

COMMENTARY ON THE PHASE 1 DESK STUDY AND ASSOCIATED STRATEGY FOR SITE DEVELOPMENT

1 SITE HISTORY

- 1.1 The historical maps indicate that the site was originally open fields with on a sloping orientation to the South-East, falling away from Bolton Road West. Land filling started on the site in Victorian times and the land filling was completed around 1975. The main waste on the site appears to be household and industrial waste, ash, and Victorian refuse. The site was levelled and turned into a park by 1989.
- 1.2 The site underwent remediation in the early 1990's and the reports made available by the council from 1991-93 identified a generation of land fill gas from the site. Following this testing regime, gas mitigation measures were installed in 1993 94. A passive venting trench with vent cowls were installed along the East, South and Southwestern perimeter of the landfill site. A bentonite cut off wall was installed to the Bolton Road West boundary. The line of this trench appears to follow the landfill site area and the land to the North of the bentonite cut off wall appears to comprise 2.5m of glacial till fill on top of the original substrate. The pavilion sits to the North of the cut off wall and it does not sit on the area of historic waste land fill.

2 LANDFILL AUDIT REPORT FOR THE SITE OF 2007

- 2.1 In 2007 a land fill audit was carried out of the site which assessed the conditions and reviewed gas flows. Gas monitoring was carried out on 16 August 2007 in the three boreholes that allowed testing. The report states the following:

"No methane was detected within these boreholes and the maximum concentrations of carbon dioxide identified was 0.8% u/v and maximum flow was 0.2 l/hr"

