3306-02 / MB

9th February 2022

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ARBOUR LANE, STANDISH – REMEDIATION STRATEGY AND VERIFICATION PLAN

In a letter dated 19th March 2019, planning permission A/19/86880/FULL was granted subject to conditions for the '*erection of one detached dwellinghouse with associated access and landscaping*', subject to Condition 5 as follows:

'Prior to the commencement of any part of the development hereby approved, an investigation and assessment of the nature and extent of any contamination of the site shall be submitted to and approved in writing by the Local Planning Authority. The assessment shall identify any remedial measures required to deal with any hazards identified and a Remediation Strategy, including remediation options appraisal and verification plan shall be submitted to and approved in writing by the Local Planning Authority. The Remediation Strategy and remedial measures shall be implemented in full and a Verification Report shall be submitted to and approved in writing by the Local Planning Authority before the occupation of any of the buildings hereby permitted'.

The following report was submitted to the Council:

- IGE Consulting *Geo-Environmental Ground Investigation and Updated Coal Mining Risk Assessment* (Revision: C, Reference: 3354-02, Dated: June 2021).

An application (A/21/92657/CON) to discharge Condition 5 was denied in a letter dated 19th January 2022 as a separate Remedial Strategy was required for the site to follow the above IGE ground investigation report and to provide further detail of the remedial requirements.

The following report addresses this planning requirement and should be read in conjunction with the above IGE ground investigation report.

This report has been undertaken in accordance with CIRIA C735 (2014), in line with best practice.

REMEDIAL STRATEGY FOR GROUND GAS

A full ground gas risk assessment is contained in the ground investigation report. A summary is presented below:

The ground gas source was identified to be off-site infilled opencast mine workings. On the basis that a potential ground gas source was identified in close proximity to the site and based on the sensitivity of the proposed development (residential dwelling) the ground gas risk was deemed to be low to moderate. Therefore, the site was conservatively designated as Characteristic Situation 2 (CS2) in line with BS8485 (2015) + A1 (2019). Therefore, ground gas protection is required within the proposed dwelling.

Design of Ground Gas Protection Measures

In accordance with BS8485 (2015) + A1 (2019), the proposed dwellinghouse is a **Type A** building and in order to protect against the CS2 ground gas risks identified, **3.5 points** of protection measures must be achieved. The proposed construction elements to achieve the required points score are given below:

- It is understood that a beam and block floor construction is to be utilised. This achieves 0 points.
- A ground gas resistant membrane is recommended. This achieves 2 points.
- A clear void passive venting layer with 'very good' performance is recommended. This achieves 2.5 points.

Further details on the above measures are included in the below table:

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 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 'very good' performance): • the subfloor void must be minimum 150mm thick, and; • the minimum area of side ventilation should be 1 No. standard louvred grille airbrick every 2m of wall, 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/m^2/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 double sided tape); • 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. It is understood that Visqueen is the Client's preference – the **Visqueen 'Gas Barrier' membrane** is recommended, along with the manufacturer's installation accessories.	**2 points**
	Total 4.5 points

Cross-Sectional Slab Details

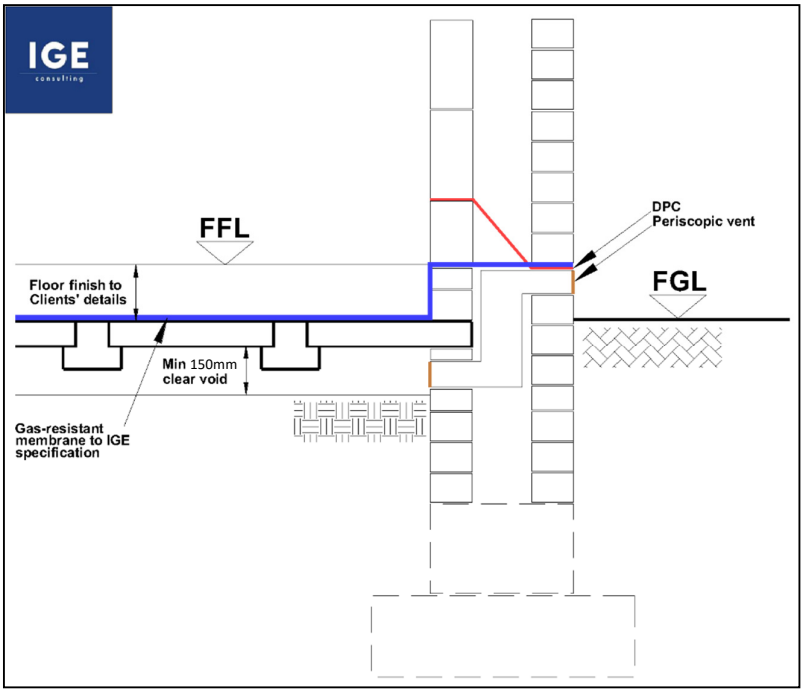


Figure 1 - Edge detail including periscopic vents (brown) and location of ground gas-resistant membrane (blue). This drawing is not to scale. Use detailed dimensions only.

