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Agrément Certificate  
No 90/2548

### TYVEK CONSTRUCTION MEMBRANES

### PRODUCT SHEET 3 — TYVEK REFLEX INSULATING BREATHER MEMBRANE

#### PRODUCT SCOPE AND SUMMARY OF CERTIFICATE

This Certificate relates to the TYVEK Reflex Insulating Breather Membrane, a low emissivity, insulating, breather membrane.

#### AGRÉMENT CERTIFICATION INCLUDES:

- factors relating to compliance with UK 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

**Weathertightness** — the product will contribute to protecting a wall against water penetration (see section 5).

**Thermal insulation** — the product can contribute to limiting heat loss through a wall (see section 6).

**Risk of condensation** — the product has a low resistance to water vapour transmission and will reduce the risk of interstitial condensation (see section 7).

**Strength** — the product has adequate strength to resist damage during the construction of the wall (see section 8).

**Durability** — the product will have a service life comparable to other similar elements of construction, eg vapour control layers (see sections 5.2 and 10).

The BBA has awarded this Agrément Certificate for the TYVEK Reflex Insulating Breather Membrane to DuPont de Nemours (Luxembourg) S.à r.l. 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  
— Materials

Chief Executive

Date of First issue: 27 September 2004

Date of Third issue: 8 April 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](http://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, the TYVEK Reflex Insulating Breather Membrane, 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(b)	Resistance to moisture
Comment:		The product will contribute to a wall meeting this Requirement. See section 5.1 of this Certificate.
Requirement:	C2(c)	Resistance to moisture
Comment:		The product can contribute to limiting the risk of interstitial condensation. See sections 7.1 to 7.3 of this Certificate.
Requirement:	L1(a)(i)	Conservation of fuel and power
Comment:		See sections 6.1 and 6.2 of this Certificate.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The product is acceptable. See section 10 and the <i>Installation</i> part of this Certificate.



## The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)(2)	Fitness and durability of materials and workmanship
Comment:		The product satisfies the requirements of this Regulation. See sections 9 and 10 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards – construction
Standard:	3.10	Precipitation
Comment:		The product will contribute to a wall satisfying clauses 3.10.1 <sup>(1)(2)</sup> and 3.10.5 <sup>(1)(2)</sup> of this Standard. See section 5.1 of this Certificate.
Standard:	3.15	Condensation
Comment:		The product can contribute to limiting the risk of interstitial condensation, with reference to clauses 3.15.1 <sup>(1)</sup> and 3.15.4 <sup>(1)</sup> of this Standard. See sections 7.1 to 7.3 of this Certificate.
Standard:	6.1(b)	Carbon dioxide emissions
Standard:	6.2	Building insulation envelope
Comment:		See sections 6.1 and 6.2 of this Certificate, with reference to clauses 6.1.6 <sup>(1)</sup> , 6.2.1 <sup>(1)(2)</sup> , 6.2.3 <sup>(1)</sup> and 6.2.4 <sup>(2)</sup> .
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 <sup>(1)(2)</sup> and Schedule 6 <sup>(1)(2)</sup> . (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 10 and the <i>Installation</i> part of this Certificate.
Regulation:	B3(2)	Suitability of certain materials
Comment:		The product is acceptable. See section 9 of this Certificate.
Regulation:	C4(b)	Resistance to ground moisture and weather
Comment:		The product will contribute to a wall satisfying this Regulation. See section 5.1 of this Certificate.
Regulation:	C5	Condensation
Comment:		The product can contribute to limiting the risk of interstitial condensation. See sections 7.1 to 7.3 of this Certificate.
Regulation:	F2(a)(i)	Conservation measures
Regulation:	F3(2)	Target carbon dioxide Emission Rate
Comment:		See sections 6.1 and 6.2 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 section: 1 *Description* (1.2).

## Non-regulatory Information

### NHBC Standards 2007

NHBC accepts that, the TYVEK Reflex Insulating Breather Membrane, when installed and used in accordance with this Certificate, as meeting Technical Requirement R3 in relation to *NHBC Standards*, Chapter 6.2 *External timber framed walls*.

## Zurich Building Guarantee Technical Manual 2007

In the opinion of the BBA, the TYVEK Reflex Insulating Breather Membrane, when installed and used in accordance with this Certificate, satisfies the relevant requirements of the *Zurich Building Guarantee Technical Manual, Section 4 Superstructure, Sub-section External walls – timber frame*.

### General

This Certificate relates to the TYVEK Reflex Insulating Breather Membrane, a low emissivity, insulating, breather membrane.

