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Agrément Certificate

97/3337

Product Sheet 1

RAWELL WATERPROOFING SYSTEM

RAWMAT HDB WATERPROOFING SYSTEM

This Agrément Certificate Product Sheet⁽¹⁾ relates to the Rawmat⁽²⁾ HDB Waterproofing System, based on composite membranes incorporating pre-hydrated sodium bentonite, for use in waterproofing and damp-proofing underground structures.

(1) Hereinafter referred to as 'Certificate'.

(2) Rawmat is a registered trademark of Rawell Group Holdings Ltd.

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

Resistance to water and water vapour — the system provides an effective barrier to the passage of liquid water and water vapour from the ground (see section 6).

Resistance to mechanical damage — the membranes are resistant to damage and have the ability to self-heal if punctured (see section 7).

Durability — when fully protected, the system provides an effective barrier to the transmission of moisture for the life of the structure in which it is incorporated (see section 11).



The BBA has awarded this Certificate to the company named above for the system described herein. This system 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 Third issue: 14 August 2018

John Albon – Head of Approvals
Construction Products

Claire Curtis-Thomas
Chief Executive

Originally certificated on 26 February 1997

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.

Any photographs are for illustrative purposes only, do not constitute advice and should not be relied upon.

British Board of Agrément

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Regulations

In the opinion of the BBA, the Rawmat HDB Waterproofing System, 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:		Application of the system will not adversely affect a structure's ability to transmit loadings and will satisfy this Requirement. See section 9 of this Certificate.
Requirement:	C2(a)	Resistance to moisture
Comment:		The system, including joints, will enable a structure to satisfy this Requirement. See section 6 of this Certificate.
Regulation:	7	Materials and workmanship
Comment:		The system is acceptable. See section 11 and the <i>Installation</i> part of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)	Durability, workmanship and fitness of materials
Comment:		The system can contribute to a construction satisfying this Regulation. See section 11 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards applicable to construction
Standard:	1.1(a)(b)	Structure
Comment:		Application of the system will not adversely affect a structure's ability to transmit loadings, with reference to clause 1.1.1 ⁽¹⁾⁽²⁾ of this Standard. See section 9 of this Certificate.
Standard:	3.4	Moisture from the ground
Comment:		The system, including joints, will enable a structure to satisfy clauses 3.4.1 ⁽¹⁾⁽²⁾ , 3.4.2 ⁽¹⁾⁽²⁾ , 3.4.5 ⁽¹⁾⁽²⁾ , 3.4.6 ⁽¹⁾⁽²⁾ and 3.4.7 ⁽¹⁾⁽²⁾ of this Standard. See section 6 of this Certificate.
Standard:	7.1(a)	Statement of sustainability
Comment:		The system can contribute to meeting the relevant requirements of Regulation 9, Standards 1 to 6 and therefore will contribute to a construction meeting a bronze level of sustainability as defined in this Standard.
Regulation:	12	Building standards applicable to conversions
Comment:		All comments given for the system 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)	Fitness of materials and workmanship
Comment:	(iii)(b)(i)	The system is acceptable. See section 11 and the <i>Installation</i> part of this Certificate.
Regulation:	28(a)	Resistance to ground moisture and weather
Comment:		The system, including joints, will enable a structure to satisfy the requirements of this Regulation. See section 6 of this Certificate.

Regulation:	30	Stability
Comment:		Application of the system will not adversely affect a structure's ability to transmit loadings and will satisfy the requirements of this Regulation. See section 9 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: 3 *Delivery and site handling* (3.1 and 3.3 to 3.7) of this Certificate.

Technical Specification

1 Description

1.1 The Rawmat HDB Waterproofing System is based on three membranes, Rawmat HDB Type S, Rawmat HDB Type P and Rawmat HDB Slabseal, consisting of pre-hydrated high-density bentonite. The membranes are nominally 6 mm thick and include a nominal 4.6 mm central core of the pre-hydrated high-density bentonite.

