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Agrément Certificate
22/6047
Product Sheet 1

DELTA MEMBRANE WATERPROOFING SYSTEMS

DELTA AMPHIBIA

This Agrément Certificate Product Sheet(1) relates to Delta Amphibia, a multi-layer membrane with hydro-active properties, for use in waterproofing and damp-proofing underground reinforced concrete structures and for the protection from radon gas from the ground.

(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

Resistance to water and water vapour — the product, including joints, provide an effective barrier to the passage of water under hydrostatic pressure and water vapour from the ground (see section 6).

Resistance to underground gases — the product will restrict the ingress of radon and may contribute to restricting the ingress of methane and carbon dioxide into the structure (see section 7).

Resistance to mechanical damage — the product will accept, without damage, the limited foot traffic and loads associated with installation, and the effects of thermal and other minor movements likely to occur in practice (see section 8).

Adhesion — the product will form a satisfactory bond with cured concrete (see section 9).

Durability — the product, when fully protected, under normal service conditions, will provide an effective barrier to the transmission of moisture and will restrict the ingress of radon and contribute to restricting the ingress of methane and carbon dioxide 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 product described herein. The product has been assessed by the BBA as being fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of First issue: 7 April 2022

Hardy Giesler
Chief Executive Officer

Regulations

In the opinion of the BBA, Delta Amphibia, 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:	**C1(2)**	**Site preparation and resistance to contaminants**
Comment:		The product, including joints, will form an effective barrier to the movement of radon and may contribute to restricting methane and carbon dioxide. See section 7 of this Certificate.
Requirement:	**C2(a)**	**Resistance to moisture**
Comment:		The product, including joints, will enable a structure to satisfy this Requirement. See section 6 of this Certificate.
Regulation:	**7(1)**	**Materials and workmanship**
Comment:		The product is acceptable. See section 11.1 and the *Installation* part of this Certificate.

The Building (Scotland) Regulations 2004 (as amended)

Regulation:	**8(1)**	**Durability, workmanship and fitness of materials**
Comment:		The product can contribute to a construction satisfying this Regulation. See section 11.1 and the *Installation* part of this Certificate.
Regulation:	**9**	**Building standards applicable to construction**
Standard:	3.1	Site preparation – harmful and dangerous substances
Standard:	3.2	Site preparation – protection from radon gas
Comment:		The product, including joints, can contribute to satisfying the requirements of this Standard with regard to the control of the effects of radon, methane and carbon dioxide, Standards, with reference to clauses 3.1.2(1)(2), 3.1.6(1)(2), 3.1.7(1)(2) and 3.2.2(1)(2). See section 7 of this Certificate.
Standard:	3.4	Moisture from the ground
Comment:		The product, including joints, will enable a structure to satisfy the requirements of this Standard, with reference to clauses 3.4.2(1)(2), 3.4.4(1)(2) and 3.4.6(1)(2). See section 6 of this Certificate.
Standard:	7.1(a)	Statement of sustainability
Comment:		The product 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:		Comments in relation to the product under Regulation 9, Standards 1 to 6 also apply to this Regulation, with reference to clause 0.12.1(1)(2) and Schedule 6(1)(2).

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

The Building Regulations (Northern Ireland) 2012 (as amended)

Regulation:	**23(a)(i)**	**Fitness of materials and workmanship**
Comment:	**(iii)(b)(i)**	The product is acceptable. See section 11.1 and the *Installation* part of this Certificate.

Regulation:	**26(1)(b)**	**Site preparation and resistance to contaminants**
Comment:	**26(2)**	The product, including joints, will form an effective barrier to the movement of radon and will contribute to restricting methane and carbon dioxide See section 7 of this Certificate.
Regulation:	**28(a)**	**Resistance to moisture and weather**
Comment:		The product, including joints, will enable a structure to satisfy the Requirements of this Regulation. 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 sections: 1 *Description* (1.1) and 3 *Delivery and site handling* (3.1, 3.2 and 3.5) of this Certificate.

