4490-06 / JH

23rd July 2026

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MCFC PROJECT TAVERNA – GROUND GAS PROTECTION MEASURES DESIGN AND VERIFICATION PLAN

Introduction

This Ground Gas Protection Measures Design and Verification Plan has been prepared at the request of Manchester City Football Club. Instructions to proceed with this report were received in July 2026. The c. 0.63 Ha site is located to the east of Etihad Stadium, Manchester at the approximate postcode M11 3FF. The National Ordnance Survey grid reference for the centre of the site is 386925E, 398736N. A site layout drawing is included in Appendix 1.

This report follows, and should be read in conjunction with, the following reports:

- Calibre Consulting Engineers *Phase 1 Geo-Environmental Report* (Ref. 0165-CAL-ZZ-ZZ-RP-G-3000, January 2026);
- IGE Consulting *Coal Mining Risk Assessment* (4490-02B, May 2026);
- IGE Consulting *Phase 2 Geo-Environmental Report* (Ref. 4490-03A, July 2026); and
- IGE Consulting *Remedial Strategy Report* (Ref: 4490-05, Dated: July 2026).

Based on the findings of the above referenced IGE Consulting reports, the site has been designated as **Characteristic Situation 3 (CS3)** with respect to ground gas due to a moderate mine gas risk. The following report has been undertaken to provide a ground gas protection measures design and verification plan in accordance with the CS3 designation, CIRIA C735 (2014) and in line with best practice. For the avoidance of doubt, IGE Consulting Ltd (IGE) shall be the designers and verifiers of the gas protection measures.

Design Of Ground Gas Protection Measures

Scope of Protection

In accordance with BS8485 (2015) + A1 (2019), the proposed development is a **Type C** building and in order to protect against the CS3 designation, **3.0 points** of protection measures must be achieved.

Examples of how the required 3.0 points can be achieved are given below:

	Design Element	BS:8485 (2015) + A1 (2019) Scores
Floor Slab	Precast suspended segmental subfloor	0
	Cast in-situ ground bearing floor slab (with only nominal mesh reinforcement)	**0.5**
	Cast in-situ monolithic reinforced ground bearing raft or reinforced cast in-situ suspended floor slab with minimal penetrations	1 or 1.5*
Ventilation	**Pressure relief pathway**	**0.5**
	Passive sub-floor dispersal layer	1.5 or 2.5**
	Active dispersal layer	1.5 to 2.5
	Active positive pressurisation	1.5 to 2.5
Membrane	**Ground gas resistant membrane*** **	**2**

* To achieve a score of 1.5 the raft or suspended floor slab should be well reinforced to control cracking and have minimal penetrations cast in.
** 2.5 points = very good performance. 1.5 points = good performance.
*** To achieve the 2 points the gas membrane must meet all criteria set out in BS:8485 (2015) + A1 (2019) Table 7.

It is understood that the proposed development will be utilising a ground bearing slab, consequently, the proposed construction elements to achieve the 3.0 points based on this construction methodology have been highlighted in the table above and further details are included in the table below:

Design Requirements	
Cast in situ ground bearing floor slab This floor type is typically constructed from a minimum of 100 mm of cast in-situ concrete with a nominal mesh reinforcement or fibre reinforcement to control shrinkage. The score is conditional on breaches of floor slabs, etc., being effectively sealed.	**0.5 points**
and	
A pressure relief pathway – cuspated geocomposite void former strips connecting to perimeter vents via a T-connector. To comply with BS8485 (2015) + A1 (2019) and to achieve 0.5 points: • the minimum thickness of the cuspated geocomposite strips used as a pressure relief pathway should be 25 mm; and • The geocomposite strips should be installed at regular intervals across the width (short length) of the building with each strip terminating at a ventilation terminal such as a vent box or telescopic vent.	**0.5 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 welded (or 150mm lapped with double sided tape) joints membrane in accordance with the manufacturer's specification and self-adhesive membrane around service penetrations or 'top hats' (make allowance for jointing); • 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	**2 points**

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 independently verified in accordance with CIRIA C735.	
	Total 3.0 points

Gas Membrane

At the time of writing a gas membrane has not been selected. The following ground gas resistant membranes are recommended:

- Visqueen Gas Barrier NF-400; and
- Juta GP1.