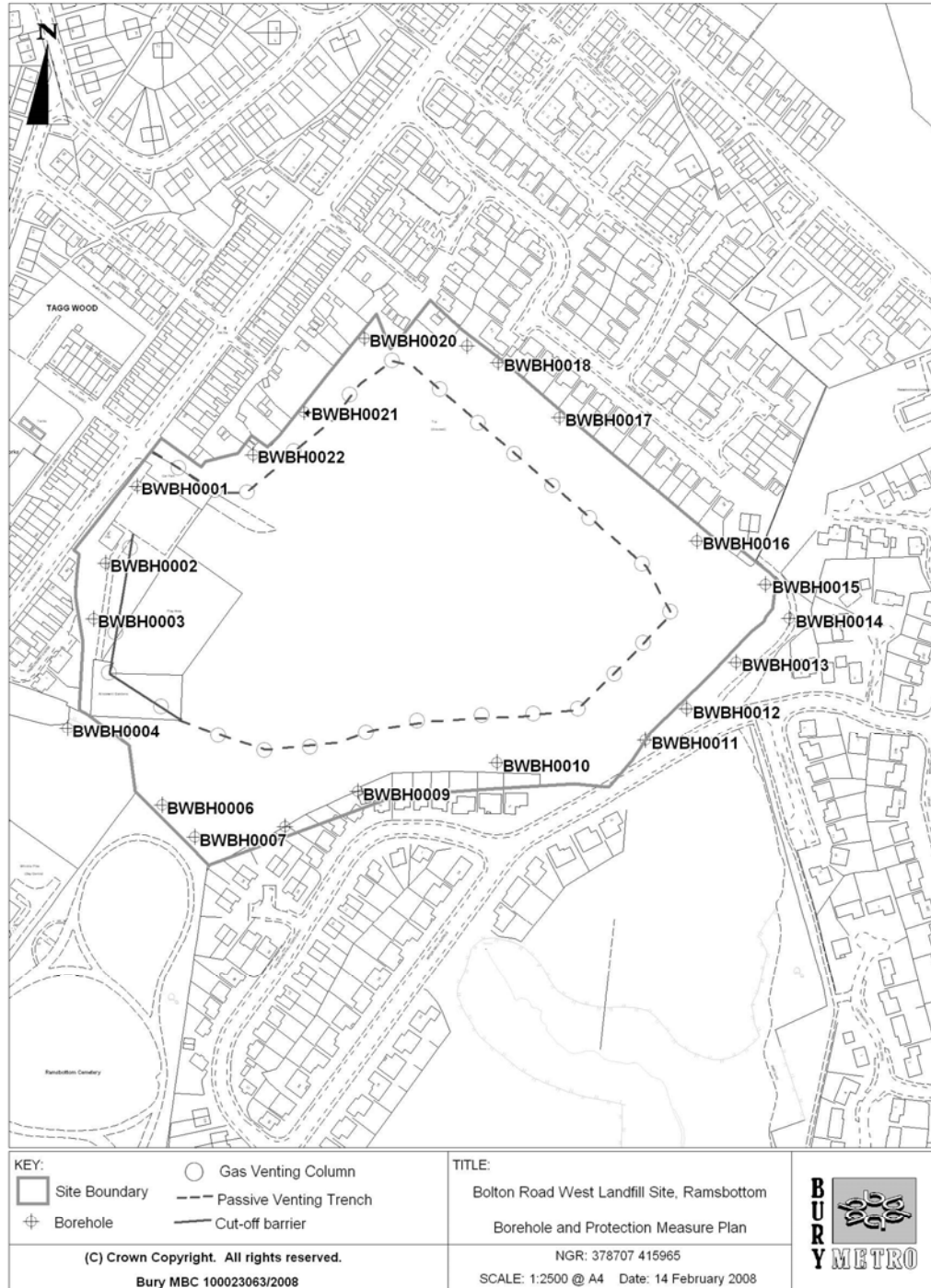
3 ANALYSIS BASED ON THE ABOVE REPORT AND THE INTRUSIVE SITE INVESTIGATION

- 3.1 The proposed pavilion extension sits to the Northwest of the cut off barrier as shown on the diagram below.
- 3.2 The gas testing carried out in 2007 identifies no methane flows and low levels of carbon dioxide. It is highly unlikely that these gas flows would increase in the proceeding 16 years.
- 3.3 The proposed works involve the construction of a small extension to a single storey sports pavilion. There are no records as to whether the original pavilion had any gas membrane installed within the construction. The pavilion received one extension in 2012 which was due to have gas protection measures installed.

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Bolton Road West Landfill Audit
16/08/2007

Site location plan showing protection measures and monitoring locations

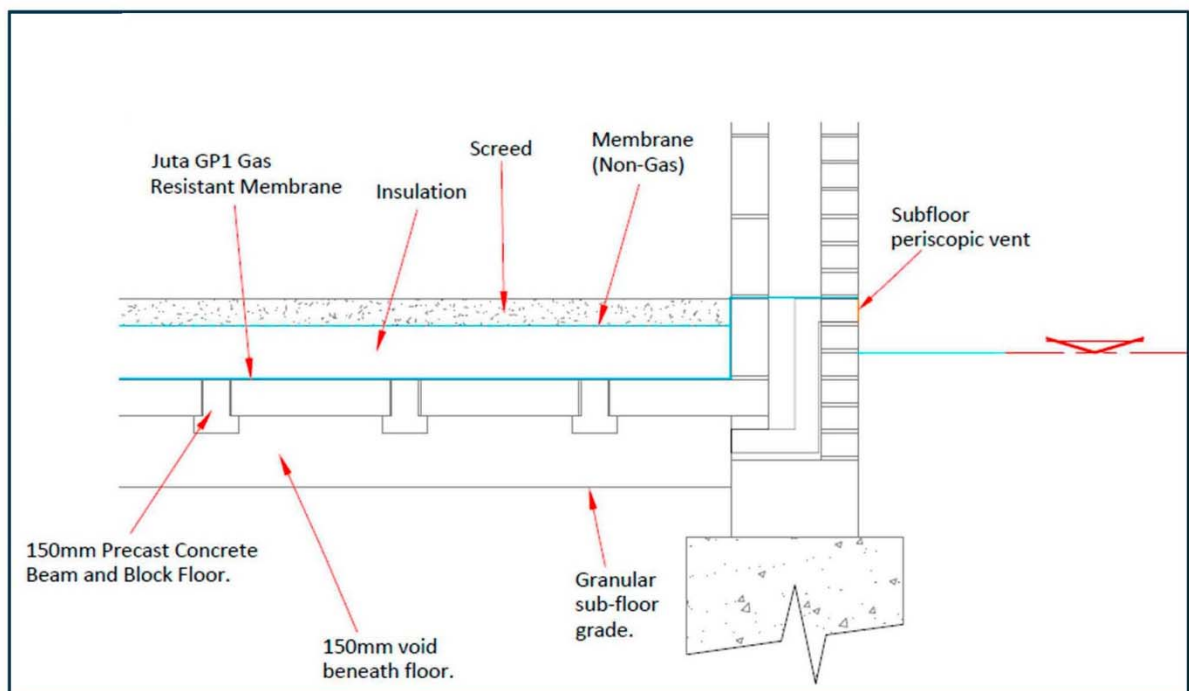


4 CONCLUSION

Given the very small-scale nature of the proposed extension to the pavilion it is proposed that a cautious approach is taken to the pavilion design. The pavilion is located on the outside of the cut-off barrier and the intrusive investigation has identified that the material below the extension is glacial fill of 2.5m depth rather than the waste tipped material that is located to the middle of the site. The gas tests of 2007 show no methane flows and low-level carbon dioxide.

