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Agrément Certificate

13/5069

Product Sheet 4

VISQUEEN MEMBRANES

VISQUEEN RADON R400 MEMBRANE

This Agrément Certificate Product Sheet⁽¹⁾ relates to Visqueen Radon R400 Membrane, for use as a low-density polyethylene gas barrier and damp-proof membrane 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 membrane provides an effective barrier to the passage of liquid water and water vapour from the ground (see section 6).

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

Resistance to puncture — the membrane 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 membrane 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

Date of Second issue: 11 April 2017

John Albon – Head of Approvals
Construction Products

Claire Curtis-Thomas
Chief Executive

Originally certificated on 10 December 2013

Certificate amended on 11 March 2020 to update product name and characteristics, NHBC Standards and front page picture.

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 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, Visqueen Radon R400 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)

Requirement:	C1(2)	Site preparation and resistance to contaminants
Comment:		When properly installed in a correctly-designed structure, the product forms an effective barrier to radon gas enabling compliance with this Requirement. See section 7.1 of this Certificate.
Requirement:	C2(a)	Resistance to moisture
Comment:		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.
Regulation:	7(1)	Materials and workmanship
Comment:		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)

Regulation:	8(1)	Durability, workmanship and fitness of materials
Comment:		The product can contribute to a construction satisfying this Regulation. See section 12.1 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards applicable to construction
Standard:	3.2	Site preparation — protection from radon gas
Comment:		The product will enable a floor to satisfy the requirements of this Standard, with reference to clauses 3.1.2 ⁽¹⁾⁽²⁾ , 3.1.6 ⁽¹⁾⁽²⁾ , 3.1.7 ⁽¹⁾⁽²⁾ , 3.1.8 ⁽¹⁾⁽²⁾ , 3.2.1 ⁽²⁾ and 3.2.2 ⁽¹⁾⁽²⁾ . See section 7.1 of this Certificate.
Standard:	3.4	Moisture from the ground
Comment:		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 ⁽¹⁾⁽²⁾ , 3.4.4 ⁽¹⁾⁽²⁾ and 3.4.6 ⁽¹⁾⁽²⁾ . See sections 6.1 and 6.2 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 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 ⁽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 12.1 and the <i>Installation</i> part of this Certificate.
Regulation:	26	Site preparation and resistance to contaminants
Comment:		When properly installed in a correctly-designed structure, the product forms an effective barrier to radon gas enabling compliance with this Regulation. See section 7.1 of this Certificate.
Regulation:	28	Resistance to moisture and weather
Comment:		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* (1.2) of this Certificate.

Additional Information

NHBC Standards 2020

In the opinion of the BBA, Visqueen Radon R400 Membrane, 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 Visqueen Radon R400 Membrane is a co-polymer thermoplastic membrane containing low-density polyethylene. The product is red in colour.

1.2 The membrane has the following nominal characteristics:

Thickness (mm)	0.4
Roll length (m)	20 ⁽¹⁾
Roll width (m)	4 ⁽¹⁾
Mass per unit area (g·m ⁻²)	366
Tensile strength (N·mm ⁻²)	
MD	>15
CD	>15
Elongation (%)	
MD	>400
CD	>400

Nail tear resistance (N)	
MD	250
CD	250
Resistance to static loading (kg)	20
Watertightness (2KPa)	pass
Durability (artificial ageing)	pass
Durability against chemicals	pass.

(1) Other sizes available on request.

1.3 Ancillary products for use with the membrane include:

- Visqueen Double-sided Tape — a butyl, double-sided tape for bonding the membrane at joints
- Visqueen Gas Resistant Foil Tape — a single-sided jointing tape, suitable for securing laps and joints
- Visqueen Gas Resistant (GR) Lap Tape — a single-sided jointing tape suitable for sealing laps.