The above membranes are suitable for use on site as they meet the requirements outlined in the table above. The membrane datasheets are contained in Appendix 2. Although not yet formally appointed, the client intends to appoint professional gas membrane installers for the works, who should be NVQ Level 2 qualified. If the appointed installation contractors wish to use an alternative membrane, this should be comparable in its technical properties to those listed above and the designer should be consulted to confirm its suitability for use.

Joints between sheets of gas membrane should be welded (recommended) or taped (minimum overlap of 150mm) between sheets with appropriate double-sided tape in accordance with the manufacturer's recommendations.

Installation accessories will also be necessary, including:

- Hand welding equipment; and
- Visqueen Pro Detailing Strip or Juta GP SAM (gas protection self-adhesive membrane).

The technical datasheets for Visqueen's Pro Detailing Strip and Juta's GP SAM are also contained in Appendix 2.

If double sided tape is utilised as opposed to hand welding the following accessories may also be necessary:

- Pre-formed top hats;
- Double Sided (gas resistant) Jointing Tape (to seal inside the Top Hat collars);
- Jubilee Clips (to seal outside the Top Hat collars); and, if required
- Pre-formed corners.

All membrane installation must be undertaken to manufacturer's specification. Installation guidance from Juta is included in Appendix 3. A gas barrier warning poster is contained in Appendix 4 which can be printed and displayed on site to warn follow-on trades of the presence of a membrane. All service entry points should be sealed using Visqueen Pro Detailing Strip or Juta GP SAM (recommended) or fitted with pre-formed gas resistant 'top hats'. If utilised, top hats should be sealed to the pipe and gas membrane utilising Visqueen Pro Detailing Strip or GP SAM; alternatively Double Sided (gas resistant) Jointing Tape could be used to seal the top hats to the membrane, with double sided tape also used to seal the top hat collar to the pipe, with a jubilee clip on the outside.

IGE recommend that the gas resistant membrane is protected above by a non-woven geotextile (protection fleece) or by insulation boards, immediately after validation to reduce the risk of damage by follow-on trades. The perimeter of the gas resistant membrane (where the membrane passes over the masonry) shall be protected by warning signage or timber boards, particularly where gas resistant membrane passes over access thresholds. IGE state that 'reinforced concrete slabs should not be laid directly onto the membrane'. Although insulation will be laid onto the membrane prior to the slab being poured, a separation membrane should also be installed between the insulation and the slab.

The ground gas membrane will be installed prior to the pouring of the ground floor slab but following the installation of the pressure relief pathway (discussed below). The building will be steel framed, constructed using a piled foundation solution. The gas membrane should be sealed to any steel framework using Visqueen Pro Detailing Strip or Juta GP SAM (or equivalent). Where present, the gas membrane should be installed in lift pits to the manufacturer's recommendations, in consultation with both the installer and the designer.

Pressure Relief Pathway

In order to prevent a build-up of ground gas beneath the gas membrane and floor slab, a pressure relief pathway should be installed comprising strips of a cuspated high density polyethylene (HDPE) geocomposite void former measuring no less than 25mm in thickness. Examples of suitable products include the following:

- Visqueen Gas Vent Mat; and
- Juta GP Void Vent.

If alternative products are to be utilised, these should be comparable to those referenced above. If a product with different properties is proposed for use, it should be confirmed suitable for use by the designer before commencing installation. The product datasheets for the Visqueen Gas Vent Mat and Juta GP Void Vent are included in Appendix 5 alongside an installation guide from Juta. The chosen void former should be installed in line with the manufacturer's recommendations at regular intervals across the width of the building (short side), connecting to a ventilation mechanism at the end of each strip along the length (long side) of the building. Suitable perimeter ventilation mechanisms include vent

boxes and telescopic vents; these are often joined to the geocomposite strips by a T-shaped connector or a perimeter connector pipe.

