closely together to form a rigid structure ensuring that the rebated ends are tightly butted.

13.5 The blocks are generally impermeable to water but, to ensure the watertightness of the joints, Marmox Multibond (acrylic) is used on the rebated joints to bond the blocks together. A thin zig-zag bead running from the top to the bottom of the exposed vertical and horizontal edge of one block is sufficient to form a watertight seal between the blocks⁽¹⁾.

(1) Guidance should be sought from the Certificate holder.

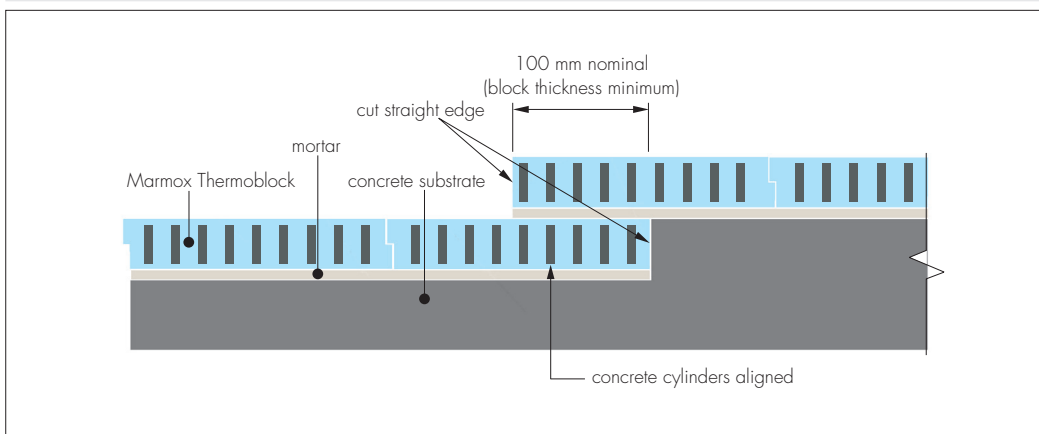
13.6 The next block should be placed and tapped into position on the bed of mortar, pressing the rebated joints together so that surplus Marmox Multibond is squeezed out, leaving a gap of approximately 1 mm.

13.7 At the end of the row, if the last block has to be cut to fit an ordinary hacksaw can be used between the concrete cylinders and a standard brick rotary-bladed cutter through the concrete cylinders. The cylinder locations are visible on the top and bottom surfaces.

13.8 Thermoblocks must not be laid on top of each other unless the concrete floor is stepped as shown in Figure 3.

13.9 If the row of blocks is stepped, a bond overlap of a nominal 100 mm, but never less than the thickness of a block, should be used and the polymer-concrete cylinders of the top block must coincide with those in the bottom block.