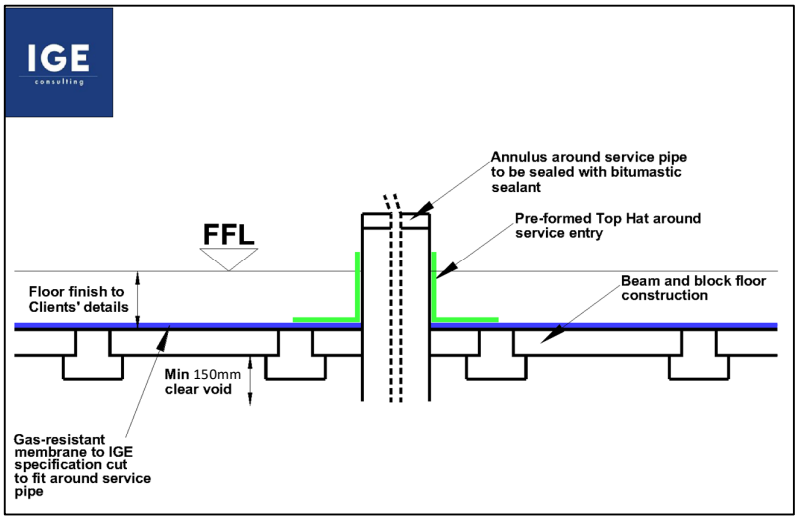


Figure 2 – Service entry detail including pre-formed top hat (green) and location of ground gas-resistant membrane (blue). This drawing is not to scale. Use detailed dimensions only.

Ground Gas Membrane Installation Guidance

It is understood that Visqueen is the Client's preference – the **Visqueen 'Gas Barrier' membrane** is recommended, which meets the above required specification. The datasheet for this membrane is included in Appendix 3.

Installation accessories will also be necessary, including:

- Jointing tape (double sided, gas resistant tape)
- Pre-formed top hats
- Jubilee clips
- Although not essential, gas resistant 'detail tape' is an easy way to install complex joints such as corners and non-standard service entries.

All membrane installation must be undertaken to manufacturer's specification. An example of correct installation is shown in Appendix 1 – *it must be noted that this is a Visqueen information sheet, however, whilst this is considered a good example, IGE do not endorse any specific brand and the methods can be applied to any membrane brand*.

All service entry points should be fitted with pre-formed gas resistant 'top hats'. Top hats should be sealed to the pipe and gas membrane utilising double sided jointing tape and fixed with a jubilee clip. An example of the method of installation of these top hats is shown above.

Adequate ventilation through internal obstructions is to be installed in line with the above recommendations. Joints between sheets of gas membrane should be lapped (minimum overlap of

150mm) and taped between sheets with appropriate double-sided tape in accordance with the manufacturer's recommendations.

A set of example photographs of good practice installation are contained in Appendix 1.

REMEDIAL STRATEGY FOR HUMAN HEALTH AND CONTROLLED WATERS

The above-referenced IGE ground investigation found that no significant contaminative sources are present on site. Consequently, the risk to human health, including construction workers, human occupants and the general public, and the risk to controlled waters, was determined to be very low as no contaminative linkages were identified. No further assessment or remedial works are necessary.

VALIDATION PROCEDURE AND REPORT

Gas Protection

Gas Protection Validation Plan

The exact construction company appointed to install the gas protection measures is unknown at the time of writing. The installers should be trained and experienced in the installation of ground gas resistant membranes.

In line with CIRIA 735 (2014), IGE Consulting or another suitably qualified verifier should independently verify the installation of the gas protection measures. A visual inspection method, including pick testing, is recommended to be carried out at the plot. This should be undertaken following the laying of the beam and block pre-cast floor units and laying of the gas membrane on top, but prior to laying insulation and finishes.

The IGE Consulting verifier or other suitably qualified verifier should:

- Identify that the correct membrane has been used, including sealing / jointing tape and pre-formed components e.g. tophats, corners.
- Inspect the general condition of the membrane for rips, tears and punctures.
- Check that all jointing has been carried out to the manufacturer's specification.
- Check that the membrane has been installed correctly across cavities, including correct jointing in these areas.
- Check that top hats have been correctly installed around service entries, including jubilee clips around the pipe and correct lapping and jointing to the membrane at the base.

