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BBA BRITISH BOARD OF AGRÉMENT
TECHNICAL APPROVALS FOR CONSTRUCTION

Agrément Certificate
No 08/4567

PRODUCT SHEET 1 — INSUBOND INSULATION

PRODUCT SCOPE AND SUMMARY OF CERTIFICATE

This Certificate relates to Insubond Insulation, a spray applied expanding polyurethane foam, for use between, or between and under, timber rafters in slated/tiled pitched roofs of new or existing domestic or similar buildings.

AGRÉMENT CERTIFICATION INCLUDES:

- factors relating to compliance with Building Regulations where applicable
- factors relating to additional non-regulatory information where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production
- formal three-yearly review.

KEY FACTORS ASSESSED

Thermal performance — the product can be used to improve the thermal performance of a roof (see section 5).

Condensation risk — the performance of the product with regard to interstitial and surface condensation has been considered. The product has a water vapour resistivity of 140 $MNsg^{-1}m^{-1}$ (see section 6).

Properties in relation to fire — the roof system using this product can be designed to meet the UK requirements (see section 7).

Durability — the durability of the product is satisfactory and will have a life equivalent to that of the structure in which it is incorporated (see section 11).

The BBA has awarded this Agrément Certificate for Insubond Insulation to Insubond Ltd as fit for its intended use provided it is installed, used and maintained as set out in this Agrément Certificate.

On behalf of the British Board of Agrément

Head of Approvals — Physics

Chief Executive

Date of First issue: 14 June 2008

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, Insubond Insulation, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements of the following Building Regulations:

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

Requirement:	C2(c)	Resistance to moisture
Comment:		The product can enable or contribute to enabling a roof to meet this Requirement. See sections 6.1 and 6.4 of this Certificate.
Requirement:	L1(a)(i)	Conservation of fuel and power
Comment:		See sections 5.2 to 5.5 of this Certificate.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The product is an acceptable material. See section 11 and the *Installation* part of this Certificate.

In addition to the contribution which the product can make to meeting the relevant requirements, the following comments should be noted:

Requirement:	B3(1)(2)(3)(4)	Internal fire spread (structure)
Comment:		Junctions between roofs and fire-resisting walls must be fire-stopped. See sections 7.1, 7.6 and 7.7 of this Certificate.

The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)(2)	Fitness and durability of materials and workmanship
Comment:		The product can contribute to a construction satisfying this Regulation. See sections 10 and 11 and the *Installation* part of this Certificate.
Regulation:	9	Building standards — construction
Standard:	3.15	Condensation
Comment:		Constructions incorporating the product can satisfy or contribute to satisfying this Standard, with reference to clauses 3.15.1[1], 3.15.3[1], 3.15.4[1] and 3.15.5[1]. See sections 6.1 and 6.5 of this Certificate.
Standard:	6.1(a)(b)	Carbon dioxide emissions
Standard:	6.2	Building insulation envelope
Comment:		The product can contribute to a roof satisfying these Standards, with reference to clauses, or parts of, 6.1.2[2], 6.1.6[1], 6.2.1[1][2], 6.2.3[1], 6.2.4[1][2], 6.2.5[1][2], 6.2.6[2], 6.2.9[1], 6.2.10[1][2], 6.2.11[1][2] and 6.2.12[2]. See sections 5.2 to 5.5 of this Certificate.
Regulation:	12	Building standards — conversions
Comment:		All comments given for this product under Regulation 9, also apply to this Regulation, with reference to clause 0.12.1[1] and Schedule 6[1].

In addition to the contribution which the product can make to meeting the relevant requirements, the following comments should be noted:

Standard:	2.1	Compartmentation
Standard:	2.2	Separation
Comment:		Junctions between roofs and fire-resisting walls must be fire-stopped, with reference to clauses 2.1.16[2], 2.2.7[2] and 2.2.10[1]. See sections 7.6 and 7.7 of this Certificate.