Ground Floor Slab

The ground floor slab will comprise a c. 175mm concrete slab with nominal reinforcement and will contain construction joints. The concrete slab should be designed and installed by qualified professionals to minimise the risk of cracking which would result in a preferential ground gas pathway. Any movement or construction joints should be designed by a structural or civil engineer and properly sealed. Construction quality is of paramount importance in minimising the frequency and severity of joints and cracks, thereby determining the performance of the ground bearing slab in providing adequate protection from ground gas.

Service ducts

Any ducts, such as those provided for water pipes, should be sealed internally once installed using a product such as Juta's GP DuctSeal HG + Grey Stuff or equivalent. Its installation should be verified including photographs.

Standard Details and Detailed Design Drawings

An extract of a standard detail from Juta of a typical section at the perimeter showing the location of the ground gas resistant membrane, geocomposite void former and vent box has been included below, with the full detail included in Appendix 6.

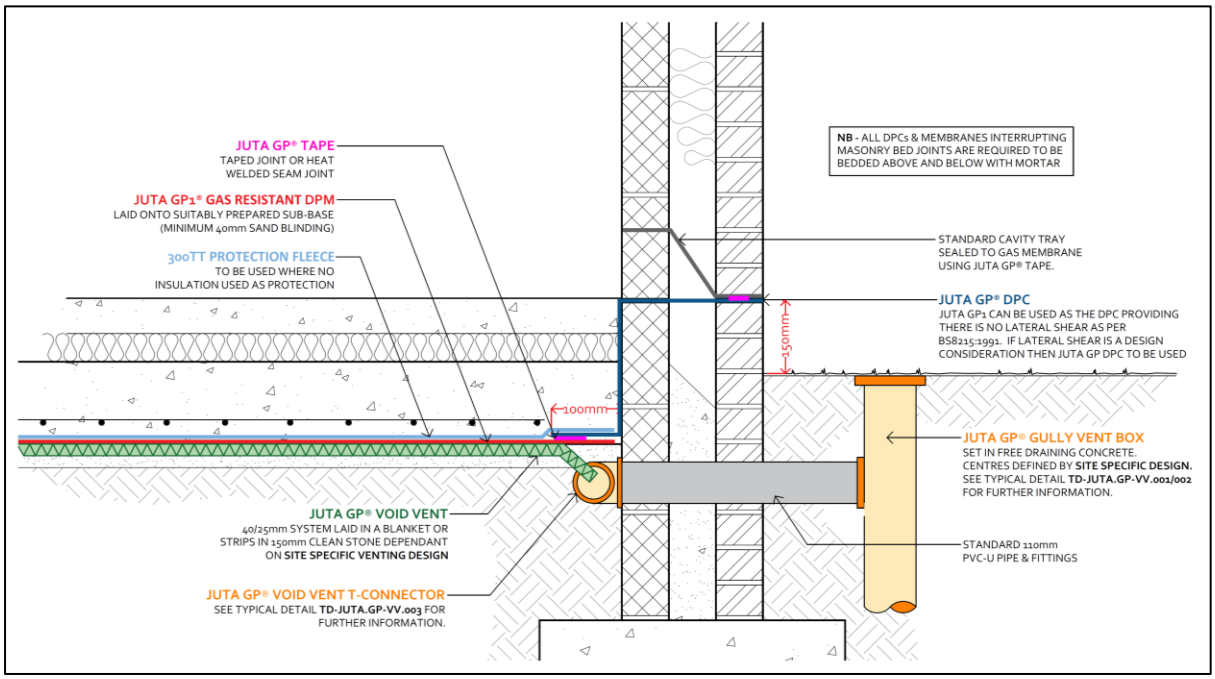


Figure 1: Extract of a Juta standard perimeter detail for a ground bearing slab, void vent and membrane below slab.