- Check that vents have been installed around the perimeter of the building in sufficient number and in the correct locations, including inspecting the condition i.e., not blocked or otherwise restricted.
- Check the presence of a clear >150mm clear void, including measuring that this is of a sufficient depth and the void has not been filled or otherwise compromised. Check that internal sleeper walls are also vented to provide adequate flow-through within the void so that none of the walls are blocking off unvented sections within the void.
- Take photographs to provide evidence of the above.
- Make a suitable record of the validation, to be included within a validation report.

The IGE Consulting verifier will record the above information using the IGE Consulting 'Ground Gas Resistant Membrane Inspection Record' sheet. An example of this is included in Appendix 2.

The following information should be included within the Verification Report to demonstrate the successful installation of ground gas protection on the site:

- Objectives of the verification.
- A brief overview of the site conditions and summary of the ground gas regime.
- A description of the installation, including gas-resistant membrane manufacturer and type used (including sealing / jointing tape and pre-formed components e.g. top hats, corners). The manufacturer specification / datasheet shall be included.
- Installer and verifier and credentials of such organisations, i.e. level of competency of installer – NVQ Level 2 or general groundworker.
- Detailed description of any deviations from the specification provided in this report, with explanation and justification of such deviations.
- As-built construction drawings and product specifications of components used.
- A description of the verification approach – in this case visual inspection, including pick testing.
- Verification evidence – in this case photographic evidence.
- Any record of relevant communications with regulatory bodies.
- Verification conclusions, including any future monitoring or management requirements (anticipated none in this case due to passive approach), and limitations of the measures installed.

SOIL MANAGEMENT

Import of Materials

Soils for use as subsoil and topsoil in the proposed garden and soft landscaping areas may be won from site without chemical testing as this material has been determined to be uncontaminated and suitable for use.

If soils are imported from off-site for use as subsoil and topsoil in the proposed garden and soft landscaping areas, they must be chemically tested and compared against the Acceptability Criteria contained in Appendix 4 to confirm their suitability. The chemical testing frequency should be as follows:

Type	Number of Samples	Testing Schedule
Greenfield source	Minimum 3 or 1 per 250m^3, whichever is greatest	pH, arsenic, cadmium, chromium (and hexavalent), copper, lead, mercury, nickel, selenium, zinc, free & total cyanide, TPH-CWG, PAH-16MS and asbestos and ID (with quantification if 'positive' ID).
Remediated, brownfield or unknown source	Minimum 3 or 1 per 50m^3, whichever is greatest	pH, arsenic, cadmium, chromium (and hexavalent), copper, lead, mercury, nickel, selenium, zinc, free & total cyanide, TPH-CWG, PAH-16MS and asbestos and ID (with quantification if 'positive' ID). Any additional contaminants of concern that may be appropriate based on the source of the samples

Validation requirements include:

- Details of the source of the imported soils
- Waste transfer notes to provide evidence of source and import
- Test results for the imported soil at the sampling frequency outlined above, compared against the Acceptance Criteria (see Appendix 4).

If any of the soils are found to be unsuitable when compared to Acceptability Criteria they must not be accepted for use within the proposed garden or soft landscaping.

Export of Materials

Any soils to be removed from site must be classified in accordance with WM3 under the definition of waste and chemically tested to determine their destination, i.e. reuse or landfill. Waste ticket records must also be retained as proof of the export of materials from site.

Stockpile Management

During the course of the development there will be areas of stockpiled soils intended for use within the proposed gardens or soft landscaping areas that will have been approved for use on site. It is imperative that the stockpiles are well managed to avoid inadvertent mixing or depositing of surplus or deleterious materials that would compromise the continued use. We would recommend that the site management reviews the proposed positions for placement of stockpiles and places either fencing or warning signs to ensure compliance.

Unexpected Contamination

If any visual or olfactory evidence of contamination is encountered during demolition or construction work, then the Local Authority Environmental Health Officer and Environment Agency should be

contacted immediately in order to agree any necessary remediation measures, and when complete this should be appropriately documented in the Validation Report.

VALIDATION / VERIFICATION REPORT

It will be necessary to include all of the above verification information in a Validation Report to provide evidence of the successful completion of validation. The Validation Report is to be submitted to Wigan Council to support the successful discharge of Condition 5.

If any additional information is needed, do not hesitate to ask.

Yours sincerely,

Molly Brown
Senior Geo-Environmental Engineer

Enc.

Appendix 1 – Good Practice Installation Guidance and Examples
Appendix 2 – Example IGE Consulting 'Ground Gas Resistant Membrane Inspection Record' sheet
Appendix 3 – Visqueen 'Gas Barrier' Membrane Datasheet
Appendix 4 – Imported Topsoil and Subsoil Acceptability Criteria

APPENDIX 1

Product Installation

How to lap and joint a membrane above a floor slab

Remove loose debris from the surface of the floor slab and unroll the first sheet of membrane. The surface of the slab should be smooth and free from projections or indentations – if very rough, apply a sand blinding.