This leaves the development with a choice of carrying out further gas testing to confirm that zero gas flows occur on site or, given the small-scale nature of the extension the scheme, provides sub-floor venting and a gas membrane to the extension. Given the small-scale nature of the extension it would be more cost effective to take the cautious approach and provide the membrane.

Having identified this approach, it is proposed to construct the extension using a beam and block floor construction. Below the beam and block floor, a void of a minimum depth of 150mm will be vented on three faces using telescopic ventilators. A gas membrane would be provided on top of the beam and block floor, and it is proposed that this should follow the characteristics situation 2 designation. This is over-designed by reference to the historic gas testing, but it is an appropriately cautious approach to the level of provision. As the development is for a Type B building, the protection measures would need to achieve 3.5 points in accordance with BS8485 + A1 (2019) recommendations. Given the beam and block floor construction the design requirement would be as follows:



Design Requirements	
A pre-cast suspended segmental subfloor (beam and block) This floor type contains many construction joints and discontinuities and can be affected by cracking. As such, it offers little resistance to the passage of ground gas and has high permeability.	0 points
and	
A 'very good' passive subfloor dispersal layer – clear void connecting to periscopic vents terminating in vents above ground level To comply with BS8485 (2015) + A1 (2019) and to achieve 2.5 points (for ' <u>very good</u> ' performance): - the subfloor void must be minimum 100mm thick, and; - for <u>houses</u>: the minimum area of side ventilation should be 1500 mm² per metre run of wall, and for <u>apartments</u> (> 15m runs of wall): the minimum area of side ventilation should be 2000 mm² per metre run of wall; i.e. based on a typical air brick of 6000mm²/m, use at least 1 air brick every 2m on at least 3 faces of the building, and; - where there are multiple internal obstructions to air flow (caused by beams), there should be four or five times the area of the side vents provided in the internal obstructions (e.g. minimum 1 air brick per 1m of internal obstructions).	2.5 points
and	
A ground gas resistant membrane To comply with BS8485 (2015) + A1 (2019) and to achieve the 2 points, the gas resistant membrane must: - be made from virgin polymer and have a methane transmission rate of less than 40.0ml/day/m²/atm (average); - have lapped and taped joints and 'top hats' around service penetrations (make allowance for jointing) – joint the membrane in accordance with the manufacturer's specification (typically 150mm laps with girth jointing strap); - be chemically resistant to degradation by other contaminants that may be present; - be sufficiently impervious, both in the sheet material and in the sealing of sheets and sealing around sheet penetrations, to prevent any significant passage of methane and/or carbon dioxide through the membrane; - be sufficiently durable to remain serviceable for the anticipated life of the building and duration of gas emissions; - be sufficiently strong to withstand the installation process and following trades until covered (e.g. penetration from steel fibres in fibre reinforced concrete, penetration of reinforcement ties, tearing due to working above it, dropping tools, etc); and to withstand in-service stresses (e.g. settlement if placed below a floor slab); - be capable, after installation, of providing a complete barrier to the entry of the relevant gas; and - be verified in accordance with CIRIA C735.	2 points
Total	
4.5 points	

The gas restraint membrane proposed is a JUTA GP1 to cover the floor slab and this is to connect into Visqueen gas proof DPC's within the walls. All service entry points are to be sealed in accordance with the manufacturer's instructions.

This report has focused on the pavilion extension being the highest risk area where ground gasses could collect leading to health risk issues. Any ground gasses venting below the car park or Artificial Grass Pitch would continue to vent to the air as they do currently as the facilities do not include any construction build ups that would impede any gas flow that could occur.

The phase 1 desk study provided includes a contaminated land preliminary risk assessment report. This identifies two other areas of risk which are addressed below:

- A. Below ground water supply paperwork – there is no new pipework as the existing supplies are retained.
- B. Protection of site staff from ground conditions – Given the tipped nature of the site all construction operatives will wear gloves and appropriate clothing to remove contamination contact risk. The pavilion risk is relatively low because of the limited time on site in the ground. The car park and AGP excavation will involve longer periods in the ground, but all excavations are by machine to reduce skin contact risk. It should be noted all excavations are shallow and are not scheduled to cross the topsoil into the deeper fill material on site thereby further reducing risk.