The detail shown above is for guidance only and does not reflect the project-specific substructure detailing. Project-specific substructure and slab-edge details prepared by Calibre Consulting Engineers are included in Appendix 7. Once the installer and products have been selected, and upon finalisation of the construction-stage substructure and slab-edge design, the gas protection specialist shall coordinate the gas protection design with Calibre Consulting Engineers to ensure compatibility with the structural/building design. Key coordination points will include interfaces with substructure masonry, venting locations, lift pits and pile caps. The design and detailing of the gas protection measures at these locations, including membrane continuity, sealing and venting arrangements, shall remain the responsibility of the gas protection specialist.

Verification Plan

Installer Competence

The operatives appointed to install the gas membrane should be suitably trained and experienced and be NVQ Level 2 accredited in '*sub-structure work occupations (construction) – installation of gas membranes*'.

Verifier Competence

A suitably experienced verifier on behalf of IGE Consulting shall undertake all verifications at the site. A copy of verification qualifications is provided in Appendix 8.

Verification Plan

In line with CIRIA 735 (2014), IGE Consulting will independently verify the installation of the gas protection measures by undertaking the following protocol. This must be undertaken following the laying of the gas membrane but prior to laying insulation and pouring of the ground floor slab. The verification process should be managed by a CL:AIRE Specialist in Gas Protection and Verification (SGPV) or equivalent accredited person and all verifiers must be suitably qualified. The IGE qualified verifier will:

- Check that a geocomposite void former of sufficient thickness has been installed at a suitable frequency across the width of the building and that this is connected by a suitable means to an adequate method of ventilation. Check that the void former is not blocked in any way that would compromise its performance as a pressure relief pathway.
- Identify that the correct membrane has been used, including prefabricated units and accessories.
- Conduct a thorough visual inspection and air lance testing to ASTM D4437.
- 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, by air lance testing to ASTM D4437.

- Check that service entries have been correctly sealed, either formed using detailing strip or self adhesive membrane, or via the installation of top hats. If top hats have been utilised, ensure that they have been appropriately sealed both to the membrane at the base and the service pipe.
- 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.
- Once poured and set, inspect the concrete ground floor slab to ensure that it has been installed to a suitable standard as to limit cracking, including the incorporation of at least a basic form of reinforcement.
- Take photographs to provide evidence of the above.

The IGE qualified 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 9.

Following the visit, site personnel should:

- Protect the membrane immediately using a protection fleece or by installing insulation immediately following the visit.
- Ensure that the membrane is not damaged by follow-on trades.
- Internally seal all service ducts once the pipes have been installed, using a suitable product such as Juta's GP DuctSeal HG + Grey Stuff.

Validation Procedure and Report

The following plan details the required actions to demonstrate the successful installation of ground gas protection on the site. In accordance with BS8485 (2015) + A1 (2019), the verification shall include, as a minimum, the following:

- 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. NVQ Level 2 etc.
- Detailed description of any deviations from the specification, with explanation and justification of such deviations.
- As-built construction drawings and product specifications of components used.
- A description of the verification approach – as specified above.
- Verification evidence – in this case photographic evidence of each verified plot at the frequency outlined above.
- 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.

When the above has been completed and prior to occupation, this information will be compiled in a validation / completion report which will be submitted to and approved in writing by the Local Planning Authority.