Remove the protective paper from one side of the appropriate jointing tape and apply it to the first sheet, starting about 50mm from the edge. Ensure that all surfaces are dry for maximum adhesion.

Unroll the second sheet along the joint, overlapping the first by at least 150mm. Press firmly onto the double sided tape, gradually removing the protective paper.

Seal the edge of the overlap with appropriate sealing tape.

How to joint the cavity tray to the membrane at the floor perimeter

Install the DPC starting from the outside of the external wall, over the inner masonry leaf and finishing at least 200mm from the wall.

Just before the floor topping is applied (or floor slab is cast), clean any mortar droppings, or other debris from the DPC. Remove the protective paper from the appropriate jointing tape and apply the tape to the DPC, starting about 50mm from the edge.

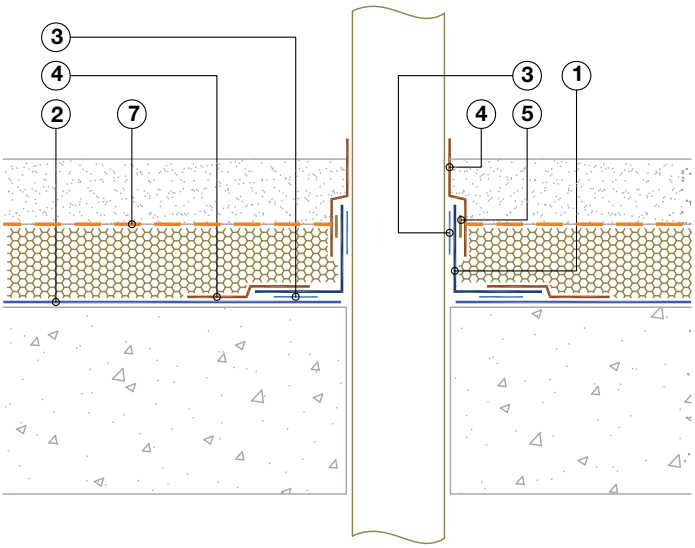
Lay the membrane over the floor slab (or subfloor blinding), overlapping the DPC by at least 150mm. Press firmly onto the appropriate jointing tape, gradually removing the protective paper.

Seal the edge of the overlap with appropriate sealing tape.

Service Pipe Penetrations

Damp proof and airtight seals should be formed around all service entry points. Visqueen Top Hat Units are available for sealing around pipe units. The full system consists of:

- Rigid preformed pipe sleeve (top hat) unit – available for either 110mm, 135mm or 160mm
- External diameter pipes.
- Flexible preformed pipe sleeve (Top Hat) unit – supplied to suit pipe.
- External diameter as required.
- Double sided jointing tape.
- Girth lap tape.
- Foil lap tape – for gas applications.



Key			
1	Preformed Pipe Sleeve	5	Jubilee Clip
2	Visqueen Gas Barrier	6	Visqueen TreadGUARD 1500
3	Visqueen Double Sided Tape	7	Visqueen Vapour Barrier
4	Visqueen GR Lap Tape	8	Smooth Sand Blinding Layer

How to install a top hat

Cut a circular hole in the membrane as close as possible to the pipe, or pipe socket. Ensure that pipe penetrations do not occur at joints in the membrane.

With the pipe in position, slide the Visqueen Preformed Top Hat Unit over the pipe (various diameters are available – 110mm being the most common).

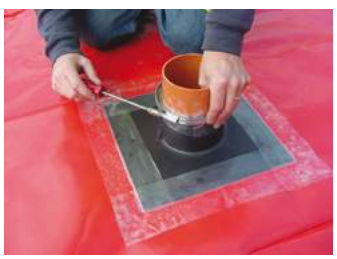
Mark the extent of the square horizontal skirt over the membrane and also mark the line of the top of the top hat unit around the pipe.

Raise the top hat unit and cut four lengths of Visqueen Double Sided Jointing Tape, one for each side of the horizontal skirt. Allowing for an overlap at each corner. Cut one length to go round the pipe.

Start to remove the protective paper from the double sided tape around the pipe and raise it up at an angle so that it will project above the top hat unit when it is stuck to the membrane.

Release the protective paper from each of the four lengths of double sided tape. Lower the top hat unit, ensuring that the free end of the protective paper around the pipe is reachable, and seal the horizontal skirt to the membrane.

Gradually remove the remainder of the protective paper from the double sided tape around the pipe.



Seal the junction of the horizontal skirt and the membrane with the appropriate sealing tape and secure the top hat unit to the pipe with a jubilee clip.

Example Ground Gas Resistant Membrane Installation Photographs

Figure 1 - Air bricks installed at <2m centres.

Figure 2 - General condition. Good installation.

