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**Agrément Certificate**

**96/3267**

Product Sheet 2

## CAPITAL VALLEY PLASTICS MEMBRANES

### RADBAR RADON 400

This Agrément Certificate Product Sheet<sup>(1)</sup> relates to Radbar Radon 400, for use as a low-density polyethylene gas barrier and damp-proof membrane (dpm) in concrete ground floors, above and below the slab not subject to hydrostatic pressure, to protect the building against moisture and radon 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 provides an effective barrier to the passage of liquid water and water vapour from the ground (see section 6).

**Resistance to underground gases** — the product is capable of restricting the ingress of radon into the building (see section 7).

**Resistance to puncture** — the product has a high resistance to puncture and over a smooth or blinded surface will not be damaged by foot or site traffic (see section 8).

**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 during the lifetime of the flooring construction in which it is installed (see section 12).



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

*Claire Curtis-Thomas*

Date of Fourth issue: 12 March 2019

John Albon – Head of Approvals  
Construction Products

Claire Curtis-Thomas  
Chief Executive

Originally certificated on 10 October 2012

Certificate amended on 1 October 2020 due to implementation of BBA policy of 0.4 mm minimum thickness for gas control membranes and change of product name.

*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 **MUST** check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA directly.*

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

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## Regulations

In the opinion of the BBA, Radbar Radon 400, 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> Comment:	<b>C1(2)</b>	<b>Site preparation and resistance to contaminants</b> When properly installed in a correctly designed structure, the product forms an effective barrier to radon enabling compliance with this Requirement. See section 7.1 of this Certificate.
<b>Requirement:</b> Comment:	<b>C2(a)</b>	<b>Resistance to moisture</b> When properly installed in a correctly designed structure, the product forms an effective barrier to the movement of water within the ground-floor slab, enabling compliance with this Requirement. See sections 6.1 and 6.2 of this Certificate.
<b>Regulation:</b> Comment:	<b>7(1)</b>	<b>Materials and workmanship</b> The product is of an acceptable material. See section 12.1 and the <i>Installation</i> part of this Certificate.



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

<b>Regulation:</b> Comment:	<b>8(1)</b>	<b>Durability, workmanship and fitness of materials</b> The product can contribute to a construction satisfying this Regulation. See section 12.1 and the <i>Installation</i> part of this Certificate.
<b>Regulation:</b> Standard: Comment:	<b>9</b> 3.2	<b>Building standards applicable to construction</b> Site preparation — protection from radon gas The product will enable a floor to satisfy the requirements of this Standard, with reference 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 section 7.1 of this Certificate.
Standard: Comment:	3.4	<b>Moisture from the ground</b> When properly installed in a correctly designed structure, the product forms an effective barrier to the movement of water within the ground-floor slab, enabling compliance with 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: Comment:	7.1(a)	<b>Statement of sustainability</b> 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.
<b>Regulation:</b> Comment:	<b>12</b>	<b>Building standards applicable to conversions</b> Comments made in relation to the product 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> Comment:	<b>23(a)(i)</b> <b>(iii)(b)(i)</b>	<b>Fitness of materials and workmanship</b> The product is acceptable. See section 12.1 and the <i>Installation</i> part of this Certificate.
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<b>Regulation:</b>	<b>26</b>	<b>Site preparation and resistance to contaminants</b>
<b>Comment:</b>		When properly installed in a correctly designed structure, the product forms an effective barrier to radon enabling compliance with this Requirement. See section 7.1 of this Certificate.
<b>Regulation:</b>	<b>28</b>	<b>Resistance to moisture and weather</b>
<b>Comment:</b>		When properly installed in a correctly designed structure, the product forms an effective barrier to the movement of water within the ground-floor slab, enabling compliance with this Regulation. 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* (1.1) of this Certificate.

### Additional Information

#### NHBC Standards 2020

In the opinion of the BBA, Radbar Radon 400, 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 EN 13967 : 2012.

### Technical Specification

#### 1 Description

1.1 Radbar Radon 400 is a blown film of extruded low-density polyethylene (LDPE). The nominal characteristics of the membrane are given in Table 1.

1.2 Ancillary products for use with the product, and within the scope of this Certificate, include:

- Radbar Double-sided butyl Jointing Tape — for joints and laps
- Radbar Single-sided Overlap Tape.

1.3 Ancillary products for use with the product, but outside the scope of this Certificate, include:

- Radbar Top Hat Unit and Clip — to seal service entry points to the membrane
- Radbar 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.

