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BY EMAIL

Our Ref: ORH/23/L3/JPjc

20th August 2026

Dear Candy

Denby Lane, Grange Moor
Gas Membrane Installation Validation – Plots 10, 11 and 20

In accordance with our commission, we have undertaken site visits in order to provide validation information for the satisfactory installation of the gas protection measures required for Plots 10, 11 and 20. Details are provided below.

Background

The site is located north of Denby Lane in Grange Moor, Wakefield and is approximately 0.9 hectares in size. The site is being developed with 21 residential plots in total. Records show no indication of any development on the site. Several old coal pits and sandstone quarries are recorded in the surrounding areas.

A Geo-Environmental Appraisal Report, referenced 4511/1A dated 11th June 2024, was undertaken by Lithos which included the Orion Homes development site (Site B) and the site directly adjacent to the west (Site A). The appraisal reviewed a site investigation undertaken by Lithos in 2022. In the report Lithos identified several potential sources of ground gas including onsite made ground, off-site backfilled opencast (directly to the east) and shallow workings. The onsite made ground was considered to be inert, with little degradable matter and therefore was considered to be low risk. Both the off-site backfilled opencast and shallow workings were classed as low risk with no significant thickness of low permeable soil.

Based on the above Lithos installed six gas monitoring wells which included two within Orion Homes development site boundary. As the gas generation potential was considered to be low and given the proposed residential land use, nine rounds of gas monitoring was undertaken by Lithos.

Upon completion of the gas monitoring program a hazardous Gas Risk Assessment was issued by Lithos in May 2023. Carbon Dioxide Concentrations of up to 3.2% v/v were detected and no detectable levels of methane. Based on worst-case (peak) gas concentrations and steady flow, a Gas Screening Value (GSV) for Carbon Dioxide of 0.0043 was calculated. This GSV equates to Characteristic Situation CS1, therefore Lithos concluded that no gas protection measures were required.



Subsequent to the Lithos investigation a Geo-Environmental Appraisal and Revised Coal Mining Risk Assessment (report ref GRO-24078-5170 dated 22nd May 2024) was undertaken by Groundtech Consulting.

A total of seven gas and groundwater monitoring wells were installed during this site investigation. Six of these wells were installed within the windowless sample boreholes (WS1 – WS6). The wells were installed to between 2m and 4m depth. During the monitoring period, methane (CH₄) has not been recorded within the standpipes. Detectable levels of carbon dioxide (CO₂) were recorded within the standpipes, the concentrations ranged between 0.1% v/v and 6.9%v/v. Oxygen (O₂) concentrations generally ranged between 18.8%v/v and 20.9%v/v.

Based on these gas results, the site was again designated as a Characteristic Situation CS1, therefore Groundtech concluded that no gas protection measures were required. In accordance with the most recent regulator comments (Ref. WK/202501954), the gas assessment has been revised increasing the classification of site to CS2. A gas risk assessment prepared by ARP is currently being considered by the regulator, but formal comments are yet to be received.

The protection measures required (for CS2) include a minimum of 150mm clear air space, passively vented using periscopic venting pipes, and a gas membrane resistant to carbon dioxide and methane, which is approved by the BS8485 Code of Practice. The membrane is to be passed through the cavity wall and act as the damp proof membrane, as recommended by the manufacturer. All service penetrations are to be formed with the use of top hats or self-adhesive gas membranes and are to be fully sealed.

The gas protection measures drawing for plots 10, 11 and 20 are presented in Appendix A.

ARP Geotechnical Ltd Brief

ARP Geotechnical Ltd (ARP) was requested by Orio Homes to carry out inspections of the gas membrane installation photographs and check that:

- 1) The appropriate products are being used.
- 2) All the area required is covered.
- 3) The membrane is appropriately sealed and is present through the cavity wall.
- 4) All the laps and joins are sufficient and are appropriately sealed.
- 5) Where applicable, each service entry is appropriately sealed.
- 6) The external vents are at the appropriate spacing and are not blocked by debris.
- 7) There are no visible punctures or tears in the membrane.
- 8) For a select number of plots and where possible the underfloor void will be inspected.



Inspection of Gas Protection Measures

Inspection to confirm the satisfactory installation of the gas membranes on Plots 10, 11 and 20 was carried out by ARP on 29th July and 19th August 2026 (the location of these plots are shown on the plan in Appendix A). Prior to arrival, the Client provided ARP with details of the membrane proprietary product (Visqueen Gas Barrier NF 400 for plot 11, and Juta GP1 Gas Barrier for plots 10 and 20) and supporting components to be installed in all dwellings covered by this report (Specification Sheets attached in Appendix B). The membrane is in line with the properties required by BS8485 and is resistant to carbon dioxide, methane, radon and moisture.

The inspection of Plot 11 was carried out by ARP on the 29th July 2026 before any floor coverings had been placed. The correct barrier (Visqueen Gas Barrier NF 400) was visible across the floor area and appeared to have been placed in accordance with the required third party and proprietary specifications (joined with doubled sided and single side tape with 100mm overlap). All service penetrations on these plots were formed using self-adhesive membrane (Visqueen Pro Detailing Strip) and were appropriately sealed. The membrane on this plot was in a satisfactory condition. The installation was completed by groundworkers. Photographs of the gas protection measures are provided in Appendix C.

The inspection of Plots 10 and 20 were carried out by ARP on the 19th August 2026 before any floor coverings had been placed, to allow for thorough verification. The correct barrier (Juta GP1 Gas Barrier) was visible across the floor area and appeared to have been placed in accordance with the required third party and proprietary specifications (joined with heat welded lap joints). All service penetrations on these plots were formed using self-adhesive membrane (GP1 SAM) and were appropriately sealed. The membrane on all plots was in a satisfactory condition. The installation was completed by Omega Stormwater Ltd. The spacing of the periscopic ventilation pipes was approximately 2m. The pipes were free from debris, and workmanship appeared to be satisfactory, as required by the guidance. Photographs of the gas protection measures are provided in Appendix C.

Conclusion

ARP has inspected the installed gas protection system for Plots 10, 11 and 20, and they were found to be satisfactory. Based on the photographs provided of the slab formation and the ARP site inspection visit, it is concluded that the installation of gas protection measures has been carried out to the required standard on Plots 10, 11 and 20.

Service ducts will require appropriate sealing using a closed cell sealant such as FiloSeal or FiloForm with the appropriate gas protection properties. It remains the responsibility of the main contractor to provide photographic evidence of service duct sealing to the Local Authority once services have been pulled through the ducts.