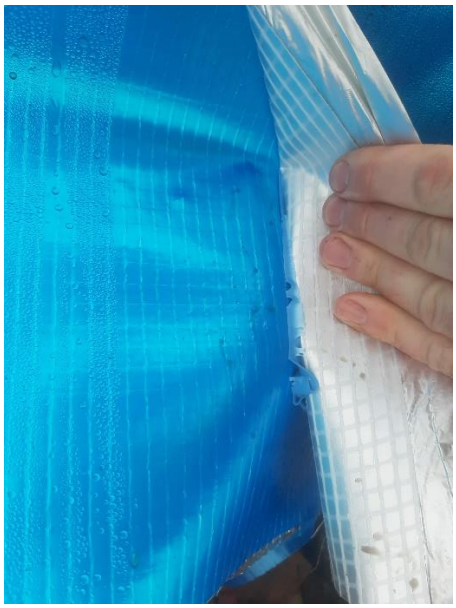


Figure 3 - 150mm overlap and good seal achieved using double-sided gas proof tape.

Figure 4 - Top hat installation with double-sided tape on all sides of top hat base and around inside of top hat sleeve. Jubilee clip around sleeve (under gaffa tape).

Figure 5 - Formation of top hat shapes using gas proof detail tape instead of using pre-formed top hats.

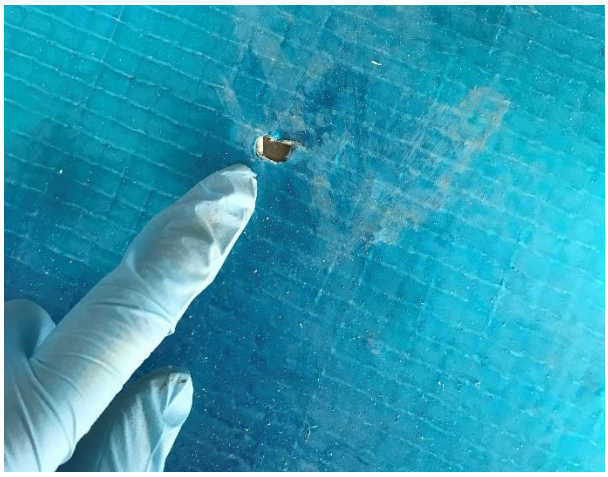


Figure 6 - Common issue: small hole in membrane caused by follow-on trades – see below.

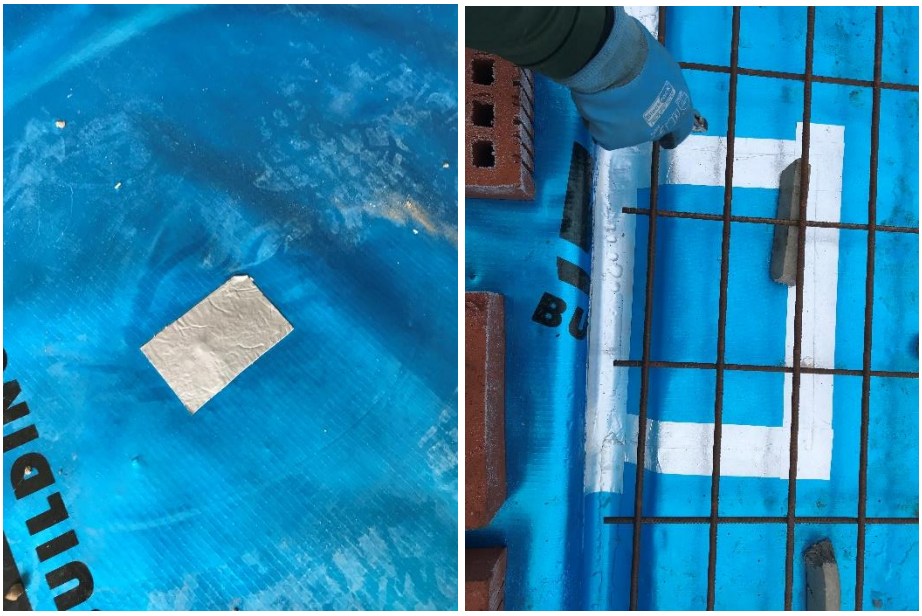


Figure 7 - Options for patching a hole: Left - gas proof detail tape used to cover the hole. Right – a piece of membrane is stuck over the hole using double-sided tape on all sides.