1.2 The membranes have the following characteristics:

- Rawmat HDB Type S — the face side is finished with a woven polypropylene fabric, with air-textured multi-filament yarns, of nominal mass per unit area of $118 \text{ g}\cdot\text{m}^{-2}$. The reverse side is finished with a polyester scrim with a nominal mass per unit area of $17 \text{ g}\cdot\text{m}^{-2}$. The membranes are available in rolls of 1 x 5 m and 2 x 30 m
- Rawmat HDB Slabseal — the face side is finished with a black polyethylene/non-woven polypropylene composite with a total nominal mass per unit area of $200 \text{ g}\cdot\text{m}^{-2}$. The reverse side is finished with a polyester scrim with a nominal mass per unit area of $17 \text{ g}\cdot\text{m}^{-2}$. The membranes are available in rolls of 1 x 5 m and 2 x 30 m
- Rawmat HDB Type P — the face side is finished with a woven polypropylene fabric, with air-textured multi-filament yarns, of nominal mass per unit area of $118 \text{ g}\cdot\text{m}^{-2}$. The reverse side is finished with a non-woven polypropylene with a nominal mass per unit area of $210 \text{ g}\cdot\text{m}^{-2}$. The membranes are available in rolls of 1 x 5 m and 2 x 50 m.

1.3 Ancillary components used in the system are:

- Rawseal TR35 and RC50 — flexible pre-hydrated bentonite strips with triangular (TR35) and rectangular (RC50) cross-sections, for use as fillets and/or void fillers in conjunction with Rawmat HDB membranes
- Rawpaste Mastic — a trowelling-grade mastic, based on hydrated bentonite, designed for use with the membranes to provide a waterproof seal at surface irregularities and at gaps around service entries. It can also be used to temporarily hold the membrane against vertical concrete surfaces
- Rawmat Washer Fixings — 30 mm diameter washers with a 40 mm needle point steel nail, for fixing the membrane to concrete or wood shuttering
- Rawtape 100 — a clear, cross-weave glassfibre-reinforced tape coated with a synthetic rubber adhesive, used to cover overlaps on Rawmat HDB Slabseal installations. The tape is supplied in rolls 100 mm x 50 m.

2 Manufacture

2.1 Rawmat HDB membranes are manufactured in a controlled continuous process, in which sodium bentonite is hydrated and extruded between the geotextile facing sheets. The resulting laminate is cut to length and reeled into rolls.

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 Rawell Environmental Ltd has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2015 by BSI (Certificate FM 511903).

3 Delivery and site handling

3.1 The membranes are supplied in rolls in the sizes detailed in Table 1. Each roll contains a minimum bentonite weight of 7.5 kg·m⁻².

<i>Table 1 Rawell HDB membranes — packaging sizes and roll weights</i>				
Type	Roll size (m)	Nominal weight (kg)	Rolls per pallet	Nominal weight per pallet (kg)
S	1 x 5	43	30	1350
	2 x 30	530	—	—
Slabseal	1 x 5	43	30	1350
	2 x 30	530	—	—
P	1 x 5	44	25	1,150
	2 x 50	860	—	—

3.2 The 1 m wide rolls are supplied wrapped in polythene to protect them from drying out. They must be stored in the original packaging, protected from liquid water and direct sunlight and protected from risk of mechanical damage.

3.3 The 2 m wide rolls are supplied wrapped in polythene and protected with hardboard. They should only be moved using a lifting bar with chains, incorporating a spreader bar to prevent damage to the ends of the rolls. Details of suitable lifting equipment are available from the Certificate holder.

3.4 Rawseal TR35 and RC50 are supplied in 1 m lengths wrapped in plastic film and packed in cardboard boxes. Packaging details and weights are given in Table 2.

<i>Table 2 Rawseal TR35 and RC50 packaging quantities and weights</i>				
Product	Lengths per box	Boxes per pallet	Weight per box (kg)	Weight per pallet (kg)
TR35	18	56	24	1350
RC50	10	56	22	1250

3.5 Rawpaste Mastic is supplied in 10 kg plastic buckets (48 buckets per pallet) or 20 kg plastic buckets (36 buckets per pallet).

3.6 Rawtape 100 is supplied in 100 mm x 50 m rolls.

3.7 The system components are not classified as hazardous under the *Classification, Labelling and Packaging of Substances and Mixtures (CLP Regulations) 2009*, however, they may present a slip hazard.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on the Rawmat HDB Waterproofing System.

4 Use

4.1 The Rawmat HDB Waterproofing System, when used with a minimum of 150 mm of properly designed concrete, is satisfactory for use as a Type A waterproofing protection as defined in BS 8102 : 2009 for the waterproofing of new structures, and as a damp-proofing membrane for solid floors in accordance with the relevant clauses of CP 102 : 1973 Section 3. Concrete structures must be designed in accordance with BS EN 1992-3 : 2006.

4.2 The system can be used externally on concrete to provide an effective barrier to the transmission of liquid water where Grades 1 to 3 waterproofing protection are required, as defined in Table 2 of BS 8102 : 2009.

