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Agrément Certificate
16/5299
Product Sheet 4

KINGSPAN KOOLTHERM RANGE FOR FLOORS, WALLS AND PITCHED ROOFS

KOOLTHERM K1 10 SOFFIT BOARD INSULATION

This Agrément Certificate Product Sheet⁽¹⁾ relates to Kooltherm K1 10 Soffit Board Insulation, comprising a wet-lay, coated glassfibre-tissue-based upper face and composite foil lower face phenolic foam board. The product is for use as soffit insulation to semi-exposed concrete floor decks in new and existing car parks, storage areas, loading bays and similar areas beneath habitable 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

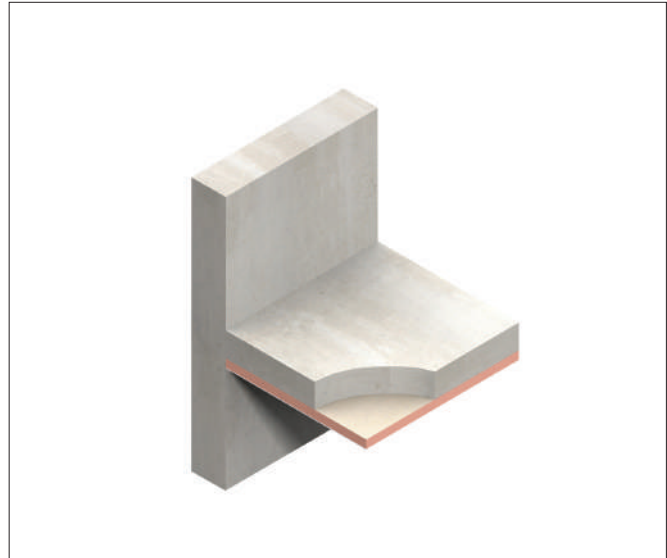
Thermal performance — the product has a declared thermal conductivity (λ_D value) of $0.018 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ (see section 6).

Condensation risk — the product can contribute to limiting the risk of condensation (see section 7).

Behaviour in relation to fire — the product is classified as class C-s2, d0 in accordance with BS EN 13501-1 : 2007 (see section 8).

Mechanical resistance and stability — the product has sufficient strength to resist the loads likely to be encountered in service (see section 9).

Durability — the product will have a life equivalent to that of the structure in which it is incorporated (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

