

## Capital Valley Plastics Ltd

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**Agrément Certificate**

**17/5422**

Product Sheet 1

### CAPITAL VALLEY PLASTICS HYDROCARBON MEMBRANE

### RADBAR FLEXIBLE HYDROCARBON MEMBRANE

This Agrément Certificate Product Sheet<sup>(1)</sup> relates to Radbar Flexible Hydrocarbon Membrane, a thermoplastic tri-polymer membrane to protect buildings from moisture, radon, methane and carbon dioxide, for use above or below the slab in concrete ground floors which are not subject to hydrostatic pressure. The product is chemically resistant when exposed to volatile organic compounds (VOCs).

(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, will restrict the passage of moisture into the structure (see section 6).

**Resistance to underground gases** — the product is capable of restricting the ingress of radon, methane and carbon dioxide into the structure (see section 7).

**Resistance to chemicals** — the product is chemically resistant when exposed to, and limits the transmission of, volatile organic compounds (VOCs) (see section 8).

**Resistance to damage** — the product has high resistance to puncture and on a smooth or blinded surface will not be damaged by foot or site traffic (see section 9).

**Durability** — under normal service conditions the product will remain effective against the ingress of water and water vapour, and will restrict the ingress of radon, methane, carbon dioxide and VOC vapours during the lifetime of the flooring construction in which it is installed (see section 13).

The BBA has awarded this Certificate to the company named above for the product described herein. This product has been assessed by the BBA as being fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of First issue: 4 May 2017

John Albon – Head of Approvals  
Construction Products

Claire Curtis-Thomas  
Chief Executive

Certificate amended on 25 August 2017 to update Tables 1 and 3.

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, Radbar Flexible Hydrocarbon Membrane, 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)

<b>Requirement:</b> C1(2) Comment:	<b>Site preparation and resistance to contaminants</b> The product can contribute to a structure satisfying the conditions of this Requirement. See sections 7.1 and 7.2 of this Certificate.
<b>Requirement:</b> C2(a) Comment:	<b>Resistance to moisture</b> The product, including joints, will enable a floor to satisfy this Requirement. See sections 6.1 and 6.2 of this Certificate.
<b>Regulation:</b> 7 Comment:	<b>Materials and workmanship</b> The product is acceptable. See section 13.1 and the <i>Installation</i> part of this Certificate.



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

<b>Regulation:</b> 8(1) Comment:	<b>Durability, workmanship and fitness of materials</b> The use of the product satisfies the requirements of this Regulation. See section 13.1 and the <i>Installation</i> part of this Certificate.
<b>Regulation:</b> 9 Standard: 3.1 Standard: 3.2 Comment:	<b>Building standards applicable to construction</b> Site preparation – harmful and dangerous substances Site preparation – protection from radon gas When properly installed in a correctly-designed structure, the product forms an effective barrier to the movement of radon, methane and carbon dioxide gases and VOC vapour within the ground-floor slab, enabling compliance with these Standards, with references to clauses 3.1.2 <sup>(1)(2)</sup> , 3.1.6 <sup>(1)(2)</sup> , 3.1.7 <sup>(1)(2)</sup> , 3.1.8 <sup>(1)(2)</sup> , 3.2.1 <sup>(2)</sup> and 3.2.2 <sup>(1)(2)</sup> . See sections 7.1 and 7.2 of this Certificate.
Standard: 3.4 Comment:	Moisture from the ground The product, including joints, will enable a floor to satisfy the requirements of this Standard, with reference to clauses 3.4.2 <sup>(1)(2)</sup> , 3.4.4 <sup>(1)(2)</sup> and 3.4.6 <sup>(1)(2)</sup> . See sections 6.1 and 6.2 of this Certificate.
Standard: 7.1(a) Comment:	Statement of sustainability The <i>product</i> 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.
<b>Regulation:</b> 12 Comment:	<b>Building standards applicable to conversions</b> Comments in relation to <i>the product</i> under Regulation 9, Standards 1 to 6 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) 2012 (as amended)