Additional Information

NHBC Standards 2022

In the opinion of the BBA, Delta Amphibia, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements in relation to *NHBC Standards*, Chapters 4.1 *Land quality — managing ground conditions*, 5.1 *Substructure and ground bearing floors*, Clause 5.1.20 *Damp-proofing concrete floors*, and 5.4 *Waterproofing of basements and other below ground structures* as a bonded membrane.

Where Grade 3 protection is required and the below ground wall retains more than 600 mm measured from the top of the retained ground to the lowest finished floor level, the product must be used in combination with either Type B or C waterproofing protection, as defined in BS 8102 : 2009.

The Certificate holder should be consulted for approved Type B and C solutions.

CE marking

The Certificate holder has taken the responsibility of CE marking the product, in accordance with harmonised European Standard EN 13967 : 2012.

Technical Specification

1 Description

1.1 Delta Amphibia is a pre-applied multilayer membrane incorporating a top layer of EPDM rubber, a hydro-expansive core and an 'active' layer that facilitates the sealing of overlaps. The membrane has a non-woven polypropylene fleece attached to the active face. The product is available in two thicknesses and has the nominal characteristics given in Table 1.

1.2 Ancillary items for use with the product include:

- Delta Amphibia Safety Tape — a 60 mm wide single-sided adhesive tape used over lapped joints to protect the joint during subsequent works and enclosure in the structure
- Delta Amphibia Bi Mastic — a modified silicone (MS) sealant/adhesive used to seal lap joints in Delta Amphibia where complete confinement may not be possible
- Delta Amphibia AKTI-VO 201 — a hydrophilic sealant for sealing around penetrations and to provide additional waterproofing protection at changes of direction and in corners
- Delta Amphibia Stopper — a plastic plug used in conjunction with Delta Amphibia AKTI-VO 201 to seal formwork spacer holes

- Delta Amphibia Pressure corners 90° and 270° and Pressure line — prefabricated steel profiles laminated with Delta Amphibia membrane used for jointing and terminations
- Delta Amphibia Lap Seal — a 60 mm wide single sided butyl tape used over lapped joints in gas protection applications.

Table 1 Delta Amphibia - Nominal characteristics

Characteristic (unit)	Value
Thickness (mm)	1.3 and 1.6
Roll Length (m)	10, 20
Roll Width (m)	0.9, 1.8
Mass per unit area ($kg \cdot m^{-2}$)	1.3 and 1.6
Impact resistance (mm)	
Method A	250 and 300
Method B	2000 and 1750
Tensile strength ($N \cdot 50\ mm^{-1}$)	
MD	≥ 300
CD	≥ 250
Elongation at break (%)	> 250 and > 500
Water vapour transmission ($g \cdot m^{-2} \cdot day^{-1}$)	< 0.1 and < 0.5
Watertightness (700 kPa)	Pass
Resistance to chemicals(1) (400 kPa)	Pass
Nail tear (N)	> 400 and > 450
Resistance to static loading (kg)	≥ 20

(1) 28 days exposure to calcium hydroxide solution.

1.3 Other ancillary items available, but outside the scope of this Certificate, include:

- protection fleece and/or protection boards for use over the membrane to protect it from damage by trafficking during the installation and backfilling operations
- specialist sealants and waterstops
- specialist concrete repair mortars
- formwork plugs - plastic plug used in conjunction with Delta Amphibia AKTI-VO 201 to seal formwork spacer holes
- concrete repair products.

2 Manufacture

2.1 The product is manufactured using specialised co-extrusion processing techniques.

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.

3 Delivery and site handling

3.1 The product is supplied in rolls of 1.8 x 20 m and 0.9 x 10 m, weighing approximately 59 kg and 15 kg, and 47 kg and 12 kg respectively for the 1.6 and 1.3 mm thick membrane. The 1.8 m wide rolls are packed individually in plastic bags and the 0.9 m wide rolls are packed individually in cardboard boxes.