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

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

Regulation:	B2	Fitness of materials and workmanship
Comment:		The product is acceptable. See section 11 and the *Installation* part of this Certificate.
Regulation:	B3(2)	Suitability of certain materials
Comment:		The product can meet this Regulation. See section 10 of this Certificate.
Regulation:	C5	Condensation
Comment:		The product can enable or contribute to enabling a roof to meet this Regulation. See section 6.1 of this Certificate.
Regulation:	F2(a)(i)	Conservation measures
Comment:		See sections 5.2 to 5.5 of this Certificate.
Regulation:	F3(2)	Target carbon dioxide Emissions Rate
Comment:		The product can contribute to a building meeting its Target Emission Rate. See sections 5.2 to 5.5 of this Certificate.

In addition to the contribution which the product can make to meeting the relevant requirements, the following comments should be noted:

Regulation:	E4(1)(2)(3)(4)	Internal fire spread — Structure
Comment:		Junctions between roofs and fire-resisting walls must be fire-stopped. See sections 7.1, 7.6 and 7.7 of this Certificate.

Construction (Design and Management) Regulations 2007
Construction (Design and Management) Regulations (Northern Ireland) 2007

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

See sections: 2 *Delivery and site handling* (2.1 to 2.3) *and* 13 *Precautions* (13.1 to 13.6)

Non-regulatory Information

NHBC Standards 2007

NHBC accepts the use of Insubond Insulation, when installed and used in accordance with this Certificate, in relation to *NHBC Standards*, Chapter 7.2 *Pitched roofs,* Clauses D10 and D11.

Zurich Building Guarantee Technical Manual 2007

In the opinion of the BBA, Insubond Insulation, when installed and used in accordance with this Certificate, satisfies the requirements of the *Zurich Building Guarantee Technical Manual*, Section 4 *Superstructure*, Sub-section *Pitched roofs*.

General

This Certificate relates to Insubond Insulation, a spray applied insulating polyurethane foam for use in pitched timber roof constructions.

The product is intended to improve the thermal insulation for the installation of a room in the roof space, and should be covered by suitable boards. The product also minimises unwanted air infiltration.

Technical Specification

1 Description

1.1 Insubond Insulation is a spray applied HFC blown, rigid polyurethane foam, for thermal insulation. It is applied to the underside of sarking boards, or a roof tile underlay and built up in layers, not exceeding 20 mm in thickness, to achieve the required level of thermal insulation.

1.2 The foam is prepared from two liquid components, one part by volume of isocyanate to one part by volume of resin mixed within the nozzle of the spray gun during the spraying process. The foam cures within two hours.

1.3 Quality control arrangements on site include checks on density and appearance.

2 Delivery and site handling

2.1 The two components of the product are delivered to site in drums (up to 250 kg capacity) bearing the product name, batch number and the BBA identification mark incorporating a BBA Certificate number.

2.2 Drums should be stored in a well-ventilated area, ideally above 10°C and away from possible ignition sources. The drums must be protected from frost.

2.3 The isocyanate component is classified as 'harmful', under *The Chemicals (Hazard Information and Packaging for Supply) Regulations 2002* (CHIP3) and bear the appropriate hazard warning signs. When cured, the product does not constitute a hazard.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Insubond Insulation.

Design Considerations

3 General

3.1 Insubond Insulation is effective in reducing the U value (thermal transmittance) of roofs of new or existing domestic or similar buildings when used:

- between timber rafters and between and over the underside of rafters of tiled or slated pitched roofs with suitable internal lining boards
- between rafters in pitched roofs and between and over the underside of rafters which enclose a non-habitable and unventilated loft space.

3.2 It is essential that elements are designed and constructed to incorporate normal precautions against moisture ingress before the application of the product.

3.3 New constructions[1] must be designed in accordance with the relevant recommendations of:

- BS 5268-2 : 2002
- BS 5268-3 : 2006
- BS 5534 : 2003
- BS 5250 : 2002.

(1) Further information is given in BRE report (BR 262 : 2002) *Thermal insulation : avoiding risks*.

3.4 Where constructions need to comply with *NHBC Standards* 2007 or *Zurich Building Guarantee Technical Manual* 2007, specifiers should observe the requirements of these documents (see also section 14.2).