The product has a high vapour permeability, reduces the risk of condensation and is suitable for timber-frame constructions, either factory or site applied.

The product reduces the U value (thermal transmittance) of walls by inhibiting radiant heat transfer across the cavity and reduces solar heat gain by reflection.

TYVEK is a registered trademark of DuPont de Nemours (Luxembourg) S.à r.l.

### Technical Specification

#### 1 Description

1.1 The TYVEK Reflex Insulating Breather Membrane is a high thermal efficiency insulating breather membrane and comprises a spunbonded polyethylene membrane, metalised and lacquered on one face for use as a radiant barrier in walls.

1.2 The product has the nominal characteristics of:

Thickness (mm)	0.25
Weight (gm <sup>-2</sup> )	85
Roll length (m)	100
Roll width (m)	0.48, 1.5, 2.4, 2.7
Tensile strength [N(50 mm) <sup>-1</sup> ]	
longitudinal	250
transverse	250
Elongation at break (%) <sup>(1)</sup>	
longitudinal	16.5
transverse	20.0
Hydrostatic head (cm of H <sub>2</sub> O)	>200
Vapour resistance (MNsg <sup>-1</sup> )	0.6 <sup>(2)</sup>
Colour	silver top side/white underside with red logo

(1) Minimum.

(2) BBA measured vapour resistance results in the range of 0.4 MNsg<sup>-1</sup> to 0.9 MNsg<sup>-1</sup>.

1.3 TYVEK SD2 Air Leakage Barrier/Vapour Control Layer, can be used in conjunction with this product. See Product Sheet 4 of this Certificate.

1.4 Ancillary items for use with the product include:

- TYVEK Acrylic Tape — a single-sided tape for sealing joints
- TYVEK Butyl Tape — a double-sided tape for sealing joints.

1.5 Quality control includes visual inspection, measurement of physical properties, thickness and roll weight.

#### 2 Delivery and site handling

2.1 The membrane is delivered to site in rolls with paper wrappings bearing the marketing company's name, the grade identification, the technical specifications, installation instructions and the BBA identification mark incorporating the number of this Certificate.

2.2 Rolls should be stored on their side, on a smooth, clean surface, under cover and protected from sunlight.

### Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on the TYVEK Reflex Insulating Breather Membrane.

## 3 General

- 3.1 The TYVEK Reflex Insulating Breather Membrane is suitable for timber-frame constructions, either factory or site applied.
- 3.2 In the absence of other guidance, suitable timber frame constructions are defined as those designed and built in accordance with *NHBC Standards*, Chapter 6.2.
- 3.3 The product meets the NHBC requirements for minimum water penetration resistance and minimum tear resistance in any direction when dry or wet, for sites defined as Very Severe exposure.
- 3.4 The product is effective in reducing the U value (thermal transmittance) of timber-framed walls and will allow a wall with 89 mm deep studs to meet the elemental U values required by Part L of the Building Regulations.
- 3.5 The product is breathable and will limit the risk of condensation within the timber-frame wall structure.
- 3.6 The membrane may be damaged by high winds, careless handling or by vandalism and should not be left uncovered for longer than is absolutely necessary. Any damaged areas should be repaired using or replaced before completion in accordance with section 14.

## 4 Practicability of installation

The product can be installed easily by operatives experienced with this type of product.

## 5 Weathertightness



5.1 The product resists liquid water penetration and wind-blown snow and will protect the sheathing and frame from external moisture (see section 15, Table for *Physical properties*).

5.2 The period prior to the installation of the brickwork should be kept to a minimum. The membranes should not be used as a temporary waterproof covering during this time.

## 6 Thermal insulation



6.1 Calculations of the thermal transmittance (U value) of specific external wall constructions should be carried out in accordance with BS EN ISO 6946 : 1997 and BRE<sup>(1)</sup> report (BR 443 : 2006 *Conventions for U-value calculations*, using an emissivity value of 0.15. Alternatively, a thermal resistance of 0.540 m<sup>2</sup>kW<sup>-1</sup> may be used if the product faces a 50 mm cavity<sup>(2)</sup> as tested by BRE.

- (1) Building Research Establishment.
- (2) When tested by BRE, the TYVEK Reflex Insulating Breather Membrane, when incorporated into the cavity of a conventional construction comprising 12.5 mm plasterboard, 250 µm polyethylene vapour control layer, 89 mm studs (10.4% timber) and 100 mm mineral wool insulation [compressed to 89 mm ( $\lambda = 0.037 \text{ Wm}^{-1}\text{K}^{-1}$ )], 12 mm OSB sheathing, TYVEK Reflex Insulating Breather Membrane within a 50 mm cavity with 102.5 mm brick leaf.