3.2 The rolls are supplied to site on pallets. Each pallet holds a maximum of 20 rolls for the 1.8 m x 20 m membranes respectively and 36 or 30 rolls for the 0.9 m wide products for the 1.6 and 1.3 mm thick membranes respectively.

3.3 Each roll bears a bar code that allows traceability back to production records.

3.4 The ancillary products are supplied in the sizes detailed in Table 2.

Table 2 Ancillary Products packaging sizes

Product	Package size
Delta Amphibia Safety Tape	25 m roll
Delta Amphibia Lap Seal	10 m roll
Delta Amphibia AKTI-VO 201	320 ml cartridge
Delta Amphibia Bi Mastic	600 ml sachet
Delta Amphibia Stopper	50 pieces in plastic bag

3.5 The Certificate holder has taken the responsibility of classifying and labelling the product under the *CLP Regulation (EC) No 1272/2008 on the classification, labelling and packaging of substances and mixtures.* Users must refer to the relevant Safety Data Sheet(s).

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Delta Amphibia.

Design Considerations

4 Use

4.1 Delta Amphibia is satisfactory for use as a Type A waterproofing protection, as defined in BS 8102 : 2009 for the waterproofing on new-build underground structures, and as a damp-proofing membrane for solid floors in accordance with the relevant clauses of CP 102 : 1973, Section 3.

4.2 The product can be used externally to provide an effective barrier to the transmission of liquid water where Grade 1 to 3 waterproofing protection is required, as defined in BS 8102 : 2009, Table 2. The product is not suitable for use in negative side pressure waterproofing applications.

4.3 Where Grade 3 waterproofing protection is required, the environment must be controlled by use of ventilation, dehumidification and/or air conditioning, as appropriate, to ensure dampness does not occur. See also the *Additional information* part of this Certificate relating to *NHBC Standards* 2022.

4.4 The product is also satisfactory for use as a gas-resistant membrane to restrict the ingress of radon. Installations must be verified in accordance with BS 8485 : 2015.

4.5 The product must always be fully protected as soon as possible after it is installed prior to backfilling, in accordance with the Certificate holder's instructions.

5 Practicability of installation

The product should only be installed by installers who have been trained and approved by the Certificate holder. The Certificate holder must be consulted for suitable installers.

6 Resistance to water and water vapour

6.1 The product, including joints when completely sealed and consolidated, will resist the passage of water under hydrostatic pressure and moisture from the ground and so satisfy the relevant requirements of the national Building Regulations.

6.2 The product will comply with the minimum sheet thickness detailed in the documents supporting the national Building Regulations for damp proof membranes.

7 Resistance to underground gases

7.1 The product, including sealed joints, will restrict the ingress of radon into buildings from naturally occurring sources. In the opinion of the BBA, the product satisfies the criteria for a radon gas resistant membrane of BRE Report BR 211 : 2015.

7.2 The membrane does not constitute a gas membrane as defined in BS 8485 : 2015 and cannot be awarded a gas score. However, when used in addition to a Type B structural barrier waterproofing in basement floor and wall constructions conforming to BS 8102 : 2009, Grades 2 or 3 waterproofing, the product may contribute to restricting the ingress methane and carbon dioxide into a building from landfill and naturally occurring sources, with reference to BS 8485 : 2015, Table 5.

7.3 Measured gas permeability/diffusion values on the membrane are given in Table 3.

Table 3 Measured gas transmission rates and radon diffusion coefficient for Delta Amphibia

Gas	Method	Result(1)(2)	
		Delta Amphibia 1.3 mm	Delta Amphibia 1.6 mm
Methane Membrane without joint	ISO 15105-1	443 $ml \cdot m^{-2} \cdot d^{-1} \cdot atm^{-1}$	348 $ml \cdot m^{-2} \cdot d^{-1} \cdot atm^{-1}$
Radon Membrane without joint	Method C of ISO/TS 11665-13	4.1 x 10^{-11} $m^2 \cdot s^{-1}$	3.5 x 10^{-11} $m^2 \cdot s^{-1}$

(1) BS 8485 : 2015 requires that the methane transmission measured in accordance with BS ISO 15105-1 : 2007 for a gas-resistant membrane is <40 $ml \cdot m^{-2} \cdot d^{-1} \cdot atm^{-1}$.