3.5 Existing constructions must be in a good state of repair with no evidence of rain penetration or damp. Defects should be made good prior to installing the product.

3.6 The product forms a strong bond with clean and dry substrates. This should be taken into account when specifying the product or anticipating future alterations.

4 Practicability of installation

The product must be installed by operatives trained and approved by the Certificate holder (see section 12).

5 Thermal performance

5.1 Calculations of the thermal transmittance (U value) of specific constructions should be carried out in accordance with BS EN ISO 6946 : 1997 and BRE[1] report (BR 443 : 2006) *Conventions for U-value calculations, using the thermal conductivity* (λ value) of the product as shown in Table 1. Examples of typical U values are given in Table 2.

(1) Building Research Establishment.

Table 1 Thermal conductivity

Thickness (mm)	Thermal conductivity ($Wm^{-1}K^{-1}$)
<80	0.028
80 to 120	0.026
>120	0.025

Table 2 U values

Rafter depth (mm)	Insubond installation thickness (mm)	Timber bridging percentage ($Wm^{-1}K^{-1}$)	(λ value) ($Wm^{-1}K^{-1}$)	U value ($Wm^{-2}K^{-1}$)
150	75	50/600	0.028	0.38
150	120	50/600	0.026	0.25
150	150	50/600	0.025	0.21
200	175	50/600	0.025	0.17
200	200	50/600	0.025	0.16

5.2 The product can contribute to a roof system achieving the following design U values as outlined in the national Building Regulations thus:

England and Wales and Northern Ireland

- 0.16 $Wm^{-2}K^{-1}$ required for 'notional' dwellings in SAP 2005
- 0.25 $Wm^{-2}K^{-1}$ limit average specified in Approved Documents; L1A (Table 2), L2A (Table 4), Technical Booklets F1 (Table 2.2) and F2 (Table 2.4)
- 0.35 $Wm^{-2}K^{-1}$ limit for an individual element specified in Approved Document L1A (Table 2), L2A (Table 4), Technical Booklets F1 (Table 2.2) and F2 (Table 2.4)

Scotland

- 0.16 $Wm^{-2}K^{-1}$ for 'notional' domestic roof required for all fuel packages in Mandatory Standard 6.1, clauses 6.1.6[1] and 6.1.2[1]
- 0.20 $Wm^{-2}K^{-1}$ maximum average specified in Mandatory Standard 6.2, clause 6.2.1[1]
- 0.25 $Wm^{-2}K^{-1}$ maximum average specified in Mandatory Standard 6.2, clause 6.2.1[2]
- 0.35 $Wm^{-2}K^{-1}$ maximum value for an individual roof element specified in Mandatory Standard 6.2, clause 6.2.1[1][2]
- 0.20 $Wm^{-2}K^{-1}$ for extensions as described in Mandatory Standard 6.2, clauses 6.2.9[1] and 6.2.10[2].

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

5.3 Where a proposed roof U value is not better than (or is greater than in Scotland) the relevant 'notional' value specified in section 5.2, additional energy saving measures will be required in the building envelope and/or services to achieve the required overall carbon dioxide emission rate reduction of about 20% in dwellings (18% to 25% in Scotland) and 23% to 28% in buildings other than dwellings.

5.4 Compliance with the guidance referred to in section 5.5 will allow the use of the default psi values from Table 3 of BRE Information Paper IP/06 *Assessing the effects of thermal bridging at junctions and around openings* and Table K1 of *The Government's Standard Assessment Procedure for Energy rating of Dwellings* (SAP 2005), in Target Emission Rate calculations to SAP 2005 or the Simplified Building Energy Model (SBEM).

5.5 The product can maintain or contribute to maintaining continuity of thermal insulation at junctions between roof and the other building elements. Guidance in this respect, and on limiting heat loss by air infiltration, can be found in:

England and Wales — *Limiting thermal bridging and air leakage: Robust construction details for dwellings and similar buildings* TSO 2002 or Accredited Construction Details (version 1.0)

Scotland — Accredited Construction Details (Scotland)
Northern Ireland — Accredited Construction Details (version 1.0).