6.2 The product can maintain or contribute to maintaining continuity of thermal insulation at junctions between the external wall 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 and the Accredited Construction Details (version 1.0)

**Scotland** — Accredited Construction Details (Scotland).

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

## 7 Risk of condensation



7.1 The risk of condensation occurring within the wall of a timber-frame building will depend upon the properties and vapour resistance of other materials used in the construction, the internal and external conditions and the effectiveness of the internal vapour check.

7.2 Vapour resistance test results indicate a range of values for the membrane of between 0.4 to 0.9 MNsg<sup>-1</sup>, the BBA recommend that a value of 0.9 MNsg<sup>-1</sup> be used for design purposes. The risk of interstitial condensation is equivalent to, or less than, that attending walls incorporating a conventional breather membrane meeting criteria to BS 4016 : 1997 (see also section 7.4 and section 15 Table for *Physical properties*).

7.3 Conventional timber-frame walls designed in accordance with BS 5250 : 2002 and incorporating the product will adequately avoid the risk of condensation.

7.4 The product has additional insulating value, see section 6.1, and will maintain the frame sheathing at a higher temperature than for the same construction incorporating a conventional breather membrane. This will in turn assist in limiting the risk of interstitial condensation arising from breaches/imperfections in the vapour control layer in the wall's internal lining. However, it must not be relied upon as an alternative to conventional good practice for maintaining integrity of the vapour control layer.

7.5 The product, although metalised, remains microporous and, therefore, highly vapour open. For this reason it can be used in timber-frame construction installed on sheathing as a direct replacement of traditional breather membrane.

7.6 Convective water transfer into the wall construction can be reduced by installing a continuous airtight sheet such as TYVEK SD2 behind the internal lining. This may also contribute to a successful pressure test by achieving the required design air permeability of  $10 \text{ m}^3\text{h}^{-1}\text{m}^{-2}$  in accordance with Approved Document L (see section 13.3 of this Certificate).

## 8 Strength

8.1 The product will resist the loads associated with construction and installation into timber-frame constructions.

8.2 The product is not adversely affected by water and will retain its properties when wet (see section 15, Table for *Physical properties* and section 15.2).

## 9 Properties in relation to fire

9.1 The product will have similar properties to polyolefin membranes in relation to fire, tending to burn and shrink away from the heat source. The product is unclassifiable in terms of the Building Regulations and this should be considered when assessing the overall fire risk.

9.2 Cavity barriers should be used to satisfy the requirements of the national Buildings Regulations.

## 9 Maintenance



As the product is confined within a wall construction it has suitable durability (see section 10), maintenance is not required.

## 10 Durability



The TYVEK Reflex Insulating Breather Membrane will be unaffected by the normal conditions found in a timber-frame wall and will have a life comparable with other elements of construction (such as vapour checks).

# Installation

## 11 General

TYVEK Reflex Insulating Breather Membrane must be installed in accordance with the marketing company's instructions and the recommendations given in *NHBC Standards*, Chapter 6.2, where appropriate.

## 13 Procedure

### Lapping and jointing

13.1 The membrane should be fixed with the silver side facing the brick leaf and in such a way as to shed water away from the sheathing, and below the lowest timber. Upper layers should be lapped over lower layers.

13.2 Horizontal laps should be at least 100 mm and vertical laps 150 mm. Vertical laps should be staggered wherever possible (see Figure 1).

13.3 To assist in achieving the design air permeability the lap joints and penetrations through the underlay can be sealed with TYVEK Acrylic Tape or TYVEK Butyl Tape.

### Fixing

13.4 The membrane must be secured at regular intervals with nails and staples to prevent damage by wind (see Figures 2, 3 and 4).

Figure 1 Laps (dimensions in mm)