John Albon — Head of Approvals
Construction Products

Claire Curtis-Thomas
Chief Executive

Date of Second issue: 28 June 2017

Originally certificated on 23 August 2016

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, Kooltherm K110 Soffit Board Insulation, 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 contribute to satisfying this Requirement. See section 9.4 of this Certificate.
Requirement: B2(1)	Internal fire spread (linings)
Comment:	The product is unrestricted under this Requirement. See section 8.1 of this Certificate.
Requirement: C2(c)	Resistance to moisture
Comment:	The product can contribute to satisfying this Requirement. See sections 7.1 and 7.3 of this Certificate.
Requirement: L1(a)(i)	Conservation of fuel and power
Comment:	The product can contribute to satisfying this Requirement. See section 6 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 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 can contribute to satisfying these Regulations. See section 6 of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation: 8(1)	Durability, workmanship and fitness of materials
Comment:	The product is acceptable. See section 12 and the <i>Installation</i> part of this Certificate.
Regulation: 9	Building standards applicable to construction
Standard: 1.1	Structure
Comment:	The product can contribute to satisfying this Standard, with reference to clauses 1.1.1 ⁽¹⁾⁽²⁾ and 1.1.3 ⁽¹⁾⁽²⁾ . See section 9.4 of this Certificate.
Standard: 2.5	Internal linings
Comment:	The product is unrestricted under this Standard, with reference to clause 2.5.1 ⁽¹⁾⁽²⁾ . See section 8.1 of this Certificate.
Standard: 3.15	Condensation
Comment:	The product can contribute to satisfying this Standard, with reference to clauses 3.15.1 ⁽¹⁾⁽²⁾ , 3.15.4 ⁽¹⁾⁽²⁾ and 3.15.5 ⁽¹⁾⁽²⁾ . See sections 7.1 and 7.4 of this Certificate.
Standard: 6.1(b)	Carbon dioxide emissions.
Standard: 6.2	Building insulation envelope
Comment:	The product can contribute to satisfying these Standards, with reference to clauses, or parts, of 6.1.1 ⁽¹⁾ , 6.1.2 ⁽²⁾ , 6.1.6 ⁽¹⁾ , 6.2.1 ⁽¹⁾⁽²⁾ , 6.2.3 ⁽¹⁾ , 6.2.4 ⁽²⁾ , 6.2.5 ⁽²⁾ , 6.2.6 ⁽¹⁾ , 6.2.7 ⁽¹⁾ , 6.2.8 ⁽¹⁾⁽²⁾ to 6.2.11 ⁽¹⁾⁽²⁾ , 6.2.12 ⁽²⁾ and 6.2.13 ⁽¹⁾⁽²⁾ . See section 6 of this Certificate.
Standard: 7.1(a)(b)	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. In addition, the product can contribute to a construction meeting a higher level of sustainability as defined in this Standard, with reference to clauses 7.1.4 ⁽¹⁾ [Aspects 1 ⁽¹⁾ and 2 ⁽¹⁾], 7.1.6 ⁽¹⁾ [Aspects 1 ⁽¹⁾ and 2 ⁽¹⁾] and 7.1.7 ⁽¹⁾ [Aspect 1 ⁽¹⁾]. See section 6.1 of this Certificate.
Regulation: 12	Building standards applicable to conversions
Comment:	Comments made 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	Fitness of materials and workmanship
Comment:	The product is acceptable. See section 12 and the <i>Installation</i> part of this Certificate.
Regulation: 29	Condensation
Comment:	The product can contribute to satisfying this Regulation. See section 7.1 of this Certificate.
Regulation: 30	Stability
Comment:	The product can contribute to satisfying this Regulation. See section 9.4 of this Certificate.
Regulation: 34	Internal fire spread – linings
Comment:	The product can contribute to satisfying this Regulation. See section 8.1 of this Certificate.

Regulation:	39(a)(i)	Conservation measures
Regulation:	40(2)	Target carbon dioxide emission rate
Comment:	The product can contribute to satisfying these Regulations. See section 6 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 section: 3 *Delivery and site handling* (3.3) of this Certificate.

Additional Information

NHBC Standards 2017

NHBC accepts the use of Kooltherm K110 Soffit Board Insulation, provided it is installed, used and maintained in accordance with this Certificate and meets the requirements of *NHBC Standards*, Chapter 2.1 *The Standards and Technical Requirements*, Technical Requirement R3, *Material Requirements*.

CE marking

The Certificate holder has taken the responsibility of CE marking the product in accordance with harmonised European Standard BS EN 13166 : 2012. An asterisk (*) appearing in this Certificate indicates that data shown are given in the manufacturer's Declaration of Performance.

Technical Specification

1 Description

1.1 Kooltherm K110 Soffit Board Insulation is manufactured from closed-cell phenolic foam, comprising a wet-lay, coated glassfibre-tissue-based upper face and composite foil lower face with the characteristics shown in Table 1.

Table 1 *Nominal characteristics*⁽¹⁾

Length (mm)	2400
Width (mm)	1200
Thickness* at 5 mm increments	25 to 140
Edge profile	Square
Minimum compressive strength at 10% compression* (kPa)	100
Nominal density (kg·m ⁻³)	35

(1) Other dimensions available on request.

1.2 Ancillary items used with this product:

- edge cover strips/tape
- suitable fixings
- timber battens/proprietary grid system.

2 Manufacture

2.1 Raw materials are injected onto the glass tissue facer on a conveyor belt. The exothermic reaction expands the foam, which then comes into contact with the foil-facer. An automated process cures and cuts the product to the required size.

2.2 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.

2.3 The management system of Kingspan Insulation Ltd has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 by the Loss Prevention Certification Board (LPCB) (Certificate 388).

3 Delivery and site handling

3.1 The boards are delivered to site shrink-wrapped in polythene packs containing a label with the product description and characteristics, the manufacturer's name, and the BBA logo incorporating the number of this Certificate.

3.2 Ideally, boards should be stored inside. If outside storage cannot be avoided, boards should be stacked clear of the ground and covered with an opaque polythene sheet or weatherproof tarpaulin. They must be protected from rain, snow and prolonged exposure to sunlight. Boards that have been allowed to get wet or that are damaged must not be used. Nothing should be stored on top of the boards.

3.3 The boards must not be exposed to a naked flame or other ignition sources, or to solvents or other chemicals. Damaged or wet boards must not be used.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Kooltherm K110 Soffit Board Insulation.

Design Considerations

4 Use

4.1 Kooltherm K110 Soffit Board Insulation is effective in reducing the thermal transmittance (U value) of new or existing exposed concrete floor decks in car parks, storage areas, loading bays and other similar areas beneath habitable buildings. Kooltherm K110 Soffit Board Insulation is intended for use as insulation installed on the cold side of the construction.

4.2 Existing constructions must be in a good state of repair. Defects must be made good prior to installation.

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 Thermal performance

6.1 Calculations of the thermal transmittance (U value) should be carried out in accordance with BS EN ISO 6946 : 2007 and BRE Report BR 443 : 2006 using the declared thermal conductivity* (λ_D) of 0.018 W·m⁻¹·K⁻¹.

6.2 Example U values shown in Tables 2 and 3 of this Certificate indicate that the product can enable, or contribute to enabling, a floor to meet the design U values quoted in the documents supporting the national Building Regulations.

Table 2 Example⁽¹⁾ U values for floors fixed directly to the soffit

U value requirement ⁽²⁾ (W·m ⁻² ·K ⁻¹)	Insulation thickness (mm) ⁽³⁾
0.13	130
0.15	115
0.20	85
0.22	80
0.25	70

(1) Values including fixing correction due to mechanical fixings causing cold bridging. 3.82 fixings m⁻², $\lambda = 17 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ (stainless steel) and a cross-sectional area of 8 mm².

(2) Construction (internal to external) 150 mm concrete deck with 2% steel. $\lambda = 2.5 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$. K110 soffit insulation fixed directly to the concrete soffit.

(3) Nearest available thickness.

Table 3 Example⁽¹⁾ U values for floors fixed to a metal frame system

U value requirement ⁽²⁾ (W·m ⁻² ·K ⁻¹)	Insulation thickness (mm) ⁽³⁾
0.13	135
0.15	115
0.20	85
0.22	80
0.25	70

(1) Values including fixing correction due to mechanical fixings causing cold bridging. 5.21 fixings m⁻², $\lambda = 50 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ and a cross-sectional area of 4 mm².

(2) Construction (internal to external) 150 mm concrete deck with 2% steel. $\lambda = 2.5 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$. 25 mm high, non-vented airspace bridged by a steel frame system = 1.5 mm thick at 600 mm centres.

(3) Nearest available thickness.

6.3 Designers must limit excessive heat loss at junctions between the wall and the structural floor.

7 Condensation risk

Interstitial condensation



7.1 Floors incorporating the product can limit the risk of interstitial condensation when they are designed and constructed in accordance with BS 5250 : 2011, Annex F, and the relevant guidance.

7.2 When designing buildings with a higher humidity class than 'humidity class 3', an assessment will need to be made, in accordance with BS EN 15026 : 2007 using the values given in Table 4, and the result will be construction and location specific.

Table 4 Material properties

Material	Thickness (mm)	Water vapour resistance (MN·s·g ⁻¹)	Water vapour resistivity (MN·s·g ⁻¹ ·m ⁻¹)
Glass tissue	0.37	3	—
Phenolic foam	25 to 140	—	370
Aluminium foil (perforated)	0.26	3	—

Surface condensation



7.3 Floors incorporating the product will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed 0.7 W·m⁻²·K⁻¹ at any point.



7.4 Floors incorporating the product will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed 1.2 W·m⁻²·K⁻¹ at any point.

8 Behaviour in relation to fire



8.1 The product is classified* as Class C-s2, d0 to BS EN 13501-1 : 2011.

8.2 The use of the product as soffit insulation for exposed floor decks is therefore unrestricted by the national Building Regulations in relation to internal fire spread over linings.

8.3 If the product is painted or covered, the effectiveness of particular coatings is outside the scope of this Certificate and should be the subject of assessment and/or test by a UKAS-accredited fire testing laboratory.