We trust the above and attachments are acceptable, but if you have any queries, please do not hesitate to contact us at your convenience.

Yours sincerely
for ARP GEOTECHNICAL LTD

✓

J Pemberton

Encs

APPENDIX A



Plots covered in
this letter



ARP GEOTECHNICAL LTD
CHARTERED CONSULTING ENGINEERS

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Project

DENBY LANE,
GRANGE MOOR

Client

ORION HOMES LTD

Title

PLOTS 10, 11 AND 20
GAS MEMBRANE VALIDATION PLAN

Date

AUGUST 2026

Drawn

JP

Scale

AS SHOWN

Job No.

ORH/23

APPENDIX B

Juta (UK) Ltd

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Church Road
Lytham FY8 5PL



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Agrément Certificate

20/5728

Product Sheet 1

JUTA GAS-RESISTANT AND DAMP PROOFING MEMBRANES

GP1 GAS BARRIER

This Agrément Certificate Product Sheet⁽¹⁾ relates to GP1 Gas Barrier, for use as a low-density polyethylene (LDPE) 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, radon, methane and carbon dioxide 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, methane and carbon dioxide into the building (see section 7).

Resistance to puncture — the membrane has a high resistance to puncture and on 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, methane and carbon dioxide 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 First issue: 11 March 2020

Hardy Giesler
Chief Executive Officer

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.

British Board of Agrément

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Regulations

In the opinion of the BBA, GP1 Gas 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 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 membrane forms an effective barrier to radon, methane and carbon dioxide, 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 membrane 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 membrane is 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 membrane 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:	3.1	Site preparation – harmful and dangerous substances
Standard:	3.2	Site preparation – protection from radon gas
Comment:		The membrane will enable a floor to satisfy the requirements of these Standards, 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 membrane 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 membrane 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 membrane 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 membrane forms an effective barrier to radon, methane and carbon dioxide 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 membrane 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, GP1 Gas Barrier, 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.

Technical Specification

1 Description

1.1 GP1 Gas Barrier is a multilayer, LDPE membrane, reinforced with a polypropylene reinforcing grid with an integral aluminium foil.

1.2 The membrane has the following nominal characteristics:

Thickness (mm)	0.6 (including reinforcement scrim)
Effective thickness (mm)	0.4 (measured between the reinforcement scrim)
Roll length (m)	various
Roll width (m)	various
Mass per unit area (g·m ⁻²)	370
Tensile strength (N·50 mm ⁻¹)	
Machine direction	600
Cross direction	480
Elongation (%)	
Machine direction	20
Cross direction	20

Nail tear resistance (N)	
Machine direction	330
Cross direction	400
Watertightness	pass
Colour	
upper surface	various
lower surface	various.

1.3 Ancillary products for use with the membrane include:

- butyl or bitumen tape — for use for joints and laps
- jointing tape — for securing laps and joints.

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

- GP Top Hats — to seal around entry points to the membrane
- GP Internal Corner Cloaks — prefabricated corner details
- GP External Corner Cloaks — prefabricated corner details
- GP Primer — used to provide adhesion for application of bitumen enhanced geomembranes
- GP Void Vent 25 — cusped high-density polyethylene (HDPE) drainage core with a non-woven polypropylene geotextile separator/filter bonded to one side
- GP Void Vent 40 — cusped HDPE drainage core with a non-woven polypropylene geotextile separator/filter bonded to one side
- GP Protection Fleece — to form a protective layer to prevent damage to the membrane
- GP-SAM — gas-resistant self-adhesive membrane
- GP DPC — a gas resistant damp-proof course (dpc).

2 Manufacture

2.1 The membrane is manufactured by an extrusion/coating 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 the manufacturer has been assessed and registered as meeting the requirements of ČSN EN ISO 9001 : 2016 and ČSN EN ISO 14001 : 2016 by Bureau Veritas (Certificates CZ006792-1 and CZ002815-1 respectively).

3 Delivery and site handling

3.1 Rolls are wrapped in polythene film. Each roll has a leaflet enclosed describing the membrane 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 GP1 Gas Barrier.

4 Use

4.1 GP1 Gas Barrier is satisfactory for use as a gas-resistant barrier to restrict the ingress of radon, methane and carbon dioxide into buildings from landfill and 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 membrane 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 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 membrane will restrict the ingress of radon, methane and carbon dioxide into buildings from landfill and naturally occurring sources and satisfy the performance criteria 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 GP1

Gas	Method	Result
Methane ⁽¹⁾	BS ISO 15105-1	$<0.09 \text{ ml}\cdot\text{m}^2\cdot\text{day}^{-1}\cdot\text{atm}^{-1}$
Carbon dioxide	BS ISO 15105-1	$<0.09 \text{ ml}\cdot\text{m}^2\cdot\text{day}^{-1}\cdot\text{atm}^{-1}$
Radon	K124/02/95	$8.0 \times 10^{-15} \text{ m}^2\cdot\text{s}^{-1}$

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

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

9 Compatibility with other materials

The membrane contains an aluminium foil interlayer which may be subject to corrosion by alkaline conditions if damage to the membrane and exposure occurs. However, under normal circumstances, the polyethylene faces of the membrane are compatible with other materials and products typically used in the same areas, with the exception of those containing pitch.

10 Underfloor heating

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

11 Maintenance

As the membrane 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 15).

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, methane and carbon dioxide during the lifetime of the building.

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

Installation

13 General

13.1 GP1 Gas Barrier must be installed and fixed in accordance with this Certificate, the Certificate holder's instructions, the relevant clauses of BRE Report BR 211 : 2015 and the guidance given in BS 8485 : 2015.

13.2 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 Procedure

14.1 The membrane 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.

14.2 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.

14.3 The membrane is rolled out with the printed side uppermost, ensuring that it is properly aligned. All end and side overlaps should be a minimum of 100 mm where taped and prepared in accordance with the Certificate holder's instructions.

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

14.5 All surfaces must be dried thoroughly prior to joining. Roll edges can be welded or taped. 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.

14.6 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.

14.7 The continuity of the gas protection must extend over the footprint of the building, and the membrane must be sealed to a gas-resistant dpc where required.

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

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

15 Repair

Any damage to the membrane 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 100 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

16 Tests

16.1 An assessment was made of data to BS EN 13967 : 2012 in relation to:

- tensile strength and elongation
- nail tear resistance
- watertightness
- resistance to static loading.