Figure 3 Block overlap



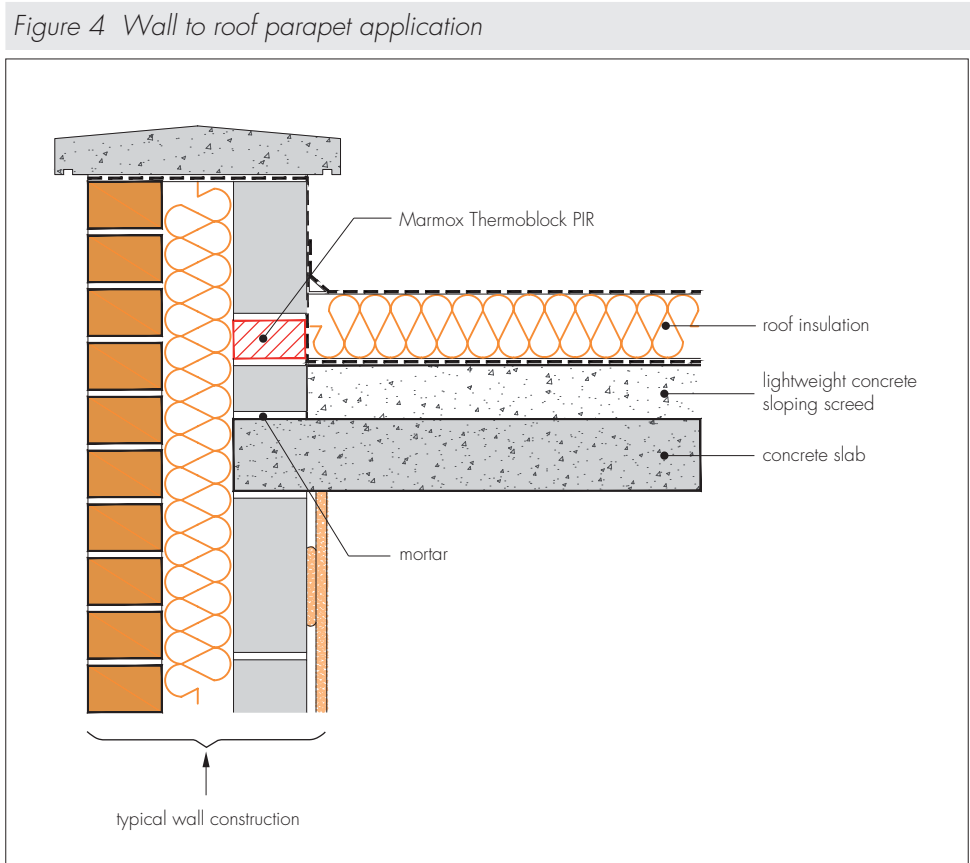
13.10 The subsequent layer of conventional bricks or blocks on top of the Thermoblock layer is laid with soft mortar; this layer must distribute the weight uniformly over the surface of the Thermoblock. Bricks with frogs and hollow or indented bricks must not be used unless the hollow is facing upwards, so that a flat surface is placed on the Thermoblock.

Roofs

13.11 The blocks are laid onto a full levelled bed of standard bricklaying mortar spread on a layer of solid blocks, bricks or concrete. Both mortar layers (above and below) must cover the full surface of the block, and have a uniform thickness of 20 mm minimum and a flat surface to ensure full contact.

13.12 The blocks should be laid in the wall to ensure they coincide with the layer of roof insulation, as shown in Figure 4.

13.13 Installation can proceed as described in 13.3 to 13.7.



14 Repair

If the blocks are damaged during other work (eg fitting services), the Certificate holder must be consulted before any repairs are carried out.

Technical Investigations

15 Tests

Tests were carried out on the blocks and the results assessed to determine:

- thermal resistance
- compressive strength
- water absorption.

16 Investigations

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

16.2 Thermal modelling was carried out using TRISCO software to establish the effective thermal conductivity of the blocks. THERM software was used to calculate the psi value examples.

16.3 A visit to an existing site was conducted to evaluate the practicability of installation and the performance in use.

Bibliography

- BS 8000-3 : 2001 *Workmanship on building sites — Code of practice for masonry*
- BS 8103-2 : 2005 *Structural design of low-rise buildings — Code of practice for masonry walls for housing*
- BS 8217 : 2005 *Reinforced bitumen membranes for roofing — Code of practice*
- BS EN 772-1 : 2011 *Methods of test for masonry units — Determination of compressive strength*
- BS EN 998-2 : 2003 *Specification for mortar for masonry — Masonry mortar*
- BS EN 1996-1-1 : 2005 *Eurocode 6 : Design of masonry structures — General rules for reinforced and unreinforced masonry structures*
- BS EN 1996-2 : 2006 *Eurocode 6 : Design of masonry structures — Design considerations, selection of materials and execution of masonry*
- BS EN 1996-3 : 2006 *Eurocode 6 : Design of masonry structures — Simplified calculation methods for unreinforced masonry structures*
- BS EN 10456 : 2007 *Building materials and products — Hygrothermal properties — Tabulated design values and procedures for determining declared and design thermal values*
- BS EN 15651 : 2012 *Sealants for non-structural use in joints in buildings and pedestrian walkways — Sealants for facade elements*
- BS EN ISO 10211 : 2007 *Thermal bridges in building construction — Heat flows and surface temperatures — Detailed calculations*
- ISO 9001 : 2008 *Quality management systems*
- BRE Information Paper IP 1/06 *Assessing the effects of thermal bridging at junctions and around openings*
- BRE Report 497 : 2007 *Thermal performance of buildings*

17 Conditions

17.1 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.

17.2 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.

17.3 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.

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

17.5 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.

17.6 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.