(2) Tests carried out on non-hydrated product.

8 Resistance to mechanical damage

8.1 When installed, the product is capable of accommodating the minor movement likely to occur under normal service conditions.

8.2 The product can be punctured by sharp objects and care must therefore be taken in handling building materials and equipment over the exposed surface.

8.3 Provided there are no sharp objects present on the membrane surface prior to and during installation of the protective layer, the product will not be damaged by normal foot traffic.

8.4 Where damage does occur, the product must be repaired (see section 14).

9 Adhesion

When cured, the poured concrete will physically bond to the product to form a satisfactory bond.

10 Maintenance

As the product is confined within the structure and has suitable durability (see section 11), maintenance is not required. However, any damage occurring before enclosure must be repaired (see section 14).

11 Durability

11.1 The product, when fully protected, in normal service conditions, will remain effective against the ingress of water and water vapour, and will restrict the ingress of radon and contribute to restricting the ingress of methane and carbon dioxide for the lifetime of the structure in which they are incorporated.

11.2 The product must be protected as soon as practicable after installation.

Installation

12 General

12.1 Delta Amphibia must be installed in accordance with the relevant requirements of BS 8102 : 2009, CP 102 : 1973 Section 3, the Certificate holder's instructions and this Certificate. Additional guidance on the use of damp-proof membranes is given in BS 8000-0 : 2014 and BS 8000-4 : 1989.

12.2 The product should be installed under dry conditions at temperatures between 5 and 35°C and avoiding contamination that could affect jointing.

12.3 All surfaces on which the membrane is to be supported must be sound, solid and free from sharp protrusions and loose aggregate to eliminate movement during the concrete pour and damage to the membrane and to ensure that the membrane is fully loaded within the structure to ensure that the overlapped joints are watertight. In situations where full loading cannot be guaranteed, eg in some vertical applications, then the overlaps must be sealed with Delta Amphibia Bi Mastic in accordance with the Certificate holder's instructions.

12.4 Delta Amphibia AKTI-VO 201 must be applied around penetrations, in corners and other details in accordance with the Certificate holder's instructions.

12.5 The membrane must be protected with a suitable protection membrane or board as soon as practicable to minimise the risk of damage from UV exposure, backfilling and from direct foot trafficking prior to the concrete pour. Direct trafficking by vehicles must be avoided.

13 Procedure

Horizontal application

13.1 Delta Amphibia membrane is unrolled onto lean concrete with the white fleece component of the membrane facing up, ie towards the concrete pour.

13.2 Subsequent sheets are then laid parallel to the first sheet using the guideline printed on the membrane to ensure an overlap of minimum 50 mm at the edge to align evenly and ensuring that end laps are staggered by minimum 300 mm.

13.3 Where adequate loading of the membrane cannot be guaranteed then an 8 to 10 mm bead of Delta Amphibia Bi Mastic should be applied centrally along the joint area before overlapping. The joint should be rolled with a suitable roller to ensure the sealant is spread throughout the jointed area.

13.4 All lap joints must be over-taped with Delta Amphibia Safety Tape for protection against damage from subsequent works.

13.5 The membrane should be taken up the formwork making sure that it will extend sufficiently over the top edge of the finished slab when poured to allow for jointing.

13.6 For gas control applications, the membrane joints must be sealed with Delta Amphibia Bi Mastic and over-taped with Delta Amphibia Lap Seal in accordance with the Certificate holder's instructions.

Vertical application

13.7 A strip of Delta Amphibia membrane is applied to the top face of the foundation slab along the edge. The strip must be wide enough to span from the edge of the slab to the external face of the wall to be cast.