16.2 Tests were carried out to determine:

- thickness, width, density and mass per unit area
- dimensional stability, low temperature flexibility and water vapour permeability
- tensile strength and elongation (control, heat aged , and UV exposed)
- watertightness (control and heat aged)
- nail tear strength (control and heat aged)
- resistance of joints to air pressure
- tensile strength of joints (control and heat aged)

to assess:

- membrane characteristics
- durability of the membrane and joints.

17 Investigations

17.1 An evaluation was made of the results of the test data regarding permeability of radon, methane and carbon dioxide.

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

17.3 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

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 + 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*

ČSN EN ISO 9001 : 2016 *Quality management systems — Requirements*

ČSN EN ISO 14001 : 2016 *Environmental management systems — Requirements with guidance for use*

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*

K124/02-95 *Radon diffusion coefficient by Czech Technical University to test number 124-11 — Measurement of radon coefficient*

18 Conditions

18.1 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.

18.2 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.

18.3 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.

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

18.5 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.

18.6 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.

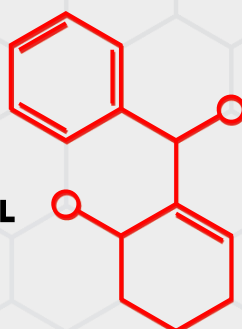


Juta GP[®] 1 - Gas Barrier is a multi-layer, low density polyethylene membrane, reinforced with a polypropylene reinforcing grid with an integral aluminium foil. GP[®] 1 is specifically designed and manufactured to perform as a Methane, Carbon Dioxide, Radon, Ground Gas, VOC /Hydrocarbon vapors, air & moisture protection system.



JUTA GP [®] 1			
Characteristics	Test Method	Unit	JUTA GP [®] 1
Physical Properties			
Thickness	EN 1849-2	mm	0.6
Thickness - Between Scrim	BS EN ISO 9863-1:2016	Mm	0.4
Width	EN 1849-2	m	Various
Length	EN 1849-2	m	Various
Weight	EN 1849-2	G/M2	370
Hydraulic Properties			
Thickness	EN 20811	-	>300
Resistance to Water Penetration	EN 13967, EN 1928	-	Pass
Water Tightness	EN 1296, EN 1367, EN 1928	-	Pass
Hydraulic Properties			
Resistance to Static Load	EN 12730-B	Kg	20
Tensile Strength (MD)	EN 12311-1	N/50mm	600
Tensile Strength (CMD)	EN 12311-1	N/50mm	480
Tensile Elongation (MD)	EN 12310-1	%	20
Tensile Elongation (CMD)	EN 12310-1	%	20
Puncture Resistance	EN 12236	kN	1.25
Resistance to Tearing (Nail Shank) MD	EN 12310-1	N	330
Resistance to Tearing (Nail Shank) CMD	EN 12310-1	N	400
Durability and Chemical Resistance			
Transmission Rate of Volatile Liquids - Diesel	ISO 6179:2010 (B)	g/m ² /h	0.246
Transmission Rate of Volatile Liquids - Xylene	ISO 6179:2010 (B)	g/m ² /h	0.571
Transmission Rate of Volatile Liquids - Toluene	ISO 6179:2010 (B)	g/m ² /h	0.583
Transmission Rate of Volatile Liquids - Petrol	ISO 6179:2010 (B)	g/m ² /h	0.135
Gas Permeability			
Methane Permeability	BS EN ISO 15105-1	ml/m ² /day/atm	<0.09
Carbon Dioxide Permeability	BS EN ISO 15105-1	ml/m ² /day/atm	<0.09
Radon Permeability	K124/02/95	m ² /s	8.0 x 10 ⁻¹⁵
Compliance and Certification			
CE Mark - EN13967:2012			
NHBC Standards Compliant			
BS 8485:2015 + A1 2019 Accordant			
BBA Certified - Certificate No. 12/4912			

Contact us to find out more information.
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Melton Grove Works, Church Road, Lytham, FY8 5PL



JUTA



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Additional Information

HANDLING

Roll weights can be in excess of 20kg and hence appropriate care and equipment is required for unloading and handling.

STORAGE

Rolls of JUTA GP® 1 should be stored on stable/level ground and stacked not more than five rolls high, with no other material stacked on top. The rolls can be stored outdoors when packaged, but should be protected from exposure to UV.

INSTALLATION

JUTA GP® 1 should be installed in accordance with the product installation guidelines, and in accordance with BS 8485:2015.

JOINTING AND SEALING

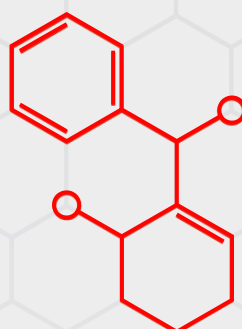
It is recommended JUTA GP® 1 be heat welded where possible, with welding carried out by competent personnel with suitable qualifications in accordance with best practice, and guidance contained within BS 8485:2015. JUTA GP® 1 should be overlapped by at least 100mm. If taping joints, only suitable tape must be used, ensuring application with a silicone roller to remove trapped air. JUTA pre-formed details, or Self Adhesive Gas Membrane are available for sealing around protuberances.

ACCESSORY PRODUCTS

-  JUTA GP® 1 Starter Band
-  JUTA GP® Tape
-  JUTA GP® Self Adhesive Membrane
-  JUTA GP® Primer
-  JUTA GP® Top Hats and Preformed Corners
-  JUTA GP® Protection Fleece
-  JUTA GP® Void Vent (25/40mm)

PLEASE CONTACT JUTA UK DIRECTLY FOR MORE INFORMATION ON JUTA GP® 1

Contact us to find out more information.
info@juta.co.uk | 01772 754177 | JUTA.CO.UK
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GP[®]1 SAM

GP[®]1 SAM, gas protection self adhesive membrane, is a bituminous gas proof and water proof sheet, composed of self-adhesive SBS polymer modified bitumen incorporating GP[®]1 with an upper surface finish of black reinforced LDPE, and a lower surface finish of siliconized release film. GP[®]1 SAM is used for the gas/waterproofing of underground structures where harmful ground gasses are anticipated, and as a self adhesive accessory to GP[®]1.

Thickness	1.2 mm
Width	0.9 m or 0.3 m
Length	20 m
Weight	1100 g/m ²

TITANTECH[®]

For developers of brownfield and contaminated sites the TITANTECH[®] family of products represent a major step forward in safeguarding projects against gaseous and chemical contamination.