APPENDIX 2

GROUND GAS RESISTANT MEMBRANE INSPECTION RECORD

Project:	
Project No:	
Plot No. Inspected:	
Date of inspection:	
Inspected by:	
Inspection Method:	

IGE consulting

Office 11, Bartle House
Oxford Court
Manchester
M2 3WQ

Tel: 0161 914 9171
Email: contact@igeconsulting.co.uk
Web: www.igeconsulting.co.uk

INSPECTED ITEM	YES/NO	COMMENTS	PHOTOGRAPHED YES / NO
Identification Identify that the correct membrane has been used, including sealing / jointing tape and pre-formed components e.g. tophats, corners.			
General Condition Inspect the general condition of the membrane for rips, tears and punctures.			
Jointing Check that all jointing has been carried out to the manufacturer's specification.			
Installation Check that the membrane has been installed correctly across cavities, including correct jointing in these areas.			
Top Hat Installation Check that top hats have been correctly installed around service entries, including jubilee clip around pipe and correct lapping and jointing to membrane at base.			
Vent Installation Check that vents have been installed around the perimeter of the building in sufficient number and in the correct locations, including inspecting the condition i.e. not blocked or otherwise restricted.			
Pressure Relief / Passive Venting Check the presence of a vented void / pressure relief pathway, including measuring that this is of a sufficient depth and not been filled or otherwise compromised. Check that internal sleeper walls are also vented to provide adequate flow-through within the void so that none of the walls are blocking off unvented sections within the void.			

This plot has PASSED / FAILED inspection.

Additional inspection visit IS / IS NOT required for this plot.

Engineer: …… **Signed: ……..**

PHOTOGRAPHS	
Figure 1 –	Figure 2 –
Figure 3 –	Figure 4 –
Figure 5 –	Figure 6 –

APPENDIX 3

Technical support: +44 (0) 333 202 6800

Date Published: 22/09/2021

Visqueen Gas Barrier

Features and benefits

- BBA certified - third party accreditation
- Complies with BS 8485:2015 + A1:2019 - industry standard for methane and carbon dioxide protection
- Flexible - easy to detail and install on site
- Multi functional - also acts as a radon and damp proof membrane
- Dual jointing methods - lap joints can be taped or heat welded

Product description

Visqueen Gas Barrier is a multi-layer reinforced polyethylene gas barrier with a 20 micron aluminium foil. The barrier is coloured blue on the upper surface and silver on the reverse. The product is supplied in single wound rolls (not folded), 2m x 50m.

Approvals and standards

- Third party accreditation (BBA 13/5069)
- Conforms to the specification 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
- CE Mark EN 13967:2017
- Quality Management System ISO 9001:2015
- Occupational Health and Safety System ISO 45001:2018
- Environmental Management System ISO 14001:2015

Usage

Visqueen Gas Barrier is suitable for use in all types of buildings to prevent the ingress of harmful levels of ground gases e.g.methane, carbon dioxide and radon.

The barrier can be positioned above or below a solid concrete ground floor slab or above a precast suspended segmental ground floor system, e.g. beam and block floor.

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

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

System components

- VisqueenPro Double Sided Jointing Tape, 50mm x 10m
- Visqueen Gas Resistant Foil Lap Tape, 75mm x 50m
- Visqueen GR Lap Tape, 150mm x 10m
- Visqueen Ultimate Top Hat Units
- Visqueen Preformed Units
- VisqueenPro Detailing Strip, 300mm x 10m, 500mm x 10m
- Visqueen TreadGUARD 300, 2m x 75m
- Visqueen TreadGUARD 1500, 1m x 2m

Find your local stockist

Heanor Gate Road, Heanor, Derbyshire, DE75 7RG
+44 (0) 333 202 6800 I enquiries@visqueen.com I www.visqueen.com

Technical support: +44 (0) 333 202 6800

Date Published: 22/09/2021

Visqueen Gas Barrier

Storage and handling

Visqueen Gas Barrier should be stored horizontally, under cover in its original packaging.

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

Preparation

Visqueen Gas Barrier 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 voids or protrusions.

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

When installing the membrane in demanding site conditions, use Visqueen GR Lap Tape in place of Visqueen Gas Resistant Foil Lap Tape.

Installation

Visqueen Gas Barrier should be loose laid on the substrate with the blue side up so as to avoid sunlight glare.

The barrier should be clean and dry at the time of jointing. It should be overlapped by at least 150mm, bonded with Visqueen Pro Double Sided Jointing Tape and sealed with Visqueen Gas Resistant Foil Lap Tape.

Alternatively lap joints can be heat welded to achieve an effective seal. Welded lap joints can be less than 150mm provided the joint integrity is not compromised.

Airtight seals should be formed around all service entry points. Visqueen Preformed Top Hat Units should be used for sealing service entry pipes. The base of the top hat and the upstand should be bonded using Visqueen Pro Double Sided Jointing Tape and sealed with Visqueen Gas Resistant Foil Lap Tape. The upstand should be secured with the supplied jubilee clip.

Forming an effective barrier to gases may give rise to complex three-dimensional detailing where, it is recommended Visqueen Preformed Units are used e.g. corners. Alternatively Visqueen Pro Detailing Strip can be used to seal awkward junctions.