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

Yours sincerely,

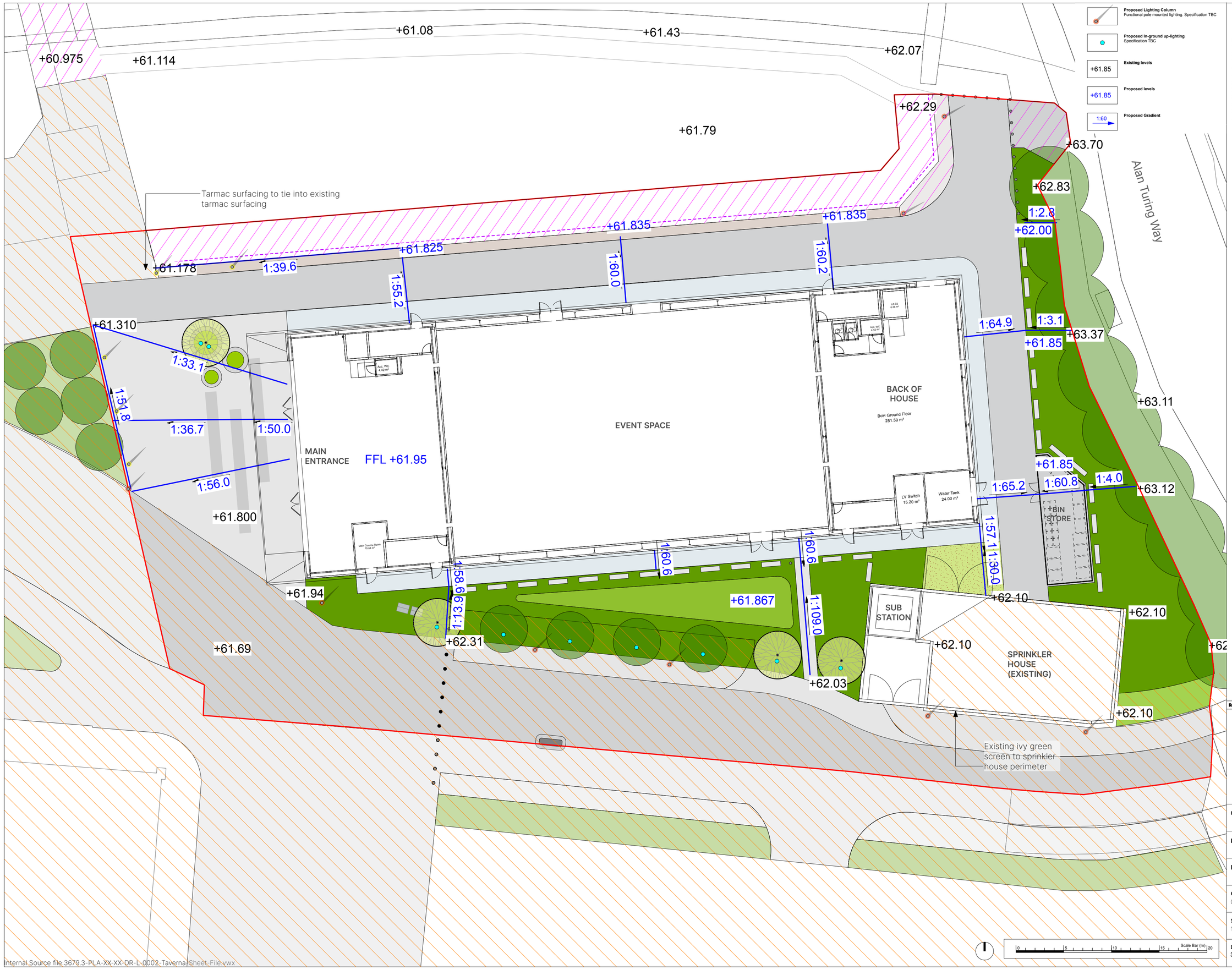
James Harley MSci SGPV FGS
Senior Geo-Environmental Engineer

Enc.