Visqueen Ultimate Gas Damp Proof Course

About Visqueen

The Visqueen name has long been recognised as one of the leading manufacturers of high quality advanced membrane technologies and design based solutions by specifiers, distributors, builders merchants and contractors throughout the UK and Europe.

For further guidance on the Visqueen services shown below, please refer to the relevant section of the Visqueen website (www.visqueen.com) or contact Visqueen Technical Services on +44 (0) 333 202 6800 or enquiries@visqueen.com

Complete Range, Complete Solution



Structural
Waterproofing



Gas
Protection



Damp Proof
Membrane



Tapes



Damp Proof
Course



Stormwater



Vapour
Control

Visqueen Technical Support

Visqueen combine an extensive product portfolio with industry leading levels of service and support which includes guidance over the phone, bespoke CAD drawings to help with complex detailing, electronic NBS specifications and access to a dedicated team of highly knowledgeable and experienced field based Technical Support Managers.

Visqueen Technical Support is available to all our customers including architects, specifiers, distributors, builders merchants, contractors and end users. All of our technical team have been awarded the industry recognised qualification Certificated Surveyor in Structural Waterproofing (CSSW).

Visqueen CPD Seminars

The Visqueen Continuing Professional Development (CPD) Seminars provide up-to-date information on changes within Building Regulations/Building Standards and nationally recognised industry guidance affecting damp proofing, water vapour control, hazardous ground gas protection and below ground structural waterproofing.

The one hour seminars have been produced for design specialists within the construction sector and are delivered by our team of Technical Support Managers.

Visqueen Training Academy

Based at our manufacturing facility in Derbyshire, the Visqueen Training Academy is available to support Visqueen customers throughout the UK by providing a wide range of both theory and practical skills related training.

Courses include one day product awareness training for our distributors and builders merchants to help them in their day-to-day jobs, through to intensive three day courses giving detailed hands-on training in the practical skills required for safe and robust product installation.

Visqueen Ultimate Gas Damp Proof Course

Property	Test method	Units	Criteria	Result	
			Fail		
Resistance to impact	BS EN 12691	mm	>MLV	200	
Durability watertightness after heat ageing	BS EN 1296	-	Pass/ Fail	Pass	
Durability watertightness against chemicals	BS EN 1847	-	Pass/ Fail	Pass	
Resistance to tearing (nail shank) CD	BS EN 12310-1	N	MDV	245	
Resistance to tearing (nail shank) MD	BS EN 12310-1	N	MDV	270	
Water vapour transmission - resistance	BS EN 1931	MNs/g	MDV	1034	
Water vapour transmission - permeability	BS EN 1931	g/m ² /d	MDV	0.13	
Radon permeability	Sp Method 3873	m ² /s	MDV	<1.5 x 10 ⁻¹²	

Health and safety information

Refer to the Visqueen Ultimate Gas Damp Proof Course safety datasheet (SDS).

