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Agrément Certificate
20/5821
Product Sheet 2

ARMATHERM THERMAL BREAKS

ARMATHERM 500

This Agrément Certificate Product Sheet(1) relates to Armatherm 500, a load-bearing polyurethane thermal break product. The product is for use in openings and junctions in protected masonry elements, at column bases and at window and door sills to reduce thermal bridging in domestic and non-domestic buildings.

(1) Hereinafter referred to as 'Certificate'.

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

Structural performance — the product has adequate compressive strength for use in masonry walls and column bases (see section 6).

Thermal performance — the product will reduce linear heat loss ψ-values (psi) in building envelope junctions (see section 7).

Behaviour in relation to fire — the product is not classified as non-combustible or of limited combustibility in accordance with BS EN 13501-1 : 2018 and its use is restricted (see section 8).

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. 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: 30 October 2020

Hardy Giesler
Chief Executive Officer

Regulations

In the opinion of the BBA, Armatherm 500, 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 sustain and transmit loads to the ground. See section 6 of this Certificate.
Requirement:	**B3(4)**	**Internal fire spread (structure)**
Comment:		The product is restricted by this Requirement. See section 8 of this Certificate.
Requirement:	**L1(a)(i)**	**Conservation of fuel and power**
Comment:		The product reduces external wall/floor junction linear thermal transmittance values. See section 7 of this Certificate.
Regulation:	**7(1)**	**Materials and workmanship**
Comment:		The product is acceptable. See section 12 and the *Installation* part of this Certificate.
Regulation:	**7(2)**	**Materials and workmanship**
Comment:		The product is restricted by this Regulation. See sections 8.1 and 8.4 of this Certificate.
Regulation:	**26**	**CO_2 emission rates for new buildings**
Regulation:	**26A**	**Fabric energy efficiency rates for new dwellings (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 Ψ 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 *Installation* 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:	2.3	Structural protection
Comment:		The product may be restricted by this Standard and requires suitable protection from fire-resistant detailing and/or linings, with reference to clauses 2.3.1(1)(2), 2.3.2(1)(2) and 2.3.5(1)(2). See section 8 of this Certificate.
Standard:	6.1	Carbon dioxide emissions
Standard:	6.2	Building insulation envelope
Comment:		The product reduces external wall/floor junction Ψ 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), provided the construction is in accordance with section 7 of this Certificate.
Standard:	7.1(a)	Statement of sustainability
Comment:		The product can contribute to satisfying 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:		Comments in relation to the 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 (as amended)

Regulation:	**23(a)(i) (iii)(b)(i)**	**Fitness of materials and workmanship**
Comment:		The product is acceptable. See section 12 and the *Installation* part of this Certificate.
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:	**35(4)**	**Internal fire spread – Structure**
Comment:		The system is restricted by this Regulation. See section 8 of this Certificate.
Regulation:	**39(a)(i)**	**Conservation measures**
Regulation:	**40(2)**	**Target carbon dioxide emission rate**
Comment:		The product reduces external wall/floor junction Ψ values and contributes to satisfying these Regulations. See section 7 of this Certificate.

Construction (Design and Management) Regulations 2015
Construction (Design and Management) Regulations (Northern Ireland) 2016

Information in this Certificate may assist the client, designer (including Principal Designer) and contractor (including Principal Contractor) to address their obligations under these Regulations.

See sections: 1 *Description* (1.2) and 3 *Delivery and site handling* (3.2) of this Certificate.

Additional Information

NHBC Standards 2020

In the opinion of the BBA, Armatherm 500, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements in relation to *NHBC Standards*, Chapter 6.1 *Exterior masonry walls* and 6.3 *Internal walls*.

Technical Specification

1 Description

1.1 Armatherm 500 is a thermal break block made of polyurethane for forming low conductivity thermal breaks in structures. The product is designed to be incorporated in column bases, wall, parapet or roof penetrations and at foundation-wall junctions.

1.2 The product is available in different grades, which are selected according to design requirements, with the characteristics given in Table 1 of this Certificate.