Handling

Roll weights can be in excess of 20 kg (approx 33 kg/roll) and hence appropriate care and equipment is required for unloading and handling. This product is non-toxic nor flammable.

Storage

Rolls of GP[®]1 SAM should be stored on in a cool, dry place, and be protected from exposure to rain, sun, heat and cold temperatures prior to installation. Exposure to sunlight for extended period of time could cause difficulty with removal of the release film.





Feature	Characteristics	Test Method	GP [®] 1 SAM
Physical Properties	Thickness	EN 1849-2	1.2 mm
	Width	EN 1849-2	0.9 or 0.3 m
	Length	EN 1849-2	20 m
	Weight	EN 1849-2	1100 g/m ²
Hydraulic Press	Water Tightness	EN 1928	Pass
	Water Vapour Transmission	EN 1931	0.013 g/m ² /day
Mechanical Properties	Tensile Strength (MD/CMD)	EN 12311-2 (A)	500 N/50mm
	Elongation (MD/CMD)	EN 12311-2 (A)	> 12 %
	Resistance to Static Load	EN 12370	20 kg
	Joint Strength	EN 12317-2	> 30 N
	Durability and Water Tightness (Ageing and Chemicals) 60 kPa	EN 1847	Pass
	Resistance to Nail Tear (MD/CMD)	EN 12310-1	> 300 N
	Resistance to Fire	EN 13501	F Euro Class
Gas Permeability	Methane Permeability	EN ISO 15105-1	< 0.68 ml/m ² /day/atm
	Carbon Dioxide Permeability	EN ISO 15105-1	< 2.81 ml/m ² /day/atm
	Radon Permeability	K124/02/95	8.0 x 10 ⁻¹⁵ m ² /S
Compliance and Certification	CE Mark - EN13967:2012 + A1:2017 Type (A/T)		
	BS 8485:2015 Compliant (Methane and Carbon Dioxide Barrier)		

JUTA UK

Please contact JUTA UK Directly for more information on GP[®]1 SAM

Installation

GP[®]1 SAM should be installed in accordance with the product installation guidelines, and in accordance with BS 8485:2015, and/or BS 8102:2009.

It is recommended that GP[®]1 SAM is not applied in temperatures below 10°C, in colder weather the material can be warmed slightly to aid adhesion.

Accessory Products

- GP[®] Primer
- GP[®] Protection Board
- GP[®] Protection Fleece

Juta (UK) Ltd

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Agrément Certificate

22/6076

Product Sheet 1

GP SELF ADHESIVE WATERPROOFING AND GAS CONTROL MEMBRANES

GP 1 SAM

This Agrément Certificate Product Sheet⁽¹⁾ relates to GP 1 SAM, a self-adhesive membrane incorporating a multilayer low-density polyethylene (LDPE) film reinforced with a polypropylene mesh and aluminium foil, for use as a damp-proof and waterproofing membrane and to protect the building from the ingress of radon, methane and carbon dioxide 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, will 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, 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 (see section 8).

Adhesion — the adhesion of the product to the substrate and to itself is satisfactory (see section 9).

Durability — under normal service conditions, the product will remain effective against the ingress of moisture, and will restrict the ingress of radon, methane and carbon dioxide from the ground for the life of the structure in which it is installed (see section 11).

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: 12 May 2022

Hardy Giesler
Chief Executive Officer



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.

British Board of Agrément

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Regulations

In the opinion of the BBA, GP 1 SAM, 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 will contribute to a construction satisfying this Requirement with regard to radon, methane and carbon dioxide. See sections 7.1 and 7.2 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 <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 use of the product satisfies the requirements of this Regulation. See section 11.1 and the <i>Installation</i> 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:		When properly installed in a correctly designed structure, the product will form an effective barrier to the movement of radon, methane and carbon dioxide from the ground enabling compliance with these 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 sections 7.1 and 7.2 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⁾ 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 12.1 and the <i>Installation</i> part of this Certificate.

Regulation:	26(1)(b),	Site preparation and resistance to contaminants
Comment:	26(2)	The product will contribute to a construction satisfying the requirements of this Regulation with regard to radon, methane and carbon dioxide. See sections 7.1, 7.2 of this Certificate.
Regulation:	28(a)	Resistance to moisture and weather
Comment:		The product, including joints, will enable a structure to satisfy 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 section: 3 *Delivery and site handling* (3.1, 3.4 and 3.5) of this Certificate.

Additional Information

NHBC Standards 2022

In the opinion of the BBA, GP 1 SAM, 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*, for use externally as a post applied membrane.

Where Grade 2 or 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 : 2022.

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/Designated Standard EN 13967 : 2012.

Technical Specification

1 Description

1.1 GP 1 SAM is a nominal 1.2 mm thick membrane comprising a multilayer, LDPE membrane, reinforced with a polypropylene reinforcing grid with an integral aluminium foil and a self-adhesive polymer modified bitumen compound applied to one face. The self-adhesive layer is protected with a siliconized polypropylene release film. The product has the nominal characteristics given in Table 1.

Table 1 Nominal characteristics

Characteristic (unit)	Value
Thickness (mm)	1.2
Effective thickness (mm)	0.9
Roll length (m)	20
Roll width (m)	0.3, 0.9
Mass per unit area ($\text{kg}\cdot\text{m}^{-2}$)	1.2
Impact resistance (mm)	≥ 250
Tensile strength (N per 50 mm)	
MD	≥ 550
CD	≥ 400
Elongation (%)	
MD/CD	≥ 20
Water vapour transmission ($\text{g}\cdot\text{m}^{-2}\cdot\text{day}^{-1}$)	0.7
Watertightness (60 kPa)	Pass
Nail tear (N)	
MD/CD	≥ 300
Resistance to static loading (kg)	≥ 20

1.2 Ancillary items for use with the product and included in this assessment are:

- GP PRIMER — a bituminous solvent-based primer used to prime masonry substrates prior to the application of GP 1 SAM
- GP LAP TAPE — a single-sided adhesive aluminium foil tape for sealing and protecting overlapped joints in GP 1 SAM.

1.3 Other ancillary items for use with the product, but outside the scope of this Certificate include:

- protection fleece and/or protection boards for use over the membrane to protect it from damage from UV and from trafficking and backfilling operations during the installation
- pre-fabricated corner units and top hats
- specialised sealants and liquid-applied membranes for sealing around penetrations and pile caps
- void-vent geocomposite membranes for use as part of a gas/VOC restrictive system
- angle fillets.