Appendix 1 - Landscape General Arrangement (3679.3-PLA-XX-XX-DR-L-0001, March 2026);
Appendix 2 – Membrane and Accessories Technical Datasheets
Appendix 3 – Juta GP1 Installation Guidance
Appendix 4 - Gas Membrane Warning Poster
Appendix 5 – Geocomposite Void Former Technical Datasheets and Juta Installation Guidance
Appendix 6 - Juta Standard Detail Drawing (Guidance Only)
Appendix 7 – Calibre Consulting Engineers Ltd Detailed Design Drawings
Appendix 8 – Verifier Qualifications
Appendix 9 – Example IGE Consulting ‘Ground Gas Resistant Membrane Inspection Record’ Sheet

APPENDIX 1

SITE LAYOUT DRAWING



Proposed Lighting Column
Functional pole mounted lighting. Specification TBC

Proposed In-ground up-lighting
Specification TBC

Existing levels
+61.85

Proposed levels
+61.85

Proposed Gradient
1:60

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NOTES:
1. Do not scale from this drawing.
2. Always work to noted dimensions.
3. All dimensions are in millimetres unless otherwise stated.
4. All setting out, levels and dimensions to be agreed on site.
5. The dimensions of all materials must be checked on site before being laid out.
6. This drawing must be read with the relevant specification clauses and detail drawings.
7. Order of construction and setting out to be agreed on site.

Key

Ornamental Planting
Mixed shrub, herbaceous perennial and ornamental grass planting (plant species to tie into existing North Stand works)
Notes: 300mm topsoil oveer 400mm subsoil

Rain Garden Planting
Rain garden suitable planting mix
Notes: 300mm topsoil oveer 400mm subsoil

Climbers
Tensile wire system with climbing plants to soften and screen the new substation enclosure. Twining climber species - final extent to be coordinated with substation ventilation requirements

Proposed Street tree
Semi-mature tree
20-25cm girth
Notes: 300mm topsoil over 600mm subsoil

Existing Tree

Surface Type 1
Insitu concrete with large format precast concrete banding to arrival plaza

Surface Type 2
Concrete block paving to footpath around the perimiter of the building. Specification to be in keeping with the North Stand development

Surface Type 3
Tarmac to access road to match existing surfacing on North Stand development.

Surface Type 4
Filter Drain along northern edge of access road to form part of the drainage strategy

Surface Type 5
Reinforced grass to sprinkler house access point

Large pre cast concrete planters
Placed in the arrival plaza, the raised concrete planters help soften the entrance facade and allow people to perch on the planter edge

Fixed Bollard
To form HVM line. Specification TBC

Fixed Concrete Block
Fixed concrete block with gabion cladding / artwork to improve appearance. To form HVM line. Specification TBC

Timber Post and rail fence
1.2m high to the northern edge of the access road
Product TBC

Bin Store
Steel frame with timber uprights and lockable gates.
Product TBC

Proposed Lighting Column
Column mounted projectors. Specification TBC

Area to Remain as Existing

Emerging Context Under North Stand Public Realm Works

Revision	Date	Description	Drawn	Apprvd.
P05	02/03/26	Incorporating Architects Comments	CB	SC
P04	27/02/26	Planning	CB	SPL
P03	30/01/26	Review and comment	CB	SPL
P02	28/01/26	For Review and Comment	CB	SPL
P01	22/01/226	For Review and Comment	CB	SPL

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Client Manchester City Football Club

Project Project Taverna

Drg Title Landscape General Arrangement

Created on	Created by	Approved by
09-01-26	CB	SPL

Scale	Size	Workstage
1:250	A2	Planning

Drg No. 3679.3-PLA-XX-XX-DR-L-0001
Suitability S2
Revision P05

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APPENDIX 2

MEMBRANE AND ACCESSORIES TECHNICAL DATASHEETS

GROUND GAS PROTECTION
GP®1 TECHNICAL DATA SHEET

JUTA | TITANTECH®



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/m²

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 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

BBA APPROVAL INSPECTION TESTING CERTIFICATION CERTIFICATE 20/5705

Please Scan

CE UK CA UK NI

Rev 2024

GROUND GAS PROTECTION
GP®1 TECHNICