



Toughsheet[™]
Building Products

BBA Approval Inspection Testing Certification

Radon Gas Barrier

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Agrément Certificate

99/3603

Product Sheet 2 Issue 4

FRANK MERCER MEMBRANES

TOUGHSHEET RADON BARRIER

This Agrément Certificate Product Sheet⁽¹⁾ relates to Toughsheet Radon Barrier, for use as a low-density polyethylene (LDPE) radon barrier and damp-proof membrane (DPM), in concrete ground floors, above and below slabs not subject to hydrostatic pressure, to protect the building against moisture and radon from the ground.

(1) Hereinafter referred to as 'Certificate'.

The assessment includes

Product factors:

- compliance with Building Regulations
- compliance with additional regulatory or non-regulatory information where applicable
- evaluation against technical specifications
- assessment criteria and technical investigations
- uses and design considerations

Process factors:

- compliance with Scheme requirements
- installation, delivery, handling and storage
- production and quality controls
- maintenance and repair

Ongoing contractual Scheme elements†:

- regular assessment of production
- formal 3-yearly review



KEY FACTORS ASSESSED

- Section 1. Mechanical resistance and stability
- Section 2. Safety in case of fire
- Section 3. Hygiene, health and the environment
- Section 4. Safety and accessibility in use
- Section 5. Protection against noise
- Section 6. Energy economy and heat retention
- Section 7. Sustainable use of natural resources
- Section 8. Durability

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 Fourth issue: 29 September 2024

Originally certified on 7 November 2016

A handwritten signature in black ink, appearing to read 'Hardy Giesler'.

Hardy Giesler
Chief Executive Officer

This BBA Agrément Certificate is issued under the BBA's Inspection Body accreditation to ISO/IEC 17020. Sections marked with † are not issued under accreditation.

The BBA is a UKAS accredited Inspection Body (No. 4345), Certification Body (No. 0113) and Testing Laboratory (No. 0357).

Readers MUST check that this is the latest issue of this Agrément Certificate by either referring to the BBA website or contacting the BBA directly.

The Certificate should be read in full as it may be misleading to read clauses in isolation.

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

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SUMMARY OF ASSESSMENT AND COMPLIANCE

This section provides a summary of the assessment conclusions; readers should refer to the later sections of this Certificate for information about the assessments carried out.

Compliance with Regulations

Having assessed the key factors, the opinion of the BBA is that Toughsheet Radon Barrier, 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 Building Regulations 2010 (England and Wales) (as amended)

Requirement:	C1(2)	Site preparation and resistance to contaminants
Comment:		The product can contribute to satisfying this Requirement. See section 3 of this Certificate.
Requirement:	C2(a)	Resistance to moisture
Comment:		The product, including joints, will enable a floor to satisfy this Requirement. See section 3 of this Certificate.
Regulation:	7(1)	Materials and workmanship
Comment:		The product is acceptable. See sections 8 and 9 of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)	Fitness and durability of materials and workmanship
Comment:		The product is acceptable. See sections 8 and 9 of this Certificate.
Regulation:	9	Building standards - construction
Standard:	3.2	Site preparation — protection from radon gas The product will contribute to satisfying this Standard, with reference to clause 3.2.2 ⁽¹⁾⁽²⁾ . See section 3 of this Certificate.
Standard:	3.4	Moisture from the ground
Comment:		The product will enable a structure to satisfy this Standard, with reference to clauses 3.4.1 ⁽¹⁾⁽²⁾ , 3.4.2 ⁽¹⁾⁽²⁾ and 3.4.5 ⁽¹⁾⁽²⁾ to 3.4.7 ⁽¹⁾⁽²⁾ . See section 3 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 - conversion
Comment:		All comments given for 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(1)(a)(i)	Fitness of materials and workmanship
Comment:	(iii)(b)(i)	The product is acceptable. See sections 8 and 9 of this Certificate.
Regulation:	26(1)(b)(2)	Site preparation and resistance to contaminants
Comment:		The product can contribute to satisfying this Regulation. See section 3 of this Certificate.

Regulation:	28(a)	Resistance to moisture and weather
Comment:	The product can contribute to satisfying this Regulation. See section 3 of this Certificate.	

Fulfilment of Requirements

The BBA has judged Toughsheet Radon Barrier to be satisfactory for use as described in this Certificate. The product has been assessed as a LDPE radon barrier and DPM for use in concrete ground floors above and below slabs not subject to hydrostatic pressure, to protect the building against moisture and radon from the ground.

ASSESSMENT

Product description and intended use

The Certificate holder provided the following description for the product under assessment. Toughsheet Radon Barrier comprises a blown film of extruded recycled LDPE.

The product has the nominal characteristics given in Table 1.

Characteristic (unit)	Value	
Thickness (mm)	0.4	0.5
Width (m)	4	4
Roll length (m)	20	12.5
Colour	Yellow	Yellow

Ancillary Items

The Certificate holder recommends the following ancillary items for use with the product, but these materials have not been assessed by the BBA and are outside the scope of this Certificate:

- double sided butyl tape – for use in joints and laps
- jointing tape – for securing laps and joints.

Applications

Toughsheet Radon Barriers are suitable for use in concrete floors not subject to hydrostatic pressure, in accordance with the relevant clauses of CP 102 : 1973.

The product can be installed as an oversite membrane, between a blinded hardcore bed and the base concrete slab, as a sandwich membrane in a base concrete slab, or between a base concrete slab and a screed.

The product can also be used in suspended floor constructions.

Definitions for products and applications inspected

A gas-resistant membrane is defined for the purpose of this Certificate as a membrane placed above, below or within the floor slab construction to restrict methane and carbon dioxide migration from the ground into a building (as defined in BS 8485 : 2015).

Product assessment – key factors

The product was assessed for the following key factors, and the outcome of the assessment is shown below. Conclusions relating to the Building Regulations apply to the whole of the UK unless otherwise stated.

1 Mechanical resistance and stability

Data were assessed for the following characteristics.

1.1 Mechanical properties

1.1.1 Trouser tear, nail tear, tensile strength, elongation, resistance to impact, dart impact and low temperature flexibility were assessed using test data for representative related products.

1.1.2 On the basis of data assessed, the product can be punctured by sharp objects and care must be taken when handling building materials and equipment over the exposed surface.

1.1.3 The product remains flexible in the extremes of temperature likely to occur in practice.

2 Safety in case of fire

Not applicable.

3 Hygiene, health and the environment

Data were assessed for the following characteristics.

3.1 Resistance to water and water vapour

3.1.1 Water vapour transmission properties, tensile shear strength of joints and airtightness of joints were assessed on the basis of existing data for a representative related product.

3.1.2 On the basis of the data assessed, the product, including joints, provides an effective barrier to the passage of water vapour from the ground. The product is impervious to water and provides a waterproof layer capable of accepting minor structural movements without damage.

3.2 Resistance to underground gases

3.2.1 Results of tests for resistance to underground gases are given in Table 2.

Table 2 Resistance to underground gases

Product assessed	Assessment method	Requirement	Result
Toughsheet Radon 400 Membrane	Radon diffusion coefficient to ISO/TS 11665-13 : 2017	Value achieved	$7.4 \times 10^{-12} \text{ m}^2 \cdot \text{s}^{-1}$
A representative related product jointed with, double sided butyl tape, jointing tape	Radon permeability to ISO/DIS 11665-10 : 2012 method C (K124/02/95)	Value achieved	$4.0 \times 10^{-12} \text{ m}^2 \cdot \text{s}^{-1}$

3.2.2 On the basis of data assessed, the product will restrict the ingress of radon into buildings from naturally occurring sources.

3.2.3 The product complies with the minimum sheet thickness for polyethylene DPMs detailed in the documents supporting the national Building Regulations.

4 Safety and accessibility in use

Not applicable.

5 Protection against noise

Not applicable.

6 Energy economy and heat retention

Not applicable.

7 Sustainable use of natural resources

The membranes comprise polyethylene, which can be recycled.

8 Durability

8.1 The potential mechanisms for degradation and the known performance characteristics of the materials in the product were assessed.

8.2 Resistance to heat ageing for trouser tear, nail tear, tensile strength and elongation were assessed using test data for a representative related product.

8.3 The effect of short term UV ageing on tensile strength and elongation were assessed using test data for a representative related product.

8.4 Dimensional stability was assessed using test data for a representative related product.

8.5 Service life

8.5.1 Under normal service conditions, the product, when fully protected, will have a life of the structure in which it is incorporated, provided it is designed, installed and maintained in accordance with this Certificate and the Certificate holder's instructions.

8.5.2 The product will not be significantly affected by short-term exposure to ultraviolet (UV) light. However, it must be protected as soon as practicable after installation.

PROCESS ASSESSMENT

Information provided by the Certificate holder was assessed for the following factors:

9 Design, installation, workmanship and maintenance

9.1 Design

9.1.1 The design process was assessed against the requirements of BS 8000-4 : 1989, BS 8485 : 2015, CP 102 : 1973 Section 3, this Certificate and the Certificate holder's instructions, and the following requirements apply in order to satisfy the performance assessed in this Certificate.

9.1.2 The design of a gas protection system must be carried out by a suitably experienced and competent individual with sufficient knowledge of ground gas risk and the construction methods and materials.

9.1.3 The continuity of the gas protection must extend over the footprint of the building, and the product must be sealed to a gas-resistant damp-proof course (DPC) where applicable.

9.1.4 On ground bearing slabs, unless the base is smooth, a surface blinding of soft sand or similar material must be used to prevent puncturing during installation or when the concrete or screed is being placed.

9.1.5 The product can be installed in all conditions normal to ground-floor slab construction. Where there is a risk of ground becoming waterlogged, sub-soil drainage must be provided in accordance with CP 102 : 1973.

9.1.6 The type of floor finish to be used may limit the suitability of a polyethylene DPM. The guidance given in CP 102 : 1973 must be followed.

9.1.7 There will be no adverse effect on the product from the underfloor heating under normal service conditions. In other circumstances, the Certificate holder's advice must be sought, but such advice is outside the scope of this Certificate.

9.2 Installation

9.2.1 Installation instructions provided by the Certificate holder were assessed and judged to be appropriate and adequate.

9.2.2 Installation must be carried out in accordance with this Certificate and the Certificate holder's instructions following the relevant guidance in BRE Report BR 211 : 2023, CP 102 : 1973, BS 8000-0 : 2014, BS 8000-4 : 1989 BS 8485 : 2015 and NHBC NF 94.

9.2.3 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.

9.2.4 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.

9.2.5 All gas membrane installations must be subject to third-party independent validation, in accordance with BS 8485 : 2015.

9.2.6 On suspended floor slabs, the area must be free of debris and projections that may damage the product.

9.2.7 All surfaces must be dried thoroughly prior to application of the double sided butyl tape. 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 double sided 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.

9.2.8 The product must be continuous with the DPC in the surrounding walls. Where necessary the membrane must be used as a vertical DPC to link the two. The DPM and the DPC joint must be overlapped by a minimum of 150 mm and sealed with an appropriate sealant tape. Where there is doubt about the compatibility of materials, the advice of the Certificate holder must be sought, however such advice is outside the scope of this Certificate.

9.2.9 The product must be covered by a screed or other protective layer as soon as possible after installation. Care must be taken to ensure that the product is not stretched or displaced when placing the concrete or screed over the product. Sufficient allowance must be made to avoid bridging (ie creating areas of unsupported membrane) during screeding operations at details such as internal angles.

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

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

9.2.12 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 DPC.

9.3 Workmanship

9.3.1 Practicability of installation was assessed against BS 8485 : 2015, on the basis of the Certificate holder's information. To achieve the performance described in this Certificate, installation of the product must be carried out by installers trained by the Certificate holder.

9.3.2 The BBA operates an Approved Installer Scheme for gas membranes; details of approved installer companies are included on the BBA website (www.bbacerts.co.uk).

9.4 Maintenance and repair

9.4.1 As the product is confined within the structure and has suitable durability, maintenance is not required. However, any damage occurring before enclosure must be repaired.

9.4.2 Any damage to the product must be repaired using a patch of the product, and laps are sealed using tape.

10 **Manufacture**

10.1 The production processes for the product have been assessed, and provide assurance that the quality controls are satisfactory according to the following factors:

10.1.1 The manufacturer has provided documented information on the materials, processes, testing and control factors.

10.1.2 The quality control operated over batches of incoming materials has been assessed and deemed appropriate and adequate.

10.1.3 The quality control procedures and product testing to be undertaken have been assessed and deemed appropriate and adequate.

10.1.4 The process for management of non-conformities has been assessed and deemed appropriate and adequate. An audit of each production location was undertaken, and it was confirmed that the production process was in accordance with the documented process, and that equipment has been properly tested and calibrated.

10.1.5 An audit of each production location was undertaken, and it was confirmed that the production process was in accordance with the documented process, and that equipment has been properly tested and calibrated.

† 10.2 The BBA has undertaken to review 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.

11 **Delivery and site handling**

11.1 The Certificate holder stated that rolls of the product are delivered to site packed in wrappers bearing labels with the product name and the BBA logo incorporating the number of this Certificate. Rolls are supplied shrink-wrapped and on pallets.

11.2 Delivery and site handling must be performed in accordance with the Certificate holder's instructions and this Certificate, including:

11.2.1 Rolls must be stored under cover on the original pallet or individually, on end.

Supporting information in this Annex is relevant to the product but has not formed part of the material assessed for the 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.

UKCA marking

The Certificate holder has taken the responsibility of UKCA marking the product in accordance with Designated Standard EN 13967 : 2012.

CE marking

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

Management Systems Certification for production

The management system of the manufacturer has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2015 by ISOQAR (Certificate 2092 QM-001).

Bibliography

- BRE Report BR 211 : 2023 *Radon: Guidance on protective measures for new buildings (including supplementary advice for extensions, conversions and refurbishment projects)*
- BS 8000-0 : 2014 + A1 : 2024 *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 13967 : 2012 + A1:2017 *Flexible sheets for waterproofing – Plastic and rubber damp proof sheets including plastic and rubber basement tanking sheet – Definitions and characteristics*
- BS EN ISO 9001 : 2015 *Quality management systems – Requirements*
- CP 102 : 1973 *Code of practice for protection of buildings against water from the ground*
- ISO/DIS 11665-10 : 2012 *method C (K124/02/95) Measurement of radioactivity in the environment — Air: radon-222 - Part 10: Determination of diffusion coefficient in waterproof materials using activity concentration measurement*
- ISO/TS 11665-13 : 2017 *Measurement of radioactivity in the environment — Air: radon 222 Part 13: Determination of the diffusion coefficient in waterproof materials: membrane two-side activity concentration test method*

Conditions of Certificate

Conditions

1 This Certificate:

- relates only to the product 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.

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.

3 This Certificate will be displayed on the BBA website, and the Certificate Holder is entitled to use the Certificate and Certificate logo, provided that the product 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.

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

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

6 Any information relating to the manufacture, supply, installation, use, maintenance and removal of this product which is contained or referred to in this Certificate is the minimum required to be met when the product 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.

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