<b>Regulation:</b>	<b>23(a)(i)(iii)(b)(i)</b>	<b>Fitness of materials and workmanship</b>
Comment:		The product is acceptable. See section 13.1 and the <i>Installation</i> part of this Certificate.
<b>Regulation:</b>	<b>26(1)(b)(2)</b>	<b>Preparation of site and resistance to dangerous and harmful substances</b>
Comment:		The product can contribute to a construction satisfying the requirements of this Regulation. See sections 7.1 and 7.2 of this Certificate
<b>Regulation:</b>	<b>28</b>	<b>Resistance to moisture and weather</b>
Comment:		The product, including joints, will enable a floor to satisfy this Requirement. See sections 6.1 and 6.2 of this Certificate.

### Construction (Design and Management) Regulations 2015

### Construction (Design and Management) Regulations (Northern Ireland) 2016

Information in this Certificate may assist the client, designer (including Principal Designer) and contractor (including Principal Contractor) to address their obligations under these Regulations.

See section: 1 *Description* (1.2) of this Certificate.

## Additional Information

### NHBC Standards 2017

In the opinion of the BBA, Radbar Flexible Hydrocarbon Membrane, provided it is installed, 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* and 5.1 *Substructure and ground bearing floors*.

### CE marking

The Certificate holder has taken the responsibility of CE marking the product, in accordance with harmonised European Standard BS EN 13967 : 2012. An asterisk (\*) appearing in this Certificate indicates that data shown are given in the manufacturer's Declaration of Performance.

## Technical Specification

### 1 Description

1.1 Radbar Flexible Hydrocarbon Membrane is a thermoplastic tri-polymer membrane available in black.

1.2 The membrane has the following nominal characteristics:

Thickness* (mm)	1
Roll length*(m)	20
Roll width* (m)	1.3
Mass per unit area* (g·m <sup>-2</sup> )	921
Tensile strength* (N·mm <sup>-2</sup> )	
MD	24
CD	22
Water vapour transmission ( <i>S<sub>d</sub></i> ) value (m)	
Watertightness* (kPa)	Pass
Nail tear* (N)	
MD	700
CD	750

1.3 Ancillary products for use with the membrane include:

- Radbar Double-sided HC Jointing Tape — butyl tape for sealing joints and laps
- Radbar Single-sided HC Overlap Tape — for securing over joints.

1.4 Ancillary products for use with the membrane, but outside the scope of the Certificate, include:

- Radbar Top Hat Unit and Clip — to seal service entry points to the membrane
- CVP Protection Boards — protection layer for preventing damage to the membrane
- Radbar Gas Sump — underfloor ventilated sump
- Radbar Pre-formed Corner Details and Cloaks — prefabricated details
- Radbar Gas Venting Membrane.

## 2 Manufacture

2.1 The product is manufactured by an extrusion process.

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 Capital Valley Plastics Ltd have been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 by NQA (Certificate 6634).

## 3 Delivery and site handling

3.1 Rolls are wrapped in polythene film. Each roll has a leaflet enclosed describing the product and installation details. The BBA logo and the number of this Certificate are printed on the leaflet and pallet label.

3.2 The rolls must be stacked on a flat surface, kept under cover and protected from sunlight and mechanical damage.

## Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Radbar Flexible Hydrocarbon Membrane.

## Design Considerations

### 4 Use

4.1 Radbar Flexible Hydrocarbon Membrane is satisfactory for use as a gas-resistant barrier to restrict radon, methane and carbon dioxide into buildings from landfill and naturally occurring sources. The product is chemically resistant when in contact with VOCs.

4.2 Buildings in areas of risk should be constructed in accordance with the recommendations of BRE Report BR 211 : 2015, and following the guidance set out in BS 8485 : 2015.

4.3 Building in areas at risk of volatile organic compounds (VOCs) should follow the guidance detailed in CIRIA C748.

4.4 The product is also satisfactory for use as a damp-proof membrane in accordance with CP 102 : 1973, Section 2, and BS 8000-4 : 1989.

## 5 Practicability of installation

The membrane is designed to be installed by a competent builder or contractor experienced with this type of product.

## 6 Resistance to water and water vapour



6.1 The membrane, including joints, provides an effective barrier to the passage of liquid moisture from the ground.

6.2 When installed in accordance with the following documents, the membrane will comply with the minimum sheet thickness detailed in the national Building Regulations:

**England and Wales** — Approved document C, Requirements C2(a), Section 4.6

**Scotland** — Mandatory Standard 3.4, clauses 3.4.2, 3.4.4 and 3.4.6

**Northern Ireland** — Regulation 28(a).

6.3 The membrane is impervious to water and provides a waterproof layer capable of accepting minor structural movements without damage.

## 7 Resistance to underground gases



7.1 The product will restrict the ingress of radon, methane and carbon dioxide gases into buildings from landfill and naturally occurring sources, and meet the performance for a gas-resistant membrane as defined in BS 8485 : 2015.

7.2 Measured gas permeability/diffusion values on unjointed membrane are given in Table 1.

*Table 1 Gas permeability of Radbar Flexible Hydrocarbon Membrane*

Gas	Method	Result
Methane	BS ISO 15105-1	28 ml·m <sup>-2</sup> ·day <sup>-1</sup> ·atm <sup>-1</sup>

7.3 BRE Report BR 211 : 2015 recommends a 300µm thick polyethylene sheet as a minimum required thickness for a radon gas-resistant membrane. It is generally accepted that other materials with comparable or higher gas resistance are suitable, provided they can withstand the construction process. In the opinion of the BBA, the product meets these criteria.

## 8 Resistance to chemicals

8.1 The product is resistant to chemicals commonly found on construction sites. Examples are given in Table 2, but a site specific examination and testing regime should be carried out on a case by case basis to establish suitability for a particular application. The butyl tape has limited resistance to diesel and similar materials. Welded joints must be used where there is any doubt over the compatibility of butyl tape.

*Table 2 Resistance to chemicals*

Test method	Exposure chemical	Tensile strength retained (%)	Result
BS EN 14414 Method A	Acid 10% solution	MD 92 CD109	Pass
BS EN 14414 Method B	Alkali	MD 98 CD 109	Pass
BS EN 14414 Method C	Diesel, paraffin and lubricating oil mixture	MD 98 CD 116	Pass
BS EN 14414 Method D	Synthetic leachate comprising a mixture of 14 acids, chlorides, sulfates and a phosphate	MD 100 CD 96	Pass

8.2 Examples of the transmission rates for commonly encountered volatile liquids are given in Table 3. A risk assessment should be carried out on a site specific basis to establish the product's suitability for a particular application.

*Table 3 Transmission rate of volatile liquids of Radbar Flexible Hydrocarbon Membrane*

Volatile liquid	Method	Result (g·m <sup>-2</sup> ·h <sup>-1</sup> )
Xylene	BS EN ISO 6179 : 2010 (method B)	4.845
Toluene	BS EN ISO 6179 : 2010 (method B)	6.695
Petrol	BS EN ISO 6179 : 2010 (method B)	5.172
Diesel	BS EN ISO 6179 : 2010 (method B)	0.004

## 9 Resistance to damage

9.1 The membrane can be punctured by sharp objects, and care should be taken when handling building materials over the exposed surface.

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

## 10 Underfloor heating

There will be no adverse effect on the membrane from underfloor heating under normal service conditions. In other circumstances, the Certificate holder's advice should be sought.

## 11 Effects of temperature

When the membrane is loose-laid and the joints are taped, the installation temperature should not be below 5°C.

## 12 Maintenance

As the product is confined under concrete and has suitable durability (see section 13), maintenance is not required. However, any damage occurring before enclosure must be repaired (see section 17).

## 13 Durability



13.1 The membrane will, in normal circumstances, remain effective against the ingress of water and water vapour, and will restrict the ingress of radon, methane, carbon dioxide and VOC vapour during the lifetime of the building.

13.2 Long periods of exposure to ultraviolet light will reduce the effectiveness of the membrane.

## 14 Reuse and recyclability

The product contains polyethylene, which can be recycled.

## Installation

### 15 General

15.1 Radbar Flexible Hydrocarbon Membrane must be installed in accordance with the Certificate holder's instructions, the relevant clauses of BRE Report BR 211 : 2015 and following the guidance of BS 8485 : 2015.

15.2 The membrane can be installed in all normal site conditions, provided that the air temperature is not below 5°C to prevent the risk of surface condensation.

### 16 Procedure

16.1 The product must only be applied to surfaces that have a smooth finish, ie they should be free from voids, projections and mortar deposits. Surfaces should be dry and free from dust and frost.

16.2 Concrete surfaces should be dense. Vertical surfaces of brickwork and blockwork must be dry and rendered to provide an even surface. Brickwork or blockwork not rendered must be flush pointed to give a smooth surface without sudden changes in level.

16.3 The membrane is rolled out with the embossed surface uppermost, ensuring that it is properly aligned. All end and side overlaps should be a minimum of 150 mm and prepared in accordance with the Certificate holder's instructions.

16.4 When the membrane is laid below the concrete slab, it should be loose-laid to accommodate any small movements.

16.5 All surfaces must be dried thoroughly prior to joining.

16.6 Joints can be installed using butyl tape, however the chemical compatibility must be checked. A strip of the tape is unrolled over the membrane with its nearest edge 50 mm from the membrane edge. The protective paper is removed from the butyl tape prior to rolling an adjacent run of the membrane, which must be carefully unrolled over the jointing tape, ensuring a 100 mm overlap.

16.7 Where doubt exists over the suitability of the butyl tape, the product can be welded using hot air or wedge welding equipment. All laps and junctions must be overlapped by 150 mm. The weld width must be a minimum of 40 mm.

16.8 All service penetrations and direction changes should be properly detailed in accordance with the Certificate holder's instructions. Service ducts should be vented to prevent the possibility of gas accumulating in confined spaces.

16.9 The continuity of the gas protection must extend over the footprint of the building, and the gas membrane must be sealed to a gas-resistant damp-proof course.

16.10 The membrane should be covered by a screed or other protective layer as soon as possible after installation. If blockwork protection is used, care must be taken to avoid damage to the membrane during construction.

16.11 The membrane installation should be subject to third-party independent validation, in accordance with BS 8485 : 2015.

## 17 Repair

Any damage to the product must be repaired using a patch of the membrane, and laps welded or sealed with double-sided tape and secured with the butyl tape. All patched areas must extend a minimum of 150 mm from the damaged area. If required by the local authority, repair work should be confirmed by an independent validation report, as all gas membrane installation should be subject to third-party validation in accordance with BS 8485 : 2015.

## Technical Investigations

## 18 Tests

18.1 Tests were carried out on the membrane to determine:

- dimensions
- mass per unit area
- dimensional stability
- water vapour transmission
- watertightness
- tensile strength and elongation
- effect of heat ageing
- effect of exposure to UV
- effect of water exposure
- resistance to static loading
- resistance to impact
- resistance to tearing
- resistance to chisel impact on joints:
- shear strength
- resistance to leakage on controls, following heat ageing and exposure to chemicals.

## 19 Investigations

19.1 An evaluation was made of the results of test data regarding permeability of methane.

19.2 A visit to a site in progress was carried out to assess the practicability of installation.

19.3 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

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

BS 8485 : 2015 *Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings*

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

BS EN 14414 : 2004 *Geosynthetics — Screening test method for determining chemical resistance for landfill applications*

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

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

BS EN ISO 6179 : 2010 *Rubber, vulcanized or thermoplastic — Rubber sheets and rubber-coated fabrics — Determination of transmission rate of volatile liquids (gravimetric technique)*

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

CIRIA C748 *Guidance on the use of plastic membranes as VOC vapour barriers*

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

### 20 Conditions

20.1 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.

20.2 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.

20.3 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.

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

20.5 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.

20.6 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.