8.4 All fixings should be of a non-combustible type to resist the increased duty that may be required in a fire.

9 Mechanical resistance and stability

9.1 The product is mechanically fixed to a suitable structural floor with a minimum 11 fixings per board as shown in Figure 1 of section 13.4.

9.2 Positive wind load (pressure) is transferred to the substrate structural floor directly via bearing and compression of the product.

9.3 Negative wind pressure (suction) is resisted by steel fixings, which retain the product.



9.4 The wind loads on the structural floor should be calculated in accordance with BS EN 1991-1-4 : 2005 and its UK National Annex. Special consideration should be given to locations with high wind-load pressure coefficients as additional fixings may be necessary. In accordance with BS EN 1990 : 2002 and its UK National Annex, it is recommended that a load factor of 1.5 is used to determine the ultimate wind load to be resisted by the product.

9.5 An assessment of structural performance for individual buildings must be carried out by a suitably qualified and experienced individual to confirm that:

- the structural floor has adequate strength to resist additional loads that may be applied as a result of installing the product
- the proposed fixing and associated layout provides adequate resistance to negative wind loads (based on the results of the site-specific assessment)
- an appropriate number of site-specific pull-out tests conducted on the substrate of the building to determine the minimum resistance to failure of the fixings. The characteristic pull-out resistance should be determined in accordance with the guidance given in the EAD 330196-00-0604 : 2016 and EOTA Technical Report TR051 : 2016.

9.6 The number and centres of fixings should be determined by a suitably experienced and competent individual. Provided the structural floor is suitable and an appropriate fixing is selected, the mechanical fixings will transfer the weight of the product to the structural floor. See section 13 for installation guidance.

9.7 The design pull through resistance given in Table 5 is calculated based on the pull-through resistance of the insulation to the head of the HD fixings (steel SAE 1022 case-hardened, 6.1 mm diameter, up to 175 mm length⁽¹⁾, with a minimum head diameter of 25 mm and a global tube washer, and a minimum of 25 mm embedment into the substrate).

(1) This relates to concrete substrates; lengths of up to 300 mm will be required if the timber batten fixing method is used (see section 13.7).

Fixings with a minimum head diameter of 25 mm and a characteristic pull-through resistance value exceeding 380 N, and corresponding values from Table 5 should be used.

Table 5 Example calculation sheet to establish ultimate wind load capacity

Factor (unit)	Product
Product thickness (mm)	all
Density of product (kg·m ⁻³)	35
Flexural strength (kPa)	627
Characteristic pull-through resistance ⁽¹⁾ (per anchor) (N)	382
Factor of safety	3
Design pull-through resistance ⁽²⁾ (per anchor)(N)	127
Fixing head diameter (minimum) mm	25

(1) Pullthrough resistance of the product over the head of the fixing.

(2) The safety factor of 3 is applied and based on the knowledge that all boards are quality control tested to ensure consistency of the tensile strength perpendicular to the face of the board.

9.8 In situations where fire performance is an important consideration, all-steel fasteners should be used. For advice on specific types, the Certificate holder should be consulted.

10 Materials in contact – wiring installations

10.1 De-rating of electric cables should be considered in areas where the product restricts the flow of air.

10.2 Recessed lighting must not be used with this form of insulation.

11 Maintenance

The product does not require maintenance. Minor surface damage can be repaired with proprietary fillers. Further advice should be sought from the Certificate holder. Major damage may require the replacement of panels.

12 Durability



The product will remain effective as soffit insulation for the life of the building providing major damage does not occur during service.

Installation

13 General

13.1 Installation of Kooltherm K110 Soffit Board Insulation must be in accordance with the Certificate holder's installation instructions and the requirements of this Certificate.