**Table 1 Nominal characteristics**

Characteristic (unit)	Thickness (µm)	
	400	500
Roll length (m)	20 <sup>(1)</sup>	12.5 <sup>(1)</sup>
Roll width (m)	4	4
Mass per unit area (g·m <sup>-2</sup> )	368	460
Tensile strength (N per 50 mm)		
MD	≥150	≥180
CD	≥150	≥180
Elongation		
MD	>450	>300
CD	>450	>300
Nail tear resistance		
MD	247	339
CD	238	346
Watertightness	pass	pass
Colour	clear, blue, black, green, orange, red	

(1) Other lengths are available on request.

## 2 Manufacture

2.1 The product is manufactured by a blown film 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 being operated by the manufacturer are being maintained.

2.3 The management system of Capital Valley Plastics Ltd has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 by NQA (Certificate 6643).

## 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 incorporating the number of this Certificate is 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 Radon 400.

## Design Considerations

### 4 Use

4.1 Radbar Radon 400 is satisfactory for use as a gas-resistant barrier to restrict the ingress of radon into buildings from naturally occurring sources.

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

4.3 Installations for radon gas control should be subject to third-party validation in accordance with BS 8485 : 2015.

4.4 The product is also satisfactory for use as a dpm in accordance with CP 102 : 1973, BS 8000-0 : 2014 and BS 8000-4 : 1989.

## 5 Practicability of installation

The membrane is designed to be installed by a competent general builder, or a 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 documents supporting the national Building Regulations:

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

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 into buildings from naturally occurring sources.

7.2 Measured gas permeability/diffusion values on an unjointed membrane are given in Table 2.

Table 2 Gas permeability of Radbar Radon 400

Gas	Method	Result
Radon	K124/02/95	$16 \times 10^{-12} \text{ m}^2 \cdot \text{s}^{-1(1)}$
Methane	ISO 15105-1	$227 \text{ ml} \cdot \text{m}^2 \cdot \text{day}^{-1} \cdot \text{atm}^{-1(2)}$

(1) Radon diffusion coefficient determined on a 300  $\mu\text{m}$  thick membrane.

(2) 500  $\mu\text{m}$  membrane.

7.3 In the opinion of the BBA, the membrane satisfies the criteria for a radon gas resistant membrane of BRE Report BR 211 : 2015.

## 8 Resistance to puncture

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

8.2 Provided that 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.

8.3 Depending on the type of construction, Radbar Protection Board may be used to minimise the risk of puncture to the membrane.

## 9 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.

## 10 Effects of temperature

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

## 11 Maintenance

As the product is confined under concrete and has suitable durability (see section 12), maintenance is not required. However, any damage occurring before enclosure must be repaired (see section 16).

## 12 Durability



12.1 The membrane will, in normal circumstances, remain effective against the ingress of water and water vapour, and will restrict the ingress of radon during the lifetime of the building.

12.2 Long periods of exposure to ultraviolet (UV) light will reduce the effectiveness of the membrane.

## 13 Reuse and recyclability

The product comprises polyethylene, which can be recycled.

## Installation

### 14 General

14.1 Radbar Radon 400 must be installed and fixed in accordance with the Certificate holder's instructions and the relevant clauses of BRE Report BR 211 : 2015.

14.2 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.

### 15 Procedure

15.1 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.

15.2 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.

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

15.4 All joints are bonded with Radbar Double-sided Jointing Tape. Joints are secured with Radbar Single-sided Overlap Tape.

15.5 The surface of the membrane to be lapped must be dry and dust free. When using Radbar Double-sided Overlap Tape, the joints must be pressed down and well rolled.

15.6 All service penetrations and direction changes must be properly detailed. Radbar Top Hat Units are available for sealing around pipe entries.

15.7 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.

15.8 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 Repair

Any damage to the product must be repaired using a patch of the membrane, and laps sealed with Radbar Double-sided Jointing Tape and secured with Radbar Single-sided Overlap 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 installations should be subject to third-party validation, in accordance with BS 8485 : 2015.

## Technical Investigations

## 17 Tests

Tests were carried out on the membrane to determine:

- moisture vapour transmission rate
- water vapour resistance
- resistance to impact
- tensile strength and elongation at break
- nail tear resistance
- trouser tear resistance
- low temperature flexibility
- dimensional stability
- strength and effectiveness of joints
- effect of heat and UV ageing on tensile properties
- resistance to static loading.

## 18 Investigations

18.1 An evaluation was made of the results of the test data regarding permeability of radon and methane.

18.2 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

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

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

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

EN 13967 : 2012 *Flexible sheets for waterproofing — Plastic and rubber damp proof sheets including plastic and rubber*

ISO 15105-1 : 2007 *Plastic. Film and sheeting. Determination of gas-transmission rate. Differential-pressure methods.*

### 19 Conditions

19.1 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.

19.2 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.

19.3 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.

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

19.5 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.

19.6 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.