Table 1 Armatherm 500 characteristics

Category	Unit	500-250	500-320	500-490
Nominal density	$kg \cdot m^{-3}$	250	320	490
Thermal conductivity	$W \cdot m \cdot K^{-1}$	0.045	0.054	0.078
Characteristic compressive strength	$N \cdot mm^{-2}$	4.3	6.3	13.3
Design flexural strength	$N \cdot mm^{-2}$	5.0	7.6	10.7
Colour	-	Peach	Brown	Grey

1.3 The product is available in sizes up to 2400 x 1200 x 50 mm, but is supplied cut to the correct dimensions according to the project-specific requirements, and can be bonded using adhesive to create 100, 150, 200 and 250 mm thicknesses.

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

- masonry
- damp proof membrane
- mortar
- perimeter/cavity/floor insulation
- wall finishes
- sealants
- adhesive.

2 Manufacture

2.1 The product is manufactured from polyurethane and made in several densities to support a wide range of loading conditions. Where thicknesses greater than 50 mm are required, blocks are bonded together using Armatherm adhesive.

2.2 Where provision is required for fixings to pass through the blocks, holes are machined in the blocks by the Certificate holder.

2.3 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.

3 Delivery and site handling

3.1 The product is supplied either boxed or palleted, depending on order size. In the case of palleted deliveries, they will be protected by board and shrink-wrapped.

3.2 During off-loading, care must be taken to avoid damage to the packaging. Prior to installation, the product must be stored in a clean and dry under cover environment away from direct sunlight, solvents or other harmful chemicals. Any damaged products should not be used.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Armatherm 500.

Design Considerations

4 Use

Armatherm 500 is suitable for use where there is penetration or transition in the building element to prevent heat loss through thermal bridges. It can be used at the base of external loadbearing and non-loadbearing walls, under column bases, or at wall, roof and parapet penetrations.

5 Practicability of installation

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

6 Structural performance

6.1 Design compressive strengths of masonry walls incorporating the thermal block should be calculated in accordance with BS EN 1996-1-1 : 2005, BS EN 1996-2 : 2006, BS EN 1996-3 : 2006 and PD 6697 : 2019.

6.2 For the design of residential buildings of up to three storeys, the guidance given in BS 8103-2 : 2013 should be used.

6.3 The values for compressive strength and modulus of Armatherm 500, when tested in accordance with the method given in ISO 604, are given in Table 2. The products are Category II masonry units as defined in BS EN 1996-1-1 : 2005.

Table 2 Characteristic compressive strength

Grade	Characteristic compressive strength $N \cdot mm^{-2}$	Characteristic compressive modulus $N \cdot mm^{-2}$
500-250	4.3	123
500-320	6.3	181
500-490	13.3	487

6.4 Compressive creep tests indicate that at the permanent stresses given in Table 3, the total predicted compressive creep during the product's design life will be acceptable.

Table 3 Resistance to creep

Grade	Permanent stress $N \cdot mm^{-2}$	Creep %
500-250	1.25	1.0
500-320	3	2.1
500-490	5	1.7

6.5 The values for characteristic initial shear strength of Armatherm 500 in masonry construction using conventional mortar, when tested in accordance with the method given in BS EN 1052-3 : 2002, may be taken as 0.004 $N \cdot mm^{-2}$.

7 Thermal performance

7.1 The product limits heat loss around the junction between an external wall and a floor by enhancing insulation continuity through the junction. The product has the thermal conductivity (λ_D) given in Table 4. It is important that the product is positioned such that it aligns with the insulation layers of the floor, foundation, roof, wall or columns between which it is positioned.

Table 4 Armatherm thermal conductivity

Grade	Thermal conductivity ($W \cdot m^{-1} \cdot K^{-1}$)
500-250	0.05
500-320	0.06
500-490	0.08

7.2 The ψ-value of any junction incorporating the product will vary depending on the construction and must be modelled in accordance with the principles given in BS EN ISO 10211 : 2017 and BRE Report BR 497 : 2007

8 Behaviour in relation to fire

8.1 The product is a polyurethane material which is not classified as 'non-combustible' or 'of limited combustibility'.

8.2 To achieve the required period of structural fire resistance as specified in the documents supporting the national Building Regulations, the product requires protection from fire, which must be provided by the internal and external linings of the building and the building fabric. The total fire resistance of any proposed construction incorporating the product can only be determined by testing in accordance with BS EN 1365-1 : 2020 by a UKAS-accredited laboratory.