If the barrier is punctured or perforated a patch of the same material should be lapped at least 150mm beyond the limits of the puncture and bonded with Visqueen Pro Double Sided Jointing Tape and sealed with Visqueen Gas Resistant Foil Lap Tape. Alternatively a patch can be formed using Visqueen Pro Detailing Strip and lapped at least 150mm beyond the extents of the puncture.

Long periods of exposure to ultraviolet light will reduce the effectiveness of the membrane. The membrane should be covered by a protective layer immediately after installation to prevent damage from following trades, ultraviolet light, etc. Care should be taken to ensure that the membrane is not punctured, stretched or displaced when applying a screed or final floor covering. A minimum thickness of 50mm screed is recommended. When reinforced concrete is to be laid over the barrier the wire reinforcements and spacers must be prevented from puncturing the barrier. Where there is a high risk of potential damage, the barrier should be covered with Visqueen TreadGuard protection, screed, or other approved protection material before positioning the reinforcement.

Usable temperature range

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

Additional information

When used in accordance BS8485:2015 + A1:2019 a subfloor ventilation system or pressure relief maybe required
Where hydrocarbon or VOC contamination is present use Visqueen Ultimate VOC or HC Blok gas protection systems
To assist build sequencing, Visqueen GR DPC is available for gas protection through the wall constructions
For suspended beam and block floor detailing see GB-01
Visqueen Preformed Top Hat Units should be used at service pipe penetrations see GB-51
For internal and external corners Visqueen Ultimate Preformed Units should be used see PFU-553
To seal around steel columns use Visqueen Pro Detailing Strip see GB-52
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.

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Technical support: +44 (0) 333 202 6800

Date Published: 22/09/2021

Visqueen Gas Barrier

Property	Test method	Units	Compliance criteria	Result
Dimensions	EN 1848-2	m		2 x 50
Overall thickness including scrim mesh	EN 1849-2	mm	+/-10%	0.52
Mass	EN 1849-2	g/m^2	-0%/+5%	400
Tensile strength - MD	EN 12311	N	MLV	350
Tensile strength - CD	EN 12311	N	MLV	350
Tensile elongation - MD	EN 12311	%	MLV	20
Tensile elongation - CD	EN 12311	%	MLV	21
Joint strength	EN 12317-2	N	MLV	332
Watertightness 2kPa	EN 1928	-	Pass/Fail	Pass
Resistance to impact	EN 12691	mm	MDV	150
Dart impact	BS 2782	g	MDV	731
Low temperature flexibility	EN 495-5	°C	MDV	-40
Durability against ageing	EN 1296 and EN 1928	-	Pass/Fail	Pass
Durability chemical resistance	EN 1847	-	Pass/Fail	Pass
Resistance to tearing (nail shank) CD	EN 12310-1	N	MDV	358
Resistance to tearing (nail shank) MD	EN 12310-1	N	MDV	368
Resistance to static loading	EN 12730	kg	MLV	20
Water vapour transmission - resistance	EN 1931	MNs/g	MDV	7000
Water vapour transmission - permeability	EN 1931	g/m^2/d	MDV	0.03
Visible defects	EN 1850 -2	-	Pass/Fail	Pass
Reaction to fire	EN 13501-1	Class	MDV	F
BS 8485:2015 + A1:2019 testing requirements				
Mass	EN 1849-2	g/m^2	Average >370	400
Methane permeability	ISO 15105-1	mls/m^2/d/atm	Pass/Fail	<0.15
Puncture CBR	BS EN ISO 12236	N	MDV	1114
Tensiles yield strength MD	ASTM D4885-01	kN/m	MDV	12.5
Tensiles yield strength CD	ASTM D4885-02	kN/m	MDV	7.3
Resistance to static loading	EN 12730	kg	>MLV	20
Yield elongation CD	ASTM D4885-04	%	MDV	19
Tear resistance - trouser method A - MD	BS ISO 34-1	kN/m	MDV	48.2
Tear resistance - trouser method A - CD	BS ISO 34-1	kN/m	MDV	44.8
Tear resistance - angle method B - MD	BS ISO 34-1	N	MDV	53.5
Tear resistance - angle method B - CD	BS ISO 34-1	N	MDV	60.6

Health and safety information

Refer to the Visqueen Gas Barrier material safety datasheet (MSDS).

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Visqueen Gas Barrier

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 PI designs and special projects

From initial design to the completed project, Visqueen are with you every step of the way. Whether it be hazardous ground gas protection and/or below ground waterproofing protection employing barrier, structurally integral or drained systems, Visqueen can offer professional indemnity (PI) insurance for bespoke Visqueen design solutions.

Visqueen Technical Support Managers work with all stakeholders to provide cost effective Visqueen solutions offering complete peace of mind throughout the construction phase and beyond.

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.