6 Condensation risk

Interstitial condensation

6.1 The unfaced product has a water vapour resistivity of 140 $MNsg^{-1}m^{-1}$). Particular constructions should be assessed in accordance with BS 5250 : 2002 to ascertain whether a vapour control layer is required on the warm side of the insulation.

6.2 Care should be taken to provide adequate ventilation, particularly in rooms expected to experience high humidities, and to ensure the integrity of vapour control layers (where installed) and linings, against vapour ingress.

6.3 For unventilated (non-habitable) roof spaces with insulation in the pitch of the roof it is essential that the movement of moisture from the occupied space below by diffusion and by convection is restricted, as follows:

- providing the means to remove it at source
- providing a well sealed ceiling in accordance with BS 5250 : 2002
- installing an effective sealed vapour control layer
- covering of water tanks in the loft space.

Surface condensation

6.4 The risk of surface condensation will be adequately limited when the thermal transmittance (U value) does not exceed 0.35 $Wm^{-2}K^{-1}$ at any point and the junctions with walls are designed in accordance with section 5.5.

6.5 The risk of surface condensation will be adequately limited when the thermal transmittance (U value) does not exceed 1.2 $Wm^{-2}K^{-1}$ at any point. Guidance may be obtained from Section 8 of BS 5250 : 2002 and BRE report (BR 262 : 2002).

7 Properties in relation to fire

7.1 The internal face of the product achieved a Class 1 surface spread of flame rating when tested in accordance with BS 476-7 : 1997.

7.2 The product must be protected from naked flames and other ignition sources during and after installation (see also sections 9.2 and 9.3.)

7.3 When installed, the product will be contained by a suitable lining board, eg 12.5 mm plasterboard, with joints fully sealed and supported by rafters or battens. Therefore, it will not contribute to the development stages of a fire or present a smoke or toxic hazard until the lining is compromised. Alternatively, the rafters may remain exposed, but the foam could then contribute to the development stages of a fire. In order to minimise this risk, the foam must receive a suitable paint or bonding plaster coating. However, 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.

7.4 The use of the product will not affect the external fire rating of a slated or tiled roof when evaluated by assessment or test to BS 476-3 : 2004.

7.5 The product must not be carried over junctions between roofs and walls required to provide a minimum period of fire resistance.

General

7.6 Care must be taken to ensure continuity of fire resistance at junctions with fire resisting elements, in accordance with the relevant provisions of the national Building Regulations.

7.7 Roofs must incorporate cavity barriers at edges, around openings, at junctions with fire resisting elements and in extensive cavities in accordance with the relevant provisions of the national Building Regulations and relevant purpose group. The design and installation of cavity barriers must take into account any anticipated differential movement.

8 Proximity of flues and appliances

When installing the product in close proximity to certain flue pipes and/or heat producing appliances, the relevant provisions of the national Building Regulations are acceptable:

England and Wales — Approved Document J

Scotland — Mandatory Standard 3.19, clauses 3.19.1[(1)(2)] to 3.19.9[(1)(2)]

(1) Technical Handbook (Domestic).
(2) Technical Handbook (Non-Domestic).

Northern Ireland — Technical Booklet L.

9 Materials in contact — Wiring installations

9.1 The product is compatible with materials in contact.

9.2 De-rating of electric cables should be considered in areas where the product restricts the flow of air. Where the foam is likely to bond to electric cables, suitable conduit or trunking should be used.

9.3 Where recessed lighting is used, provision should be made to prevent the fitting overheating, (ie ventilated fittings used).

10 Maintenance

The product, once installed, does not require any regular maintenance and it has suitable durability (see section 11).

11 Durability

The durability of the product is satisfactory and will have a life equivalent to that of the structure in which it is incorporated.

Installation

12 Approved Installers

The Certificate holder operates an Approved Installer Scheme(1) for this product, under which the installers are approved, registered and regularly reviewed by the Certificate holder to demonstrate that they are competent to carry out installation of the product in accordance with this Certificate. Details of Approved Installers are available from the Certificate holder. Approved Installers are responsible for each installation of the product that they undertake.