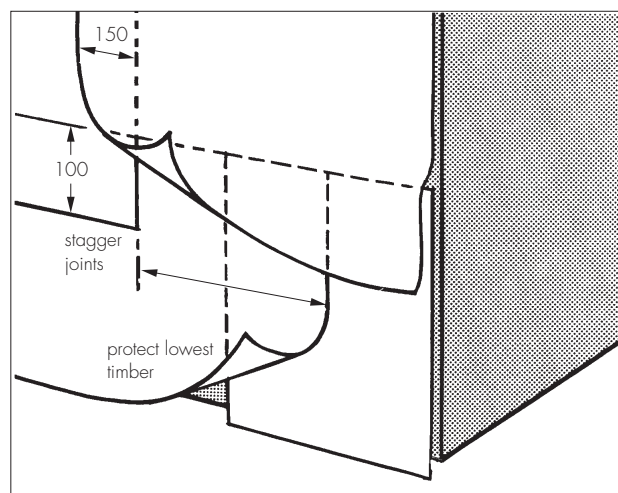


Figure 2 Factory method of installation on timber frame panel

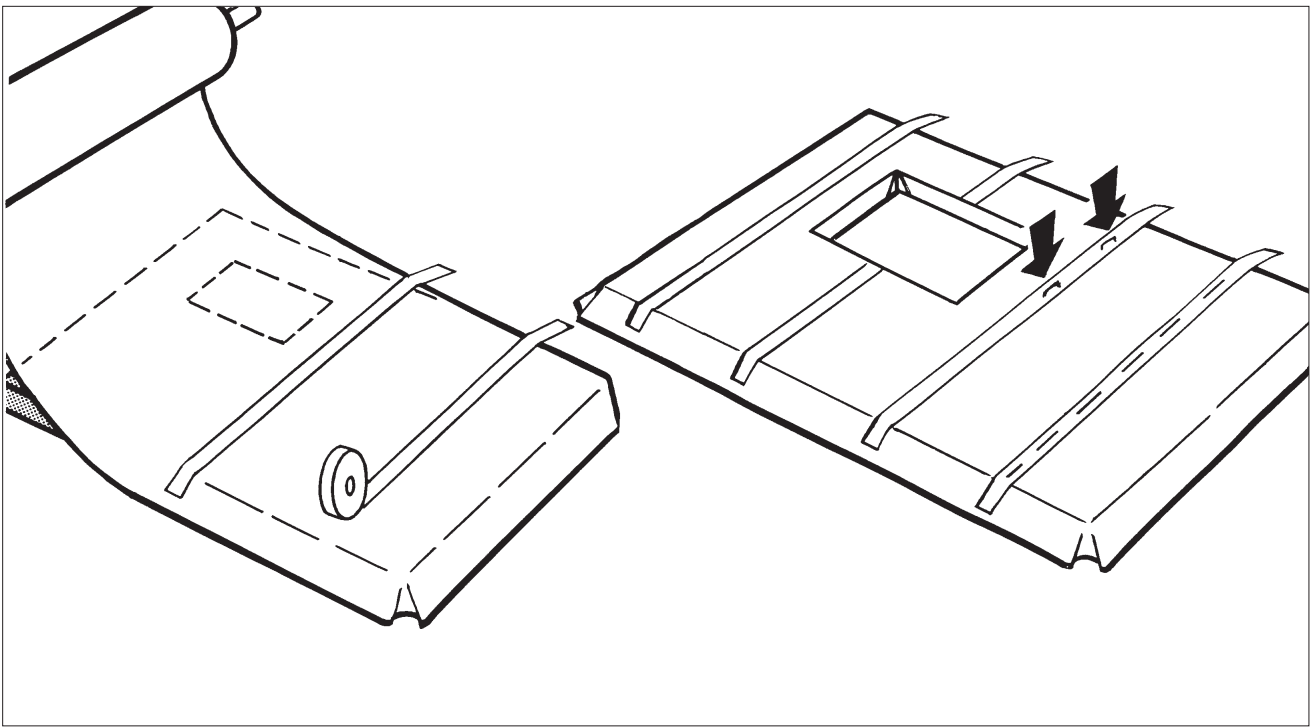


Figure 3 Site installation — external corner

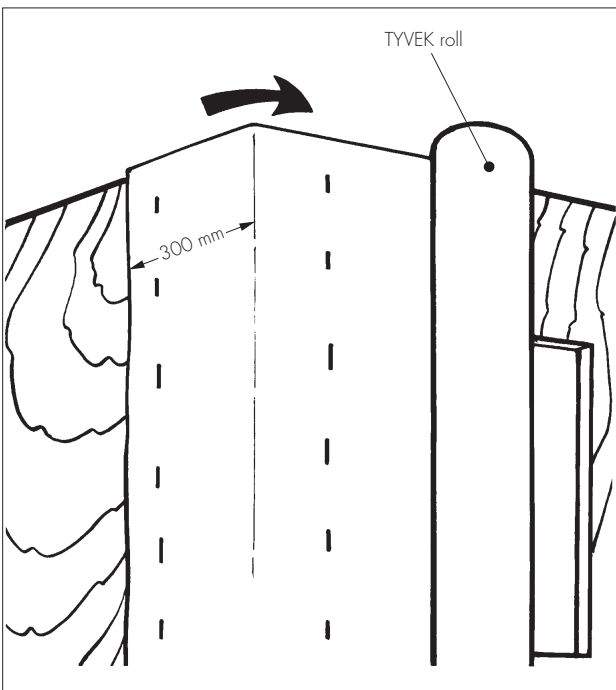
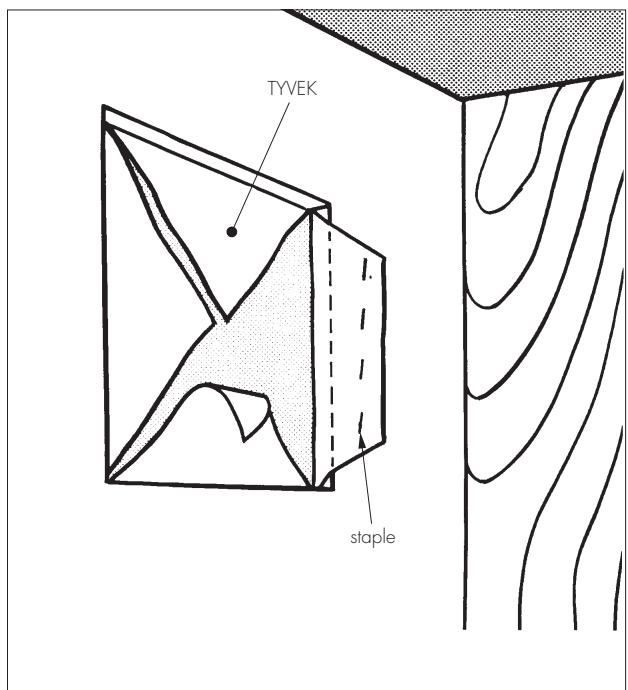


Figure 4 Site installation — opening



13.5 Nails should be galvanized or sherardized mild steel, austenitic stainless steel, phosphor bronze or silicon bronze and staples should be of austenitic stainless steel.

#### Marking stud positions

13.6 It is essential that the positions of studs are marked to enable wall tie fixing.

#### Lowest timbers

13.7 It is essential that the lowest timbers in the wall are protected by the breather membrane.

## 14 Repair

Damage to the membrane can be repaired prior to the installation of the external walls or cladding by laying another sheet over the damaged area and sealing it correctly ensuring water is shed away from the sheathing.

## 15 Tests

15.1 Samples of the TYVEK Reflex Insulating Breather Membrane were obtained from the company for testing. The results of the tests carried out by, or on behalf of, the BBA show typical results for the materials and are summarised in Table 1.

Table 11 Physical properties

Tests (units)	Mean result	Method <sup>(1)</sup>
Water vapour permeability ( $\text{gm}^{-2}\text{day}^{-1}$ )	284	BS 3177 (25°C/75% RH)
Vapour resistance (dry cup) ( $\text{MNsg}^{-1}$ )	0.72	BS 3177 (25°C/75% RH)
Vapour resistance (wet cup) ( $\text{MNsg}^{-1}$ )	0.58	BS 7374, Test 3 (23°C/95%–50% RH)
Mullen Burst strength ( $\text{kNm}^{-2}$ )	870	BS 3137
1 metre head of water	pass	MOAT 27 : 5.1.4.2
Resistance to water penetration (Eosin Test)	pass	BS 4016

(1) The test documents are detailed in the *Bibliography*. Numbers in the table refer to the sections/parts of the documents.

15.2 The following tests were carried out on a product of similar specification:

- tensile strength
- elongation
- resistance to tear (nail)
- resistance to tear (trouser)
- UV ageing
- heat ageing
- water soak.

## 16 Investigations

16.1 The risk of interstitial condensation in a range of typical wall constructions was successfully evaluated.

16.2 An examination was made of independent data covering U values and risk of interstitial condensation of completed wall constructions.

16.3 The effect of heat and UV ageing was evaluated.

16.4 The methods of quality control were examined and details obtained of the quality and composition of the materials used.

## Bibliography

BS 3137 : 1972 *Methods for determining the bursting strength of paper and board*

BS 3177 : 1959 *Method for determining the permeability to water vapour of flexible sheet materials used for packaging*

BS 4016 : 1972 *Specification for building papers (breather type)*

BS 4016 : 1997 *Specification for flexible building membranes (breather type)*

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

BS 7374 : 1990 *Methods of test for water vapour transmission resistance of board materials used in buildings*

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

MOAT No 27 : 1983 *General Directive for the Assessment of Roof Waterproofing Systems*

## 17 Conditions

17.1 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.

17.2 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.

17.3 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.

17.4 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.

17.5 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.