Visqueen Ultimate Gas Damp Proof Course

Property	Test method	Units	Criteria	Result	
Colour				Gold/white	
Weight		g/m ²		490	
Length	BS EN 1848-2	m	-0/+10%	20	
Width	BS EN 1848-2	mm	-0/+10%	500, 600, 750 and 900	
Thickness	BS EN 1849-2	mm	+/-10%	0.5	
BS 8485:2015 and C748:2014 physical test results					
Puncture	BS EN ISO 12236:2006	N	MDV	1640	
Impact resistance Method A hard surface	BS EN 12691	mm	MDV	200	
Impact resistance Method B soft surface	BS EN 12691	mm	MDV	1250	
Tensiles yield strength MD 1	ASTM D4885-01	kN/m	MDV	5.1	
Tensiles yield strength CD 1	ASTM D4885-01	kN/m	MDV	4.91	
Yield elongation MD 1	ASTM D4885-01	%	MDV	76	
Yield elongation CD 1	ASTM D4885-01	%	MDV	62	
Tear resistance - trouser method A - MD	BS ISO 34-1	kN/m	MDV	60.2	
Tear resistance - trouser method A - CD	BS ISO 34-1	kN/m	MDV	66.1	
Tear resistance - angle method B - MD	BS ISO 34-1	N	MDV	48.7	
Tear resistance - angle method B - CD	BS ISO 34-1	N	MDV	49.6	
1 - at yield and not break as equipment used was not strong enough to break the DPC					
BS 8485:2015 - Methane testing					
Methane permeability unjointed	ISO 15105-1	ml/m ² /d/atm	<40	1.3	
Methane permeability welded joint	ISO 15105-1	ml/m ² /d/atm	<40	24	
Carbon dioxide	ISO 15105-1	ml/m ² /d/atm	<40	8.3	
C748:2014 - Permeation vapour tests - 100% concentration					
Benzene	ISO 15105-2	MDV	0.08	70	2.92
Toluene	ISO 15105-2	MDV	0.09	78.5	3.27
Ethyl benzene	ISO 15105-2	MDV	0.11	93.8	3.91
m,p xylene	ISO 15105-2	MDV	0.01	6.7	0.28
Hexane	ISO 15105-2	MDV	gas	2.6	0.11
Vinyl chloride	ISO 15105-2	MDV	0	6.4	0.27
Tetrachloroethene (PCE)	ISO 15105-2	MDV	0	3.2	0.13
Trichloroethene (TCE)	ISO 15105-2	MDV	solid	0.3	0.01
Naphthalene	ISO 15105-2	MDV	0.03	19.7	0.82
UKCA, CE, UKNI Mark EN 14909:2012					
Characteristic					
Tensile strength - MD	BS EN 12311	N/mm ²	MDV	32.8	
Tensile strength - CD	BS EN 12311	N/mm ²	MDV	33.1	
Tensile elongation - MD	BS EN 12311	%	MDV	699	
Tensile elongation - CD	BS EN 12311	%	MDV	723	
Joint strength	BS EN 12317-2	N	MDV	265	
Watertightness 2kPa	BS EN 1928	-	Pass/	Pass	

Visqueen Ultimate Gas Damp Proof Course

Storage and handling

Visqueen Ultimate Gas Damp Proof Course should be stored vertically, under cover in its original packaging.

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

Preparation

Visqueen Ultimate Gas Damp Proof Course can be cut with a sharp retractable safety knife or robust scissors.

Installation

DPCs and DPC cavity trays systems to be designed and installed in accordance with the relevant sections of BS 8215:1991, PD 6697:2019 and BS 8000-3:2020.

When built into a masonry wall construction the DPC should be installed on an even bed of wet mortar, and any perforations in adjacent courses of masonry should be completely filled with mortar. To ensure mortar adhesion, as soon as possible after laying the DPC, lay at least one further course of masonry including a bed of mortar. If positioned on the sleeper walls below a suspended ground floor e.g. beam and block floor system, the DPC can be dry laid, however all sharp protrusions must be removed from the substrate. The DPC must extend through the full thickness of the masonry wall, including pointing, applied rendering or other facing materials.

When used as a site formed cavity tray, the DPC can be either built-in to the inner leaf or surface fixed to the cavity face of the inner leaf.

When surface fixing the cavity tray, the substrate should be primed with Visqueen HP Tanking Primer and allowed to dry. The DPC should be bonded to the inner leaf using Visqueen 100mm Double Sided Butyl Tape and permanently secured using Visqueen Fixing Strip and fixing suitable for the substrate. Visqueen Fixing Pins for both rigid urethane foam insulation boards, and pins for masonry substrates are available.

To simplify complex or awkward junctions e.g. corners, changes of level, etc, an extensive range of Visqueen Ultimate Preformed Units are available.

All DPC to DPC laps and DPC to Visqueen Ultimate Preformed Unit laps should be a minimum of 100mm and bonded with Visqueen 100mm Double Sided Butyl Tape. Alternatively, the above laps can be heat welded.

Usable temperature range

It is recommended that Visqueen Ultimate Gas Damp Proof Course and all associated system components should not be installed below 5°C.

Additional information

For additional detailing information, contact Visqueen Technical Services +44 (0) 333 202 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.

Visqueen Ultimate Gas Damp Proof Course

Features and benefits

- Complies with CIRIA C748:2014 - industry standard for volatile organic compounds (VOC) protection
- 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
- Provides protection against radon, carbon dioxide, methane and VOCs
- Dual jointing methods - lap joints can be taped or heat welded
- Visqueen Ultimate Preformed Units available - simplifies complex or awkward detailing

Product description

Visqueen Ultimate Gas DPC utilises Visqueen's Advanced Barrier Technology. The DPC is a 0.5mm thick, flexible 7 layer co-extruded film providing volatile organic compound (VOC) and ground gas resistance.