(1) The Certificate holder's records relating to their Approved Installer Scheme will be audited annually by the BBA as part of its programme of surveillance.

13 Precautions

13.1 Insubond Insulation process may produce a build-up of harmful vapours. It is required that all personnel in the area for treatment wear the correct protective clothing, breathing equipment and gloves. The Certificate holder's instructions must be followed at all times.

13.2 Vapours given off by certain components of the system, ie 4,4' diphenylmethane diisocyanate (MDI), are generally heavier than air and will tend to move to lower parts of the building. These parts should be suitably ventilated.

13.3 If vapour levels need to be measured, methods should be those recommended by the Health and Safety Executive. Certain applications, ie confined roofs, require the use of extractor fans as recommended by the Certificate holder.

13.4 To comply with the requirements of Section 4 of the Health and Safety at Work Act 1974, it is essential that there is an exchange of information between the client and the installer before spray operations commence on any site. Existing health hazards at the premises and those likely to be brought into the client's environment by the Certificate holder should be discussed and measures agreed to deal with them effectively.

13.5 After installation in loft voids, fire warning labels are placed in prominent positions if the foam is to be left exposed. The foam is a combustible material; adequate precautions should be taken to avoid ignition at all times.

13.6 To prevent the product from entering the occupied space, the loft hatch/cover must be kept closed during the spraying process. Protective covers must be placed over water tanks to prevent contamination during application, and should not be removed until sufficient time has elapsed for potentially harmful vapours to be ventilated from the roof space.

14 Procedure

General

14.1 Building elements to be insulated should be assessed as suitable and any necessary repairs carried out. The positioning and access to services should also be considered.

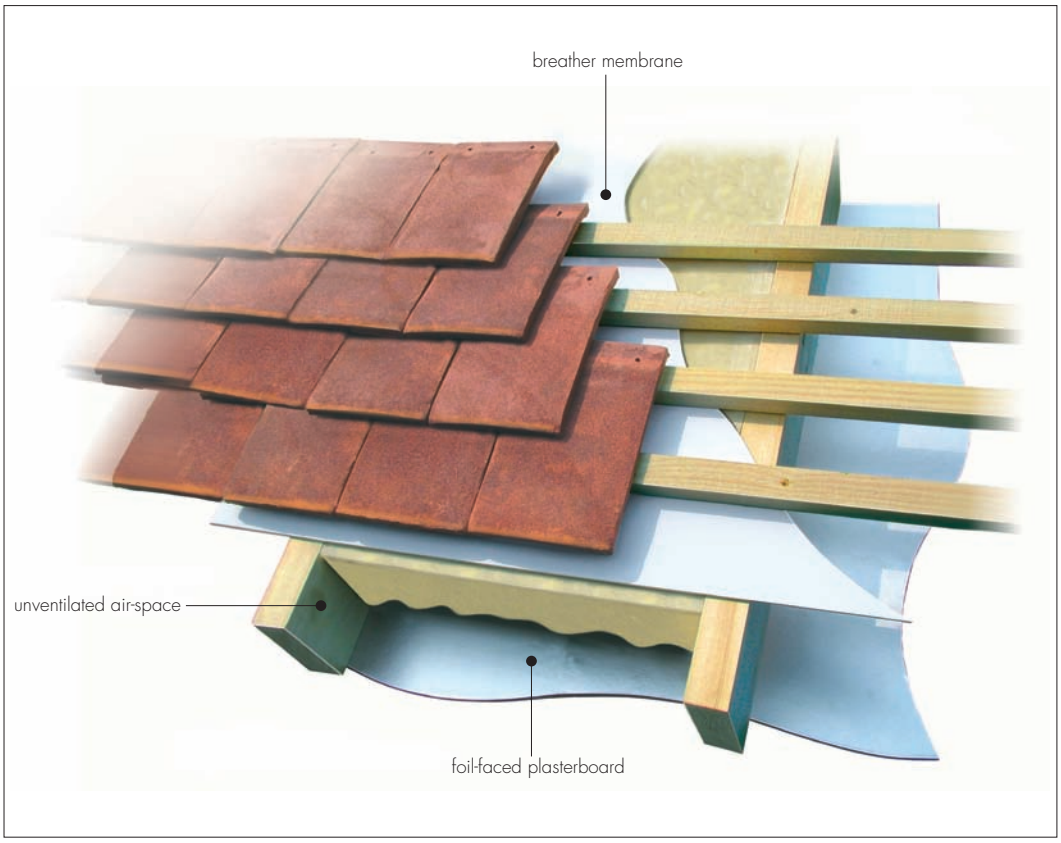
14.2 To satisfy the requirements of NHBC and Zurich Building Guarantee, a vapour control layer must be applied behind the plasterboard lining and the product must only be applied to a roof construction incorporating a breathable roof tile underlay.