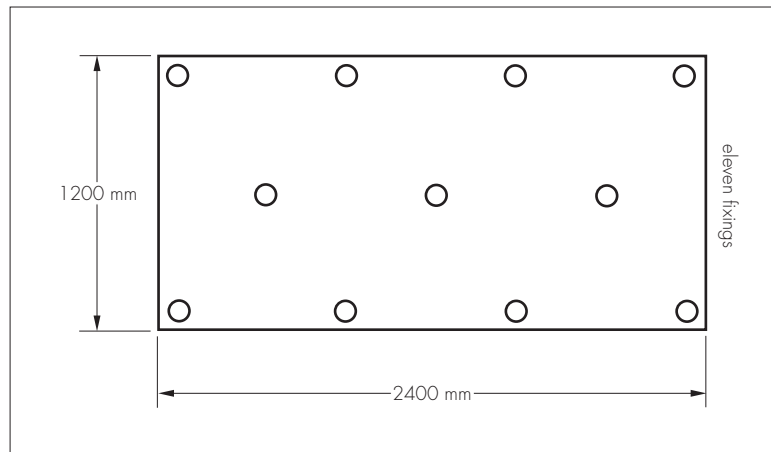
13.2 The product may be fixed directly to a concrete soffit (with or without metal shuttering), to timber battens or a proprietary grid system.

13.3 The product may be cut using a fine-toothed saw or a sharp knife, snapping the board over a straight edge and cutting the facing on the other side.

Fixing directly to concrete soffits

13.4 The product may be fully restrained to a concrete soffit by the use of eleven approved insulation fasteners with a minimum head diameter of 25 mm. The fasteners should be spaced as shown in Figure 1.

Figure 1 Fastener layout



13.5 The fasteners must penetrate into the concrete soffit to a minimum distance of 40 mm. Fixings to board edges and corners should be situated less than 150 mm, but no less than 50 mm, from the board edge. If an alternative fixing penetration into the concrete slab is required, guidance should be sought on suitable fixing products and installation from the fixing manufacturer.

13.6 Board joints should preferably be staggered.

Fixing to timber battens/grid system

13.7 A treated timber batten system may be used if a void is necessary due to uneven surfaces, or services present.

13.8 Battens should be at least 50 mm by 25 mm and placed at 600 mm centres to coincide with the edges/centres of the boards.

13.9 The battens should be fixed to the soffit by a suitable method.

13.10 The product should be fixed to the timber battens using suitable fixings. These should be placed at a maximum of 300 mm centres in rows not greater than 600 mm apart.

13.11 Fixings should be positioned not less than 25 mm from board edges. Exposed joints should be covered with a suitable tape or cover strip.

13.12 The product may also be fixed to a grid system comprising metal furring bars. The manufacturer's advice should be sought on each system under consideration.

Technical Investigations

14 Tests

An examination was made of test data on Kooltherm K1 10 Soffit Board Insulation in relation to:

- water permeability of the insulation
- laminate bond strength between foil and insulation, and the glass-fibre tissue and insulation
- thermal conductivity
- behaviour in relation to fire.

15 Investigations

15.1 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.

15.2 The following investigations were also carried out:

- U value calculations and condensation risk analysis.

Bibliography

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

BS EN 1990 : 2002 *Eurocode — Basis of structural design*

NA to BS EN 1990 : 2002 UK National Annex for *Eurocode — Basis of structural design*

BS EN 1991-1-4 : 2005 *Eurocode 1 : Actions on structures — General actions — Wind actions*

NA to BS EN 1991-1-4 : 2005 UK National Annex to *Eurocode 1 : Actions on structures — General actions — Wind actions*

BS EN 13166 : 2012 *Thermal insulation products for buildings — Factory made phenolic foam (PF) products — Specification*

BS EN 13501-1 : 2007 *Fire classification of construction products and building elements — Classification using test data from reaction to fire tests*

BS EN 15026 : 2007 *Hygrothermal performance of building components and building elements — Assessment of moisture transfer by numerical simulation*

BS EN ISO 6946 : 2007 *Building components and building elements — Thermal resistance and thermal transmittance — Calculation method*

BS EN ISO 9001 : 2008 *Quality management systems — Requirements*

BRE Report (BR 443 : 2006) *Conventions for U-value calculations*

EAD 330196-00-0604 : 2016 *Plastic Anchors for fixing of external thermal insulation composite systems with rendering*

EOTA Technical Report TR051 : 2016 *Recommendations for job site tests of plastic anchors and screws*

Conditions of Certification

16 Conditions

16.1 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.

16.2 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.

16.3 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.

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

16.5 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.

16.6 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.