The Certificate holder should be consulted for suitable products.

2 Manufacture

2.1 The product is manufactured by extrusion and laminating processes.

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 systems of the manufacturers have been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2015 by Bureau Veritas (Certificate CZ006792-1) and BSI (Certificate Q09303).

3 Delivery and site handling

3.1 The product is delivered to site in rolls of 0.3 x 20 m and 0.9 x 20 m weighing approximately 7 and 22 kg respectively.

3.2 Rolls must be stored horizontally under cover in cool dry conditions, protected from rain, direct sun light and extremes of temperature. Pallets must not be stacked on top of one another. The product should be protected against mechanical damage.

3.3 GP LAP TAPE is available in rolls with nominal dimensions of 50 m x 75 mm x 0.2 mm. The product is packed into cardboard boxes. Each box contains 16 rolls.

3.4 GP PRIMER is supplied in 5 and 25 litre tins.

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 GP 1 SAM.

Design Considerations

4 Use

4.1 GP 1 SAM is satisfactory for use as a Type A waterproofing protection, as defined in BS 8102 : 2022 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 internally and externally applied to provide an effective barrier to the transmission of liquid water where Grades 1 to 3 waterproofing protection is required, as defined in BS 8102 : 2022, Table 2.

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 compatible with concrete, smooth brick and blockwork or screeded substrates, and is resistant to those chemicals likely to be present in normal service conditions.

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

4.6 The product should be fully protected immediately after it is installed, in accordance with the Certificate holder's instructions.

5 Practicability of installation

The product 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



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.

7 Resistance to underground gases



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

7.2 Measured gas permeability/diffusion values on GP 1 SAM are given in Table 2.

Table 2 Gas permeability of GP 1 SAM

Gas	Method	Result
Methane ⁽¹⁾	BS ISO 15105-1	
- unjointed		0.69 ml·m ² day ⁻¹ ·atm ⁻¹
Carbon dioxide		2.85 ml·m ² day ⁻¹ ·atm ⁻¹
Radon (unjointed) ⁽²⁾	BS ISO 15105-1 K124/02/95	8.0 x 10 ⁻¹³ m ² ·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·m²·d⁻¹·atm⁻¹.

(2) Measured on the GP 1 component of the product without the self-adhesive bitumen coating.

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 mechanical damage

8.1 The product can accept the limited foot traffic and light loads associated with the installation without damage.

8.2 When installed, the membrane is capable of accommodating the minor movements likely to occur under normal service conditions.

8.3 The product can be damaged by sharp objects and care must be taken with exposed surfaces during construction and back filling operations. Where damage does occur, the product must be repaired (see section 15).

9 Adhesion

The adhesion of the product to the substrate and to itself, with joints as described in this Certificate, is satisfactory.

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 15).

11 Durability



11.1 The product, when fully protected in normal circumstances, will remain effective against the ingress of water and water vapour, and will restrict the ingress of radon, methane, carbon dioxide during the lifetime of the building.

11.2 Long periods of exposure to UV radiation will reduce the effectiveness of the membrane and it should be protected from UV as soon as practicable after it is installed.

12 Reuse and recyclability

The product contains polyethylene, which can be recycled.

13 General

13.1 GP 1 SAM must be installed in accordance with the Certificate holder's instructions and this Certificate and follow the relevant guidance given in BS 8102 : 2022, BS 8485 : 2015, BRE Report BR 211 : 2015, BS 8000-0 : 2014 and BS 8000-4 : 1989.

13.2 The product must be installed in dry conditions at temperatures between 10 and 35°C. Care must be taken to ensure that there is no surface condensation when installing at low temperatures that could affect jointing.

13.3 The surface onto which the product is to be applied must be smooth, dry and free from sharp protrusions and debris that could damage the membrane. Brickwork or blockwork must be flush pointed or rendered to provide a smooth surface.

13.4 For internal tanking applications the membrane must be fully loaded.

13.5 The membrane must be protected as soon as possible after it is installed to minimise the risk of damage from direct foot trafficking and exposure to UV radiation. Direct trafficking by vehicles must be avoided.

14 Procedure

14.1 Prepared surfaces must be primed with GP PRIMER, typically at a coverage rate of between 6 and 10 m² per litre, and allowed to dry before application of the membrane. Only areas that can be covered with the membrane on the same day should be primed.

14.2 Sharp angles at changes of direction should be avoided by using suitable angle fillets. The Certificate holder should be consulted for suitable products.

14.3 The membrane is cut to length allowing 100 mm for end laps and positioned by progressively peeling back the release film and applying the self-adhesive face to the primed surface.

14.4 The membrane should be smoothed out to remove air pockets and then rolled using a hard silicone roller.

14.5 Remaining bubbles should be slit and the membrane adhered to the substrate. Slits and other damage should be covered using a patch of the membrane ensuring a minimum overlap on the damaged area of 100 mm.

14.6 Subsequent adjacent strips of the membrane are then lapped over the previously applied membrane ensuring a minimum side overlap of 50 mm and 100 mm for end laps. The laps must then be rolled with a hard silicone roller to ensure good adhesion.

14.7 GP LAP TAPE is then applied equally over the joint.

14.8 In vertical applications the top of the membrane must be immediately supported.

14.9 The Certificate holder must be consulted for the treatment of specific details.

14.10 For gas applications the membrane installation should be subject to third-party independent validation, in accordance with BS 8485 : 2015 as detailed in CIRIA C735 section 3.4. Particular attention should be paid to laps, edges and sealing of service entries and penetrations such as pipes and pile caps.

15 Repair

Any damage to the membrane must be repaired using a patch of the membrane. All patched areas must extend a minimum of 100 mm from the damaged area. If required, 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 as detailed in CIRIA C735 section 3.4.

16 Tests

Tests were carried out and the results assessed to determine:

- visible defects
- width and straightness
- thickness
- mass per unit area
- resistance to static loading
- resistance to impact
- watertightness of joints (60 kPa)
- shear strength of joints
- water vapour transmission.

17 Investigations

17.1 An assessment was made of independent test reports to establish:

- radon diffusion coefficient
- resistance to transmission of methane and carbon dioxide gas
- watertightness after exposure to liquid chemicals (60 kPa)
- watertightness after heat ageing (60 kPa).