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APPENDIX 4

ACCEPTABILITY CRITERIA

Soils intended for use in private gardens, public open space, and soft landscaping must be tested at the rates outlined above and compared to the following acceptability criteria, to confirm their suitability for use:

IGE consulting

Office 11, Bartle House
Oxford Court
Manchester
M2 3WQ

Tel: 0161 914 9171
Email: contact@igeconsulting.co.uk
Web: www.igeconsulting.co.uk

Suite	Determinand (mg/kg unless stated)	Acceptability Criteria for:			
		Private Gardens	Public Open Space (residential)	Soft Landscaping or Public Open Space (Park)	General Fill
A	Asbestos (%)	ND	ND	ND	<0.001 – 0.01%
B	pH	>6 - <8[3]	>6 - <8[3]	>6 - <8[3]	>5 - <10[3]
	Total Cyanide	0.5[3]	0.5[3]	0.5[3]	0.5[3]
	Free Cyanide	0.5[3]	0.5[3]	0.5[3]	0.5[3]
	Soluble Sulphate (mg/l)	500[3]	500[3]	500[3]	500[3]
C	Arsenic	37	79	170	640
	Beryllium	1.7	2.2	63	12
	Boron	290	21000	46000	240000
	Cadmium	11	120	560	190
	Chromium (III)	910	1500	33000	8600
	Chromium (VI)	6	7.7	220	33
	Copper	2400	12000	44000	68000
	Lead	200[1]	630[1]	1300	2330[1]
	Inorganic Mercury	40	120	240	1100
	Nickel	130	230	800	980
	Selenium	250	1100	1800	12000
	Vanadium	410	2000	5000	9000
	Zinc	3700	81000	170000	730000
D	Naphthalene	2.3	4900	1200	
	Acenaphthylene	170	15000	29000	
	Acenaphthene	210	15000	29000	
	Fluorene	170	9900	20000	
	Phenanthrene	95	3100	6200	
	Anthracene	2400	74000	150000	
	Fluoranthene	280	3100	6300	
	Pyrene	620	7400	15000	
	Benzo(a)anthracene	7.2	29	49	
	Chrysene	15	57	93	
	Benzo(b)fluoranthene	2.6	7.1	13	
	Benzo(k)fluoranthene	77	190	370	
	Benzo(a)pyrene	2.2	5.7	11	
	Indeno(1,2,3-cd)pyrene	27	82	150	
	Dibenz(a,h)anthracene	0.24	0.57	1.1	
	Benzo(ghi)perylene	320	640	1400	
E	Total PAHs				1000[4]
F	TPH-CWG - Aliphatic >EC5 - EC6	42	570000	95000	
	TPH-CWG - Aliphatic >EC6 - EC8	100	600000	150000	
	TPH-CWG - Aliphatic >EC8 - EC10	27	13000	14000	
	TPH-CWG - Aliphatic >EC10 - EC12	130	13000	21000	
	TPH-CWG - Aliphatic >EC12 - EC16	1100	13000	25000	
	TPH-CWG - Aliphatic >EC16 - EC21	65000	250000	450000	
	TPH-CWG - Aliphatic >EC21 - EC35				
	TPH-CWG - Aliphatic > EC35 - EC44	65000	250000	450000	
	TPH-CWG - Aromatic >EC5 - EC7	70	56000	76000	
	TPH-CWG - Aromatic >EC7 - EC8	130	56000	87000	
	TPH-CWG - Aromatic >EC8 - EC10	34	5000	7200	

	TPH-CWG - Aromatic >EC10 - EC12	74	5000	9200	
	TPH-CWG - Aromatic >EC12 - EC16	140	5100	10000	
	TPH-CWG - Aromatic >EC16 - EC21	260	3800	7600	
	TPH-CWG - Aromatic >EC21 - EC35	1100	3800	7800	
	TPH-CWG - Aromatic > EC35 - EC44	1100	3800	7800	
G	TPH > EC6 - EC40				5000[4]
H	Benzene	0.087	72	90	
	Toluene	130	56000	87000*	
	Ethylbenzene	47	24000	17000*	
	p & m-xylene	56	41000	17000*&**	
	o-xylene	60	41000	17000*	
	MTBE (Methyl Tertiary Butyl Ether)	LOD[3]	LOD[3]	LOD[3]	

LQM/CIEH S4ULs for Human Health Risk Assessment (3rd edition, 2015) used unless stated:

1) *Category 4 Screening Levels (March 2014)*
2) *CL:AIRE Soil GAC for Human Health Assessment (January 2010)*
3) *In-house screening criteria used as no GAC methodology currently exists*
4) *Hazardous waste thresholds. This limit only applies to imported material, not to in-situ soil.*

Assumed 1% SOM (most conservative) for those values dependent upon SOM.
ND = Not Detected
LOD = Limit of Detection
**Exceeds vapour saturation limit*
***Exceeds solubility saturation limit*