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

- Visqueen pre-formed top hat units — for sealing around service pipe penetrations
- TreadGUARD¹⁵⁰⁰ — 100% recycled, heavy-duty protection layer used to prevent damage to the membrane
- TreadGUARD³⁰⁰ — a medium-duty protection blanket used to prevent damage to the membrane
- Visqueen Pro Detailing Strip — used for sealing around column penetrations and for repairs/patching of membranes damaged during installation
- Visqueen Gas Resistant Damp Proof Course — a high-performance damp-proof course (dpc) with low permeability to radon, carbon dioxide and methane gas
- Visqueen Zedex CPT DPC — a high performance, flexible dpc and cavity tray
- Visqueen Gas Resistant Self Adhesive Membrane (GR SAM) — aluminium/polyethylene laminate with a modified bitumen adhesive backing, used to maintain gas membrane continuity on vertical surfaces and around complex penetrations and foundations
- Visqueen High Performance Tanking Primer — primes surfaces prior to the application of Visqueen Gas Resistant Self Adhesive Membrane (GR SAM)
- Visqueen Gas Vent Mat — a 25 or 50 mm thick venting mat that forms a void to collect high levels of gas concentrations underneath the concrete slab
- Visqueen Radon Sump — a pre-fabricated plastic moulded unit which provides a preferential pathway for radon gas to escape when activated with a mechanical fan.

2 Manufacture

2.1 The product is manufactured by extrusion.

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 the manufacturer has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2015 by SGS Ltd (Certificate GB17/873194).

3 Delivery and site handling

3.1 The product is delivered to site in rolls wrapped in branded polythene film, marked with a label bearing the product name, width, length and Certificate holder's address and phone number. The BBA logo incorporating the number of this Certificate is printed on the wrapper.

3.2 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 Visqueen Radon R400 Membrane.

Design Considerations

4 Use

4.1 Visqueen Radon R400 Membrane 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 guidance set out in BS 8485 : 2015.

4.3 The product is also satisfactory for use as a damp-proof membrane in accordance with CP 102 : 1973 Section 3, 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.

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 on the unjointed membrane is given in Table 1.

Table 1 Gas permeability of Visqueen Radon Membrane

Gas	Method	Result
Radon	SP Method no 3873	$8 \times 10^{-12} \text{ m}^2 \cdot \text{s}^{-1}$

7.3 In the opinion of the BBA, the membrane satisfies the criteria for a radon gas-resistant membrane of the 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 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.

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 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 Visqueen Radon R400 Membrane 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.

14.3 Unless the base is smooth, a surface blinding of soft sand (or similar material) should be used to prevent puncturing during installation or when concrete screed is being placed.

14.4 If the membrane is installed below a steel-reinforced floor concrete slab, it should be covered with a suitable protection screed prior to the positioning of the reinforcement. The Certificate holder should be consulted for suitable products.

14.5 If the membrane is above the slab, its installation should be delayed until just before laying the screed or flooring top to avoid damage from site traffic.

15 Procedure

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

15.2 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.

15.3 All joints must be bonded with Visqueen Double Sided Tape. Joints are secured with Visqueen Gas Resistant Foil Tape or Visqueen Gas Resistant (GR) Lap Tape.

15.4 The surface of the gas membrane (dpm) to be lapped must be dry and dust-free. When using Visqueen Double-sided Tape, the joints are pressed down and well rolled. Alternatively joints can be hot-air welded.

15.5 All service penetrations and direction changes must be properly detailed. Pre-formed top hat units are available for sealing around pipe entries. The Certificate holder should be consulted for suitable products.

15.6 The continuity of the gas protection must extend over the footprint of the building and the gas membrane must be sealed to a compatible gas-resistant dpc.

15.7 The membrane must be covered by a screed or other protective layer as soon as possible after installation.

15.8 The membrane installation may be subject to third-party independent validation in accordance with BS 8485 : 2015.

16 Repair

Before permanent protection is placed, the membrane area must be inspected for defects. Damage to the product must be repaired using Visqueen Pro Detailing Strip, or, if a larger repair is required, by using a patch of the membrane and sealing laps with Visqueen Double-sided Tape and Visqueen Gas Resistant Foil Tape. All patches 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

17 Tests

An assessment was made of test data in relation to:

- mass per unit area
- density
- water vapour permeability
- water vapour resistance
- static indentation
- low-temperature flexibility
- dimensional stability
- watertightness
- heat ageing at 70°C for 84 days followed by tensile strength and elongation, nail tear resistance and watertightness
- short-term UV ageing, followed by tensile strength and elongation
- tensile strength of joints
- heat ageing of joints at 70°C for 84 days followed by tensile strength.

18 Investigations

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

18.2 A site visit was conducted to assess practicability of installation.

18.3 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 8000-0 : 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 + A1 : 2019 *Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings*

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

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

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

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

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 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.