Between rafters (see Figure 1)

14.3 The product should be spray applied to clean and dry substrates in a flash coat, <10 mm thick and when sprayed to a roof tile underlay, care must be taken to ensure the integrity of the drape. Once the reaction has taken place and the surface is hard the next layer is applied in a thickness not exceeding 20 mm thick and allowed to cure.

14.4 Subsequent layers not exceeding 20 mm thick are applied until the required total thickness is achieved.

Figure 1 Typical application



Between and below rafters

14.5 Cross-battens are mechanically fixed to the rafters. The battens must be of sufficient thickness and spacing (up to 600 mm) to provide adequate support to which the plasterboard can be mechanically fixed. The foam is spray applied to the depth of the battens as in section 14.3 and 14.4.

Technical Investigations

15 Investigations

15.1 An examination of Insubond Insulation was made of independent data relating to:

- thermal conductivity
- behaviour in relation to fire
- water vapour permeability.

15.2 A theoretical analysis of the hygrothermal behaviour of various constructions incorporating the product was carried out.

15.3 The methods adopted for quality control, relating to incoming materials and the installed product, were examined and found to be satisfactory.

Bibliography

BS 476-3 : 2004 *Fire tests on building materials and structures — Classification and method of test for external fire exposure to roofs*
BS 476-7 : 1997 *Fire tests on building materials and structures — Method of test to determine the classification of the surface spread of flame of products*

BS 5250 : 2002 *Code of practice for control of condensation in buildings*

BS 5268-2 : 2002 *Structural use of timber — Code of practice for permissible stress design, materials and workmanship*
BS 5268-3 : 2006 *Structural use of timber — Code of practice for trussed rafter roofs*

BS 5534 : 2003 *Code of practice for slating and tiling (including shingles)*

BS EN ISO 6946 : 1997 *Building components and building elements — Thermal resistance and thermal transmittance — Calculation method*

16 Conditions

16.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is granted only to the company, firm or person named on the front page — no other company, firm or person may hold or claim any entitlement to this Certificate
- is valid only within the UK
- has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English law.

16.2 References in this Certificate to any Act of Parliament, Statutory Instrument, Directive or Regulation of the European Union, British, European or International Standard, Code of Practice, manufacturers' instructions or similar publication, are references to such publication in the form in which it was current at the date of this Certificate.

16.3 This Certificate will remain valid for an unlimited period provided that the product/system and the manufacture and/or fabrication including all related and relevant processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

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

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product/system or any other product/system
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product/system
- individual installations of the product/system, including the nature, design, methods and workmanship of or related to the installation
- the actual works in which the product/system is installed, used and maintained, including the nature, design, methods and workmanship of such works.

16.5 Any information relating to the manufacture, supply, installation, use and maintenance of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used and maintained. It does not purport in any way to restate the requirements of the Health & Safety at Work etc Act 1974, or of any other statutory, common law or other duty which may exist at the date of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care. In granting this Certificate, the BBA does not accept responsibility to any person or body for any loss or damage, including personal injury, arising as a direct or indirect result of the manufacture, supply, installation, use and maintenance of this product/system.

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