The DPC has an embossed/debossed finish, is coloured gold/white and can be installed with either surface facing upwards.

It is supplied in 20m length rolls and the following widths as standard: 500mm, 600mm, 750mm and 900mm.

Approvals and standards

- Complies with CIRIA C748:2014
- 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
- Conforms to the specification requirements of NHBC Amber 1 and Amber 2 applications
- Conforms to the specification requirements of BR 211:2015
- Shear strength tested to BS EN 1052-4:2000 Methods of test for masonry - Part 4.
- Flexural mortar bond strength tested in accordance with DD 86-1:1983
- UKCA UKNI CE to EN 14909:2012 Type A
- 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 Ultimate Gas Damp Proof Course is suitable for all masonry wall applications including residential, commercial and multi storey buildings. It can be site formed into a built-in or surface fixed cavity tray to manage the downward passage of water in cavity wall applications.

The DPC is used to prevent harmful volatile organic compounds (VOCs) and hazardous ground gases from entering into the cavity from the ground or entering the building via internal walls. The DPC is also suitable for use on NHBC Amber 1 and 2 sites or where radon gas exists. It can also be used on sleeper walls below a ground floor construction e.g. beam and block floor system.

System components

- Visqueen 100mm Double Sided Butyl Tape, 100mm x 15m
- Visqueen Zedex DPC Surface Fixing System
- Visqueen Preformed Units
- Visqueen DPC Joint Support
- Visqueen HP Tanking Primer, 5L



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 Fleece
- GP[®] Protection Board



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.

Certifications



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Feature	Characteristics	Test Method	GP [®] 1
Physical Properties	Thickness	EN 1849-2	0.6 mm
	Thickness - between Scrim	BS EN ISO 9863-1:2016	0.4 mm
	Width	EN 1849-2	Various m
	Length	EN 1849-2	Various m
	Weight	EN 1849-2	370 g/m ²
Hydraulic Press	Water Column	EN 20811	> 300
	Resistance to Water Penetration	EN 13967, EN 1928	Pass
	Water Tightness	EN 11296, EN 1367, EN 1928	Pass
Mechanical Properties	Resistance to Static Load	EN 12730-B	20 kg
	Tensile Strength (MD)	EN 12311-1	600 N/50mm
	Tensile Strength (CMD)	EN 12311-1	480 N/50mm
	Tensile Elongation (MD)	EN 12310-1	20%
	Tensile Elongation (CMD)	EN 12310-1	20%
	Puncture Resistance	EN 12236	1.25 kN
	Resistance to Tearing (Nail Shank) MD	EN 12310-1	330 N
	Resistance to Tearing (Nail Shank) CMD	EN 12310-1	400 N
Durability and Chemical Resistance	Transmission Rate of Volatile Liquids - Diesel	ISO 6179:2010 (B)	0.246 g/m ² /h
	Transmission Rate of Volatile Liquids - Xylene	ISO 6179:2010 (B)	0.571 g/m ² /h
	Transmission Rate of Volatile Liquids - Toluene	ISO 6179:2010 (B)	0.583 g/m ² /h
	Transmission Rate of Volatile Liquids - Petrol	ISO 6179:2010 (B)	0.135 g/m ² /h
Gas Permeability	Methane Permeability	BS EN ISO 15105-1	< 0.09 ml/m ² /day/atm
	Carbon Dioxide Permeability	BS EN ISO 15105-1	< 0.09 ml/m ² /day/atm
	Radon Permeability	K124/02/95	8.0 x 10 ⁻¹⁵ m ² /s
	Hydrogen Sulphide Permeability	BS EN ISO 15105-1	< 0.1 ml/m ² /day/atm
Compliance and Certification	CE Mark - EN13967:2012 (A1 2017)		
	NHBC Standards Compliant		
	Conforms to BS 8485:2015 + A1 2019		
	BBA Certified - Certificate No. 20/5728		

JUTA UK

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

Jointing and Sealing

It is recommended 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.

Accessory Products

- GP[®]1 Starter Band
- GP[®] Tape
- GP[®] Self Adhesive Membrane
- GP[®] Primer
- GP[®] Top Hats and Preformed Corners
- GP[®] Protection Fleece
- GP[®] Void Vent (24/40mm)



GP[®]1



GP[®]1 proprietary gas resistant damp proof membrane (DPM) 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, air & moisture protection system.

Thickness	0.6 mm
Width	Various m
Length	Various m
Weight	370 g/m ²

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Handling

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

Storage

Rolls of 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

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

Certifications



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