17.2 An assessment of existing test data held by the BBA to establish:

- flexibility at low temperature
- peel adhesion
- resistance to fatigue
- foldability at low temperature
- tensile strength and elongation.

17.3 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

BRE Report BR 211 : 2015 *Radon : Protective measures for new buildings*

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

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

BS 8102 : 2022 *Protection of below ground structures against water ingress — Code of practice*

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

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

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

18 Conditions

18.1 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.

18.2 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.

18.3 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.

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

18.5 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.

18.6 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.

VisqueenPro Detailing Strip, 300mm x 10m, 500mm x 10m

Features & benefits

- Flexible - can be cut and shaped to various applications
- Multi-use - suitable for complex junctions, stanchions, patchwork and terminations
- Gas resistant aluminium core

Product description

VisqueenPro Detailing Strip is a composite of PET/aluminium and a cold weather butyl compound. It is available in roll format, 300mm x 10m and 500mm x 10m.

Approvals and standards

- Complies with the methane gas transmission rate, mass per unit area and thickness requirements of BS 8485:2015 + A1:2019 - industry standard for methane and carbon dioxide protection
- Suitable for all Characteristic Gas Situation (CS) ground gas regimes
- Conforms to the specification requirements of NHBC Amber 1 and Amber 2 applications
- Conforms to the specification requirements of BR 211:2023
- Visqueen certified with Quality Management System ISO 9001:2015
- Visqueen certified with Occupational Health and Safety System ISO 45001:2018
- Visqueen certified with Environmental Management System ISO 14001:2015

Usage

VisqueenPro Detailing Strip is used for sealing junctions and complicated detailing in Visqueen gas protection systems, waterproofing systems, and damp proofing systems. It can be used on concrete, blockwork, brickwork, particle boards, steel work, steel stanchions and wooden substrates for both vertical and horizontal application.

Storage and handling

Store in a dry and clean environment in its current packaging. The product must be stored upright.

VisqueenPro Detailing Strip can be cut with a sharp retractable safety knife.

Care should be taken when handling the product in line with current manual handling regulations.

Preparation

Surfaces must be smooth and free from sharp protrusions, ensure the surface and working area is not water logged and is frost free. When applying to blockwork or brickwork the joints must be flush pointed. Prior to bonding, substrates such as masonry, concrete and steel should be primed using Visqueen HP Tanking Primer and allowed to dry thoroughly. Visqueen HP Tanking Primer must not be used on Insulation or ICF systems.

Installation

Position and peel back the VisqueenPro Detailing Strip release film and apply the pressure sensitive, self adhesive face to the prepared substrate. Apply pressure by rolling to ensure a full bond is achieved. All lap joints should be a minimum of 150mm and must be pressed and rolled to ensure damp, gas or waterproofing continuity.

When used for sealing membranes punctures, VisqueenPro Detailing Strip should be lapped at least 150mm beyond the extents of the puncture.

Usable temperature range

It is recommended that VisqueenPro Detailing Strip should be installed above -5°C. Prior to installation, ensure that frost or ice is not present on the substrate.

Additional information

The information in this datasheet was correct at the time of publication.

It is the user's responsibility to obtain the latest version of the datasheet as it is updated on a regular basis.

The information contained in the latest datasheet supersedes all previously published editions.

Property	Value
Width	300mm or 500mm

VisqueenPro Detailing Strip, 300mm x 10m, 500mm x 10m

Length	10m
Application temperature range	-5°C to 40°C
Peel Adhesion BS EN 12316, ASTM D1000, in N/cm @ 5°C	
- Polyethylene	20.7
- Polyethylene with no static charge	21.2
- Steel	26.9
- Concrete	28.8
Mean water vapour resistance factor, BS EN 1931, u	3960000
Mean water vapour diffusion equivalent air layer thickness BS EN 1931, (Sd) in m	4752
Mean water vapour resistance, BS EN 1931, MNs/g	23760
Mean water vapour permeability, BS EN 1931, g/m2/day	0.03

Health and safety information

Refer to the VisqueenPro Detailing Strip safety datasheet (SDS)

About Visqueen

Visqueen is a leading provider of construction membrane technologies and design-based solutions for ground gas, structural waterproofing, damp proofing and fire protection.

We offer complete support at every stage of the specification, including the supply chain process. As the UK's principal technical authority, we are best placed to ensure that the principal designer and contractor specify the most technically suited, durable, and competitive solution to guarantee their project is protected for the lifetime of the building.

Visqueen is at the forefront of advanced membrane technology and innovation in the construction industry, earning the trust and loyalty of specifiers throughout the UK and Europe.

For more information, visit visqueen.com or contact our sales office at [+44 \(0\) 333 202 6800](tel:+442023332026800) or enquiries@visqueen.com

Complete Range, Complete Solution



Passive Fire Protection



Gas Protection



Damp Proof Membrane



Air and Vapor Control



Stormwater



Damp Proof Course



Temporary Protection

Visqueen Technical Support

Visqueen offer a comprehensive full nationwide technical support. Our team of CSSW qualified technical support managers provide on site design-based solutions for specifiers, contractors and builders merchants, and will ensure that from design stage to installation the project is fully risk assessed and the specification is approved by all stakeholders.

Our Technical Office, can design, prepare and manage CAD detailing, together with assisting in quantity take offs, while offering advice on technical installations and product selection.

Competency & Design

Visqueen promotes competency in building design by ensuring that its technical team possesses the necessary skills, knowledge, experience, and ethical practices. The company adopts the "golden thread of information," ensuring all project data is digitally secure and accessible throughout a building's lifecycle. This approach aligns with the Building Safety Act and aims to foster accountability and compliance with evolving regulations, providing clients with confidence in the safety and reliability of their projects.

VisqueenPro Detailing Strip, 300mm x 10m, 500mm x 10m

Visqueen CPD Seminars

Visqueen's CPD Seminars offer insights into Building Regulations, Standards, and industry guidance related to damp proofing, hazardous ground gas protection, and structural waterproofing. These one-hour seminars are tailored for construction design professionals and delivered by our Technical Support Managers. Visit our website to book a free CPD.

Visqueen Contract Design Services

Visqueen Contract Design Services offers a bespoke design service led by our team of Certified Surveyors in Structural Waterproofing (CSSW), providing experienced and specialised waterproofing design expertise for complex projects. We provide comprehensive support throughout the entire project, ensuring that all work meets the requirements of warranty providers and adheres to the highest standards of quality, reliability and current legislation.