4.3 Where Grade 3 waterproofing protection is required, the environment must also be controlled by the use of ventilation, dehumidification and/or air conditioning (as appropriate), to ensure that dampness does not occur. The use of combined waterproofing protection should be considered as recommended in BS 8102 : 2009.

4.4 The system prevents the passage of water between itself and the concrete structure to which it is fixed. The system must be adequately confined to ensure a watertight seal is achieved in service.

4.5 The system does not require hydrating or priming.

4.6 The system must never remain permanently exposed.

5 Practicability of installation

The system must only be installed by installers who have been trained and approved by the Certificate holder.

6 Resistance to water and water vapour



When used in combination with a minimum 150 mm section of properly designed concrete, the system, when completely sealed and consolidated, will adequately resist the passage of moisture into the structure.

7 Resistance to mechanical damage

7.1 The membranes are robust and resistant to damage from normal site activities and have the ability to self-heal if punctured. More extensive damage must be repaired (see section 14).

7.2 The membranes are not fully bonded to the substrate and can thus accommodate any likely structural movement in service, eg differential settlement or movement at joints.

8 Chemical resistance

8.1 The membranes are pre-hydrated, and are relatively unaffected by electrolytes. Site-specific advice can be obtained from the Certificate holder.

8.2 The membranes are not affected by organic contaminants and can tolerate acidic or alkaline conditions.

9 Resistance to loading



Provided the membranes are adequately confined and not subject to point loading, a Rawmat HDB installation beneath a foundation slab will transmit dead and imposed loads to the ground safely and without excessive deformation. In situations where point loading is anticipated the Certificate holder's advice should be sought.

10 Maintenance

As the system is confined by the concrete/backfill and has suitable durability (see section 11), maintenance is not required. However, any damage occurring during installation must be repaired (see section 14).

11 Durability



The system, when fully protected and subjected to normal service conditions, will provide an effective barrier to the transmission of moisture for the life of the structure in which it is incorporated.

Installation

12 General

12.1 Rawmat HDB membranes must be installed on flat, smooth surfaces without wrinkles or creases in the membrane. Cracks or voids should be filled and levelled using Rawpaste Mastic.

12.2 The membranes may be installed under most normal site conditions, including sub-zero temperatures. Surfaces may be damp but must be free from standing water.

12.3 Rawmat HDB Type S and Rawmat HDB Slabseal membranes are applied with the scrim geotextile side in contact with the walls and roof of the structure. However, under a floor slab, Rawmat HDB Type S membrane can be laid onto a blinded concrete surface with the woven fabric side uppermost.

12.4 Rawmat HDB Type P membrane is applied with the woven geotextile side facing the concrete which is poured against the membrane. Under a floor slab, the membrane can be laid onto a well compacted sub-base with the woven side uppermost. Against piles it is laid with the woven side facing inwards towards the structure.

12.5 The membranes must be contained properly to ensure that a watertight seal is achieved in service. The quality of the backfilling operation is therefore important in order to achieve the required compaction, and must be adequately supervised on site.

12.6 Sheets are arranged to provide minimum lap joints of 100 mm. These joints may be temporarily secured by Rawmat Washer Fixings or caulked with Rawpaste Mastic. Wherever possible, sheets should be staggered to prevent a concentration of laps at any particular point.

12.7 Overlaps in Rawmat HDB Slabseal installations must be sealed with Rawtape 100 applied evenly over the two sheets and bonded to the polyethylene face.

12.8 Rawmat HDB Type P overlaps are formed by peeling the non-woven geotextile off the clay core of the first sheet and laying the second sheet down so that the woven geotextile of the second sheet contacts the clay core of the first sheet when the two are compressed.

12.9 The membranes are easy to handle and can be cut using a sharp knife.

12.10 The membranes are pre-hydrated and can be formed and cut easily. It is recommended that the installation is conducted systematically, and that the backfill material or concrete is applied promptly, after installation. Temporary protection from rain or drying conditions can be provided by covering with thin plastic sheeting. The membrane must not be allowed to become saturated when unconfined. If subject to prolonged exposure to drying conditions, the membrane should be sprayed lightly with water to stop curling at the edges and to ensure that the properties of the membrane are not impaired.