13.8 The Delta Amphibia membrane is then turned over the Delta Amphibia membrane strip and secured at the external edge of the slab using the Delta Amphibia Pressure corner 90° profile using a suitable nail gun and masonry nails. The opposite edge of the Delta Amphibia membrane strip is then secured to the slab using the Delta Amphibia Pressure Corner 270° profile ensuring that the profile is in line with the external face of the wall to be cast.

13.9 After the formwork for the wall has been placed, the Delta Amphibia membrane is applied to the formwork ensuring that the face with the fleece is facing the concrete pour to be executed. All corners, sealing strip edges and other fixings/penetrations through the membrane must be sealed with Delta Amphibia AKTI-VO 201 mastic.

13.10 Adjacent sheets are laid parallel to each other using the guideline printed on the membrane to ensure an overlap of at least 50 mm at the edge to align evenly and ensuring that end laps are staggered by a minimum of 300 mm. The top of the membrane is secured using the Pressure line profile in conjunction with Delta Amphibia AKTI-VO 201. When applied to wooden formwork and adequate loading of the membrane can be guaranteed, the overlapped sheets can be stapled together in accordance with the Certificate holder's instructions, ensuring that there is full contact between the overlapped sheets along the whole length of the joint.

13.11 In all situations where adequate loading of the membrane cannot be guaranteed, (eg when the membrane is applied to slurry walls, piling or for additional protection) or when other types of formwork are used (eg metal) an 8 to 10 mm bead of Delta Amphibia Bi Mastic must be applied centrally along the joint area before overlapping. The joint should be rolled with a suitable roller to ensure the sealant is spread throughout the jointed area.

13.12 For gas control applications , the membrane joints must be sealed with Delta Amphibia Bi Mastic and over-taped with Delta Amphibia Lap Seal in accordance with the Certificate holder's instructions.

13.13 The top of the membrane is secured using the Pressure Line profile in conjunction with Delta Amphibia AKTI-VO 201 mastic once the wall has been cast and the formwork removed.

13.14 Formwork tie holes must be sealed using suitable plugs with Delta Amphibia AKTI-VO 201 mastic.

14 Repair

14.1 Any damage to the membrane must be repaired by cleaning the surrounding area in accordance with the Certificate holder's instructions and applying a patch of Delta Amphibia. All patched areas must extend a minimum of 100 mm from the damaged area.

14.2 Overlaps should be sealed using Delta Amphibia Bi Mastic and secured with Delta Amphibia Safety Tape.

15 Tests

Tests were carried and the results assessed to determine:

- characterisation by thermal analysis
- IR analysis
- thickness
- mass per unit area
- width
- straightness
- flatness
- tensile strength and elongation
- resistance to impact
- resistance to static loading
- resistance to chisel impact
- watertightness
- water vapour permeability
- bond strength of poured concrete
- resistance to hydrostatic pressure at joints (60 kPa).

16 Investigations

16.1 An evaluation was made of the results of independent test data to establish:

- resistance to tear (nail)
- watertightness (700 kPa)
- watertightness after exposure to alkali (700 kPa)
- watertightness after heat ageing (700 kPa)
- straightness
- flatness
- gas permeability.

16.2 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.

Bibliography

BR 211 : 2015 *Radon — Guidance on protective measures for new buildings*

BS 8000-0 : 2014 *Workmanship on construction sites — Introduction and general principles*

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

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

BS ISO 15105-1 : 2007 *Plastics — Film and sheeting — Determination of gas-transmission rate — Differential-pressure methods*

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

EN 13967 : 2012 + A1 : 2017 *Flexible sheets for waterproofing — Plastic and rubber damp proof sheets including plastic and rubber basement tanking sheet — Definitions and characteristics*

PD ISO/TS 11665-13 *Measurement of radioactivity in the environment - Air: radon 222 - Determination of the diffusion coefficient in waterproof materials - membrane two-side activity concentration test method*

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 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.

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.

17.6 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.