Visqueen Training Academy

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Visqueen Gas Barrier NF-400

Features & benefits

- BDA Agreement Certification - third party accreditation
- Complies with NHBC Foundation NF94 guidance for use in Type A membrane locations - non foil system
- Complies with the methane gas transmission rate, mass per unit area and thickness requirements of BS 8485:2015 + A1:2019 - industry standard for methane and carbon dioxide protection
- Transparent - allows a clear view of the substrate during and post installation
- Multi functional - also acts as a radon and damp proof membrane
- Dual jointing methods - depending upon specification, lap joints can be heat welded or taped

Product description

Visqueen Gas Barrier NF-400 is a co-extruded, multi-layer thermoplastic gas membrane, 0.4mm thick (400 micron). The membrane is transparent with a blue tint and supplied 2.4m x 43.5m in a single wound roll.

Approvals and standards

- Third party accreditation (BDA Agreement Certificate BAB-24-339-P-A-UK)
- Complies with the methane gas transmission rate, mass per unit area and thickness requirements of BS 8485:2015 + A1:2019
- Suitable for all Characteristic Gas Situation (CS) ground gas regimes
- Complies with NHBC Foundation NF94 guidance for use in Type A membrane locations (non foil system)
- Conforms to the specification requirements of NHBC Amber 1 and Amber 2 applications
- Conforms to the specification requirements of BR 211:2023
- UKCA UKNI CE to EN 13967:2012
- Visqueen certified with Quality Management System ISO 9001:2015
- Visqueen certified with Occupational Health and Safety System ISO 45001:2018
- Visqueen certified with Environmental Management System ISO 14001:2015

Usage

Visqueen Gas Barrier NF-400 is suitable for use in all types of buildings to prevent the ingress of harmful levels of methane, carbon dioxide and radon.

The barrier can be positioned above or below reinforced cast in situ concrete floor slabs e.g. ground bearing, suspended or raft, or above precast suspended segmental subfloors, e.g. beam and block floor.

The barrier can also be used as a high performance radon membrane and/or damp proof membrane.

NHBC NF94 guidance: Radon, carbon dioxide, and methane protection

Visqueen Gas Barrier NF-400 when installed with either welded or taped joints complies with NHBC Foundation NF94 publication, Hazardous ground gas - an essential guide for housebuilders, in Type A membrane locations in precast suspended segmental subfloors and reinforced cast in situ concrete floor slabs (ground bearing, suspended or raft).

For site or zone characteristic gas situations of CS4 and above, contact Visqueen Technical Office.

The barrier is not intended for use where there is a risk of hydrostatic pressure.

System components

- VisqueenPro Double Sided Jointing Tape, 50mm x 10m
- VisqueenPro Detailing Strip, 300mm x 10m, 500mm x 10m
- Visqueen TreadGUARD 1500, 1m x 2m
- Visqueen TreadGUARD 300, 2m x 75m
- Visqueen NF-Detailing Strip, 300mm x 10, 500mm x 10m
- Visqueen NF-60 Lap Tape, 60mm x 45m
- Visqueen NF-150 Lap Tape, 150mm x 10m

Storage and handling

When storing Visqueen Gas Barrier NF-400 care should be taken to:

- store in its original packaging;
- avoid exposure to direct sunlight and high or low temperatures for prolonged periods of time;
- store in a well-ventilated covered area to protect from rain, frost, humidity and mechanical damage;
- store away from possible ignition sources;
- store rolls of the barrier horizontally on a flat surface and not stacked.

Care should be taken to avoid accidental damage to the product when handling on site.

Care should be taken when handling the product in line with current manual handling regulations.

Preparation

Visqueen Gas Barrier NF-400

Visqueen Gas Barrier NF-400 should be installed on a smooth continuous surface e.g. grouted beam and block floor, a compacted blinding layer e.g. 50mm thick sand blinding, or smooth concrete blinding. The substrate should be free from irregularities such as loose aggregates or other sharp protrusions, voids, projections or mortar deposits.

The barrier can be cut with a sharp retractable safety knife or robust scissors.

Hand rollers are required during lap joint formation and sealing membrane detailing. Typical hand rollers include 40mm silicone pressure roller and 6mm brass penny pressure roller.

Consult the project specification to ensure the correct method of lap joint formation for the project is followed (welded or taped).

Rolls of tape should be kept in a warm, dry location prior to use to ensure the tape is workable and can be more easily applied.

Installation

Installation of Visqueen Gas Barrier NF-400 should be carried out by a competent contractor experienced with this type of product e.g. hold an NVQ Level 2 Diploma in substructure work occupations (Installation of Gas Membranes - Construction).

The installation should be subjected to third-party validation in accordance with BS 8485:2015 +A1:2019 and CIRIA C735.

Visqueen Gas Barrier NF-400 should be loose laid on the substrate ensuring that the barrier sheet edges are aligned allowing adequate overlap for jointing between the sheets. The barrier can be laid either side facing upwards.

The barrier lap area should be clean and dry at the time of jointing. The barrier has been designed to exhibit superior welding properties using hot wedge and hot air welding, therefore onsite welding of all lap joints is recommended. When hot air hand welding the lap joints, the joint should be overlapped by approximately 100mm and an approximate 35mm weld is normally achieved. During hand welding, the lap joints should be firmly compressed using a hand roller to ensure an adequate bond is achieved.

When taping the lap joints, the joint should be overlapped by approximately 100mm and bonded with VisqueenPro Double Sided Jointing Tape (positioned approximately 25mm from the edge of the sheet) and sealed with Visqueen NF-60 Lap Tape or Visqueen NF-150 Lap Tape depending upon the project specification. The lap joints should be firmly compressed using a hand roller during taping to ensure an adequate bond is achieved.

Gas protection should be continuous at all detailing including internal and external walls, internal and external corners, doorway thresholds, service pipes, party walls and structural columns. Visqueen NF-Detailing Strip should be used to seal these junctions. The detailing strip lap joints should be firmly compressed using a hand roller to ensure an adequate bond is achieved. Visqueen Ultimate Preformed Units are also available.

If the barrier is punctured or perforated a patch of the same material should be lapped at least 100mm beyond the limits of the puncture and either welded in position, or bonded with VisqueenPro Double Sided Jointing Tape (positioned approximately 25mm from the edge of the sheet) and sealed with Visqueen NF-60 Lap Tape or Visqueen NF-150 Lap Tape depending upon the project specification. Alternatively a patch can be formed using Visqueen NF-Detailing Strip lapped at least 150mm beyond the extents of the puncture.

Long periods of exposure to ultraviolet light will reduce the effectiveness of the barrier. The barrier should be covered by a protective layer e.g. Visqueen TreadGuard protection or other approved protection material, immediately after installation to prevent damage from following trades, ultraviolet light, etc. Care should be taken to ensure that the barrier is not punctured, stretched or displaced during or post installation.

VisqueenPro Detailing Strip is also suitable for sealing detailing junctions and patch repairs, however when the gas protection measures are to conform with the requirements of NHBC NF94 guidance, please ensure acceptance by all stakeholders prior to use.

Usable temperature range

When Visqueen Gas Barrier NF-400 is installed with taped lap joints, the air temperature should not be below 5°C or falling to prevent the risk of surface condensation affecting the tape adhesion.

When ambient temperatures are above 25°C or rising, the barrier should be covered immediately after installation.

Additional information

When used in accordance BS8485:2015 + A1:2019 a subfloor ventilation system or pressure relief may also be required.

To assist build sequencing, Visqueen Ultimate Gas DPC is available for gas protection through the wall construction.

Visqueen Gas Barrier NF-400

For further information contact Visqueen Technical Office on 0333 202 6800.

The information in this datasheet was correct at the time of publication. It is the user's responsibility to obtain the latest version of the datasheet as it is updated on a regular basis. The information contained in the latest datasheet supersedes all previously published editions.

Property	Test method	Units	Compliance criteria	Result
Dimensions	BS EN 1848-2	m	-	2.4 x 43.5
Nominal thickness	BS EN 1849-2	mm	+/-10%	0.4
Mass	BS EN 1849-2	g/m ²	>370	>370
Tensile strength - machine direction	BS EN 12311-2 method B	N/mm ²	MDV	26.3
Tensile strength - cross direction	BS EN 12311-2 method B	N/mm ²	MDV	29.4
Elongation at break - machine direction	BS EN 12311-2 method B	%	MDV	607
Elongation at break - cross direction	BS EN 12311-2 method B	%	MDV	921
Joint strength - taped joint	BS EN 12317-2	N/50mm	MDV	217
Joint strength - welded joint	BS EN 12317-2	N/50mm	MDV	405
Watertightness at 2kPa for 24 hours	BS EN 1928 method A	-	Pass/Fail	Pass
Watertightness at 2kPa for 24 hours after ageing	BS EN 1296 (12 weeks) + BS EN 1928 method A	-	Pass/Fail	Pass
Watertightness at 2kPa for 24 hours after alkali environment	BS EN 1847 (28 days) + BS EN 1928 method A	-	Pass/Fail	Pass
Resistance to impact	BS EN 12691 method A	mm	MLV	200
Low temperature flexibility	BS EN 495-5	°C	MDV	-20
Resistance to tearing (nail shank) - machine direction	BS EN 12310-1	N	MDV	265
Resistance to tearing (nail shank) - cross direction	BS EN 12310-1	N	MDV	240
Water vapour resistance	BS EN 1931 method B	MNs/g	MDV	2,296
Water vapour permeability	BS EN 1931 method B	g/m ² /d	MDV	0.08
Water vapour resistance factor	BS EN 1931 method B	μ	MDV	1,140,000
Water vapour diffusion equivalent air layer thickness	BS EN 1931 method B	SD in m	MDV	459
Methane gas transmission rate - membrane	BS ISO 15105-1	ml/m ² /day/atm	MDV	13.2
Methane gas transmission rate - welded membrane joint	BS ISO 15105-1	ml/m ² /day/atm	MDV	15
Carbon dioxide gas transmission rate	BS ISO 15105-1	ml/m ² /day/atm	MDV	22
Radon gas transmission rate - membrane	SP method	m/s	MDV	<3.0 x 10 ⁻⁹
Puncture CBR	BS EN 12236	N	MDV	1620
Tensile yield strength - machine direction	ASTM D4885-01	kN/m	MDV	8
Tensile yield strength - cross direction	ASTM D4885-02	kN/m	MDV	7.3

Visqueen Gas Barrier NF-400

Resistance to static loading	BS EN 12730 method C	kg	MDV	15
Elongation yield - machine direction	ASTM D4885-01	%	MDV	405.3
Elongation yield - cross direction	ASTM D4885-01	%	MDV	400.2
Tear resistance - trouser method A - machine direction	BS ISO 34-1	kN/m	MDV	128
Tear resistance - trouser method A - cross direction	BS ISO 34-1	kN/m	MDV	109.7
Tear resistance - angle method B - machine direction	BS ISO 34-1	N	MDV	137
Tear resistance - angle method B - cross direction	BS ISO 34-1	N	MDV	139.6

Health and safety information

Refer to the Visqueen Gas Barrier NF-400 safety datasheet (SDS).

About Visqueen

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APPENDIX C



ORH/23 –DENBY LANE, GRANGE MOOR – PLOTS 10, 11 AND 20
GAS MEMBRANE INSPECTION PHOTOGRAPHS (29th JULY AND 19th AUGUST 2026)



Photograph 1: General View of Plot 11. 29/7/26



Photograph 2: Example of SAM being used to seal a service entry on Plot 11. 29/7/26



Photograph 3: Example of SAM detail being used on a corner of Plot 11 garage. 19/8/26



Photograph 4: View of double sided tape and lap tape connecting sheets of gas membrane together Plot 11 garage. 19/8/26



Photograph 5: General view of Plot 10. 19/8/26



Photograph 6: Example of SAM being used to seal a double service entry on Plot 10. 19/8/26



Photograph 7: Example of SAM detail being used on a corner of Plot 10. 19/8/26



Photograph 8: View of heat welded joints connecting sheets of gas membrane together Plot 10. 19/8/26



Photograph 9: General view of Plot 20. 19/8/26



Photograph 10: Example of SAM detail being used on a corner detail of Plot 20. 19/8/26



Photograph 11: Example of SAM being used to seal a service entry on Plot 20. 19/8/26



Photograph 12: View of heat welded joints connecting sheets of gas membrane together as well as the detail work of the transition to the garage which is a lower elevation on Plot 20. 19/8/26



Photograph 13: View of evenly spaced periscopic vents on Plot 10. 19/8/26



Photograph 14: View of evenly spaced periscopic vents on Plot 20. 19/8/26