12.11 The Certificate holder's advice must be sought concerning installations involving movement joints.

12.12 Waterstops used in conjunction with the system must be independently assessed in accordance with BS 8102 : 2009.

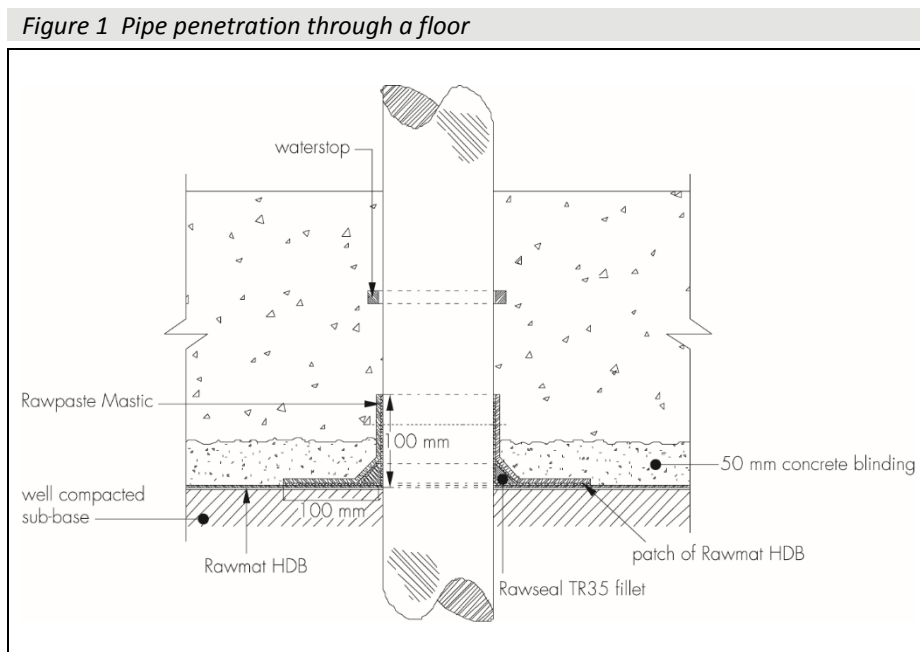
13 Procedure

Horizontal surfaces

13.1 The surface is prepared, including a 50 mm blinding layer where required. The membrane may be rolled out either manually, for the 1 m wide rolls, or by machine with a suitable lifting device and spreader bar.

13.2 Before the placing of reinforcement on studs, the membranes are usually protected by covering with a 50 mm screed of blinding concrete. The concrete should be placed over the membrane following the direction of the overlaps, to avoid the membrane folding or concrete getting between the sheets. If a protective concrete blinding is not applied, small pads or cushions of concrete should be placed underneath the studs to spread the load.

13.3 To seal piles or vertical penetrations through the membrane, the surface of the penetration must be brushed clean and free of debris. The base of the penetration should receive a layer of Rawpaste Mastic, and a length of Rawseal TR35 fillet is fitted tightly and joined to form a continuous seal. A patch piece 150 mm larger than the penetration in all directions is sealed to the penetration before the main sheet is applied and trimmed around. To complete the seal, additional Rawpaste Mastic is applied (see Figure 1).



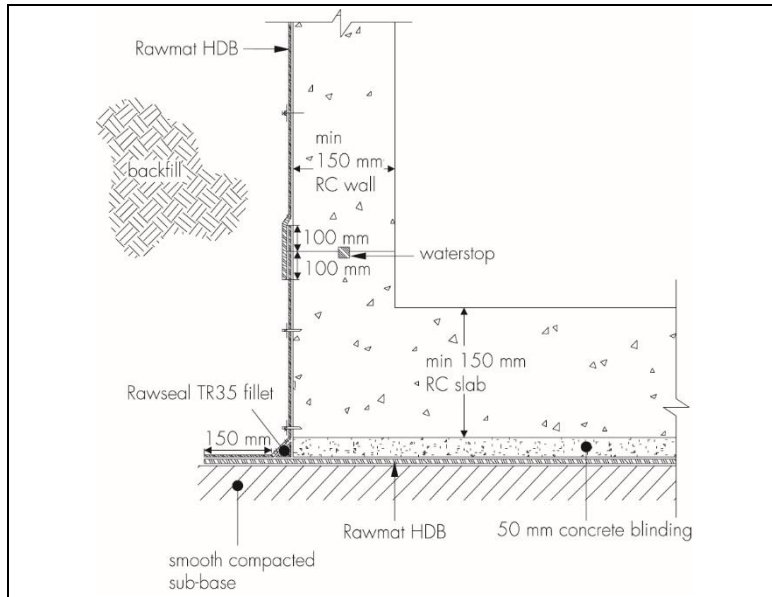
13.4 The membrane should extend a minimum of 150 mm outside the perimeter of the construction to enable a good lap joint to be made with the vertical sheets. Alternatively, the membrane should be turned vertically up the face of the shutter and nailed in place.

13.5 The applied membrane is covered with poured concrete as soon as possible after placing.

Vertical surfaces

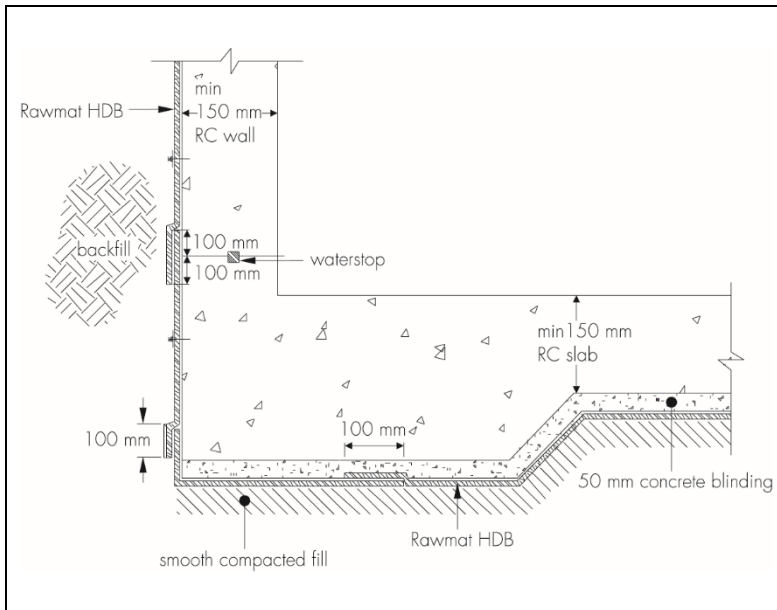
13.6 Connection with any horizontal Rawmat HDB membrane protruding from the bottom of the slab should be made using Rawseal TR35 fillet working from the base up the wall. The horizontal membrane should be cleaned prior to any overlapping (see Figure 2).

Figure 2 Slab to wall junction — detail A



13.7 Alternatively the horizontal membrane can be turned vertically up the floor slab shutter and held in place while the slab is poured. The vertical membrane will overlap this sheet to ensure continuity (see Figure 3).

Figure 3 Slab to wall junction — detail B



13.8 The membrane can be fixed to the vertical surface using Rawmat Washer Fixings fastened every 400 mm, to spread the load.

13.9 Alternatively, the membrane can be applied to the inside face of the shuttering and subsequently filled with the poured concrete.

13.10 Backfilling should be carried out as soon as possible after placing the Rawmat HDB membranes. Backfill material should be free from building debris and angular aggregate, and be compacted to a minimum 85% Modified Proctor.

13.11 To prevent soil or debris from damaging the membrane, a protection board or positive drainage can be used. The Certificate holder should be contacted for advice on suitable systems.

14 Repair

Damaged areas of the membrane can be repaired prior to enclosure in the structure by overlaying a patch, 150 mm larger in all directions, to the damaged area and nailing in place to secure. If the damage is more extensive, the membrane should be replaced with a fresh sheet and the Certificate holder's advice should be sought.

Technical Investigations

15 Tests

15.1 A trial installation was built using the Rawmat HDB Waterproofing System, and observations were made of the ease of installation at corners, laps and around obstructions, and the rate and pattern of water penetration.

15.2 Tests were conducted to determine the resistance to electrolytes.

16 Investigations

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

16.2 An assessment was made of independent reports relating to:

- resistance to hydrostatic pressure
- effect of wet/dry cycling
- freeze/thaw resistance
- effect of electrolytes
- resistance to loading
- chemical resistance.

16.3 Visits were made to sites in progress to assess the application properties of the system.

16.4 A survey of contractors was conducted to assess the system's application properties and performance in use.

Bibliography

BS 8102 : 2009 *Code of practice for protection of below ground structures against water from the ground*

BS EN ISO 9001 : 2015 *Quality management systems – Requirements*

BS EN 1992-3 : 2006 *Eurocode 2 – Design of concrete structures – Liquid retaining and containing structures*

CP 102 : 1973 *Code of practice for protection of buildings against water from the ground*

17 Conditions

17.1 This Certificate:

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

17.2 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

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

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

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

17.5 In issuing this Certificate the BBA is not responsible and is excluded from any liability to any company, firm, organisation or person, for any matters arising directly or indirectly from:

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product/system or any other product/system
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product/system
- actual installations of the product/system, including their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the product/system is installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the product/system, including its manufacture, supply, installation, use, maintenance and removal
- any claims by the manufacturer relating to CE marking.

15.6 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.