8.3 Incorporation of the product must not interfere with the provision of effective cavity barriers and fire-stopping around services and penetrations of the building envelope.

8.4 The product should not be used in the external walls of buildings with a storey more than 18 m above ground level. For other applications (eg column bases), the product may be used in buildings without height restriction provided that the overall construction achieves the required duration of fire resistance as specified in the documents supporting the national Building Regulations.

9 Resistance to moisture

9.1 The product should be used in conjunction with a conventional dpc in accordance with BS 8215 : 1991 and the relevant clauses of BS 8000-4 : 1989.

9.2 The characteristic short-term water absorption of Armatherm 250, 320 and 490 is 0.05, 0.03 and 0.02 $kg \cdot m^{-2}$ respectively, when tested in accordance with BS EN 1609 : 2013.

9.3 The product's ability to resist rain ingress as part of a wall construction has not been assessed and it should only be used in protected constructions not exposed to the elements.

10 Condensation risk

The product when installed in a wall/floor junction or column/base junction (shown in Figures 1 and 2) designed in accordance with BRE Report BE 262 : 2002 and BS 5250 : 2011 and maintaining the insulation continuity, must achieve the critical temperature factors exceeding the values given in BRE information Paper IP 1/06.

11 Maintenance

The product is situated within the building structure and will not require maintenance.

12 Durability

The product has adequate durability and will have a life equal to that of the construction in which it is installed. The design life for masonry walls designed in accordance with BS EN 1996-1-1 : 2005 is 60 years.

Installation

13 General

13.1 Installation of Armatherm 500 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.

13.2 The level of supervision during installation of the blocks and the associated structure must be sufficient to satisfy the requirements of BS EN 1996-1-1 : 2005, BS EN 1996-2 : 2006 and BS 8000-3 : 2001 and the National Structural Steel Specification (NSSS) and the National Structural Concrete Specification (NSCS).

13.3 The width of the blocks must always be equal to the width of the wall or foundation on which they are installed. No eccentricity should be induced due to offset loading of the blocks.

13.4 The mortar used in laying the blocks should be of the appropriate designation class in accordance with BS EN 998-2 : 2016, and be of appropriate consistency, ie not too wet (water/cement-ratio = 0.7), as the bedding layer is thicker than a regular masonry joint.

14 Procedure

Masonry construction

14.1 The Armatherm 500 blocks are laid as for conventional masonry onto a horizontal mortar bed, with the exception that perpend joints are dry butted. The product can be used at following locations:

- roof-parapet junction
- wall-foundation junction.

14.2 The product should be installed in accordance with the installation requirements of the manufacturer and conventional good practice for construction, including the provision of movement joints where these would normally be required.

14.3 The blocks are laid onto a full levelled bed of standard bricklaying mortar spread on a 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.

14.4 The blocks should be incorporated into the base of the 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 1.

Figure 1 Wall-floor junction

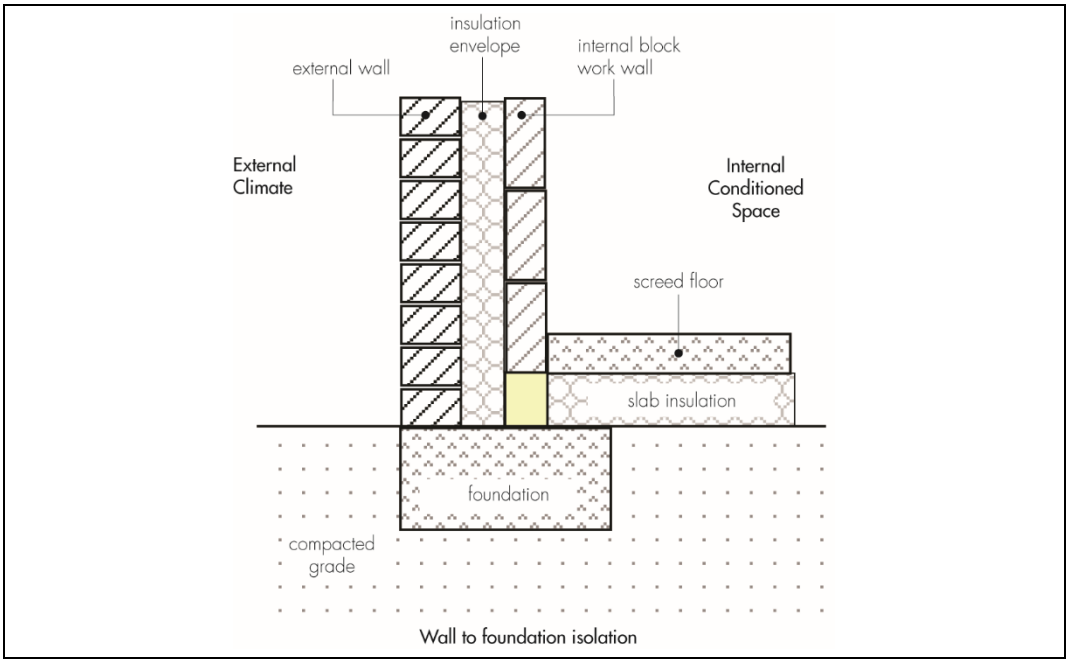
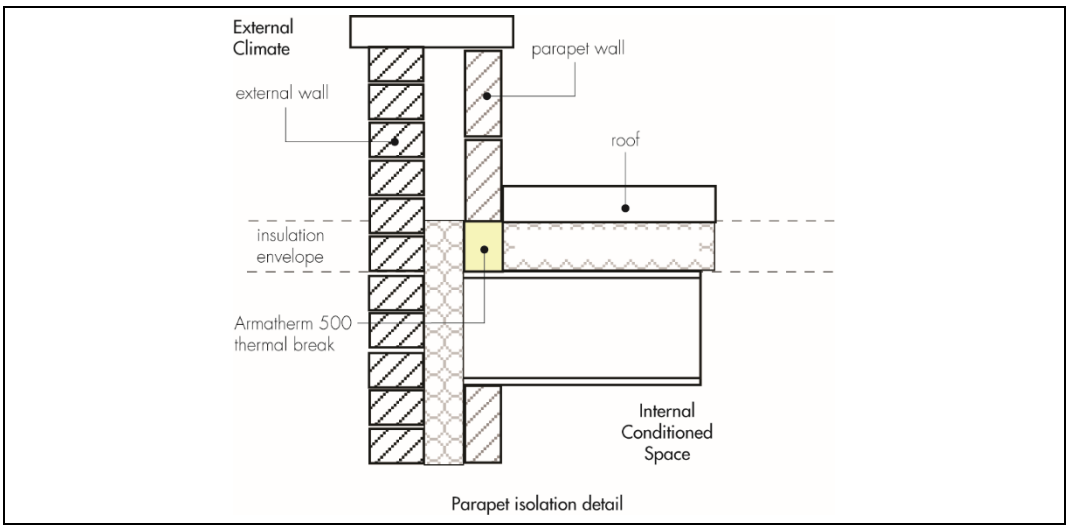


Figure 2 Wall-roof junction



14.5 Using the same technique as conventional brickwork, the blocks are pressed into position and tapped down until level and stable.

14.6 The next block should be placed and tapped into position on the bed of mortar, and butted tightly to the adjacent block.

14.7 At the end of the row, if the last block must be cut to fit, an ordinary handsaw can be used to cut the block to size. Care should be taken to fit the blocks as tightly together as possible to minimise thermal bridging.

14.8 The subsequent layer of conventional bricks or blocks on top of the Armatherm 500 layer is laid with soft mortar; this layer must distribute the weight uniformly over the surface of the Armatherm 500. 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 Armatherm 500.

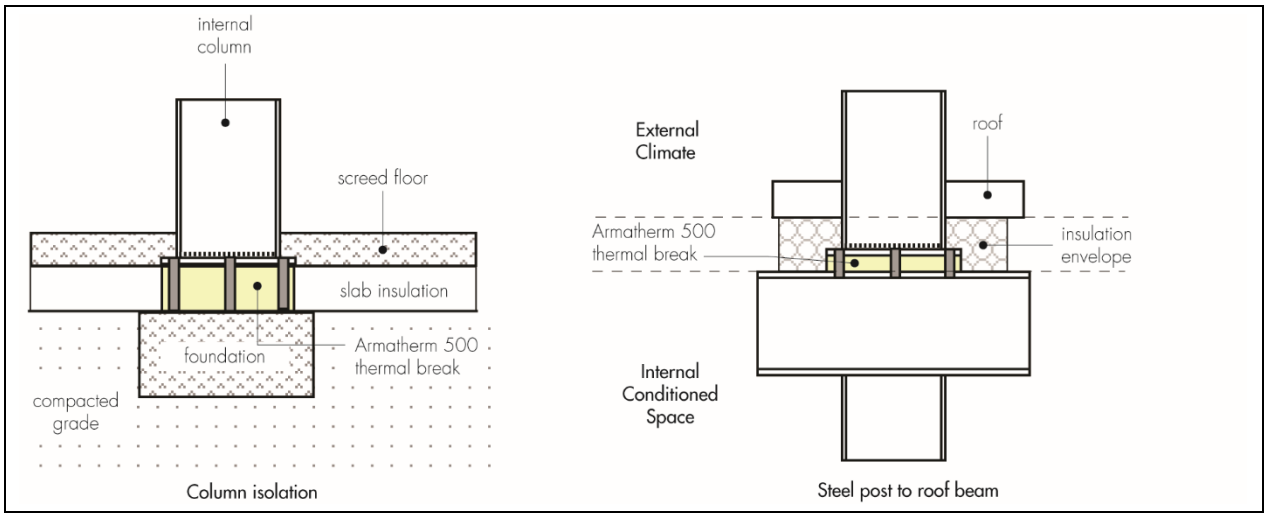
Column bases

14.9 When used under column bases, the blocks must be accurately positioned over the foundation, with the holes for the structural fixings aligned with the receiving points in the foundation. Holes should not be modified on-site without first consulting the Certificate holder.

14.10 The column should be located centrally on the block to avoid eccentricity of loading (see Figure 3).

14.11 The holding-down fixings (foundation bolts) should be pre-loaded to the correct torque, accounting for the creep in the block.

Figure 3 Column base installation



15 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

16 Tests

Tests were carried out and the results assessed to determine:

- compressive strength
- compressive creep
- thermal resistance
- water absorption
- initial shear strength.

17 Investigations

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

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

Bibliography

BS 5250 : 2011 + A1 : 2016 *Code of practice for control of condensation in buildings*

BS 8000-3 : 2001 *Workmanship on building sites — Code of practice for masonry*

BS 8000-4 : 1989 *Workmanship on building sites – Code of practice for waterproofing*

BS 8215 : 1991 *Code of practice for design and installation of damp-proof courses in masonry construction*

BS 8103-2 : 2013 *Structural design of low-rise buildings — Code of practice for masonry walls for housing*

BS EN 998-2 : 2016 *Specification for mortar for masonry — Masonry mortar*

BS EN 1052-3 : 2002 *Methods of tests for masonry – Determination of initial shear strength*

BS EN 1609 : 2013 *Thermal insulating products for building applications – Determination of short term water absorption by partial immersion*

BS EN 1365-1 : 2020 *Fire resistance tests for loadbearing elements – Walls*

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 13501-1 : 2018 *Fire classification of construction products and building elements – Classification using data from reaction to fire tests*

BS EN ISO 10211 : 2017 *Thermal bridges in building construction — Heat flows and surface temperatures — Detailed calculations*

ISO 604 : 2002 *Plastics – Determination of compressive properties*

BRE Information Paper IP 1/06 *Assessing the effects of thermal bridging at junctions and around openings*

BRE Report BR 262 : 2002 *Thermal insulation : avoiding risks*

BRE Report 497 : 2007 *Thermal performance of buildings*

PD 6697 : 2019 *Recommendations for the design of masonry structures to BS EN 1996-1-1 and BS EN 1996-2*

18 Conditions

18.1 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.

18.2 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.

18.3 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.

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

18.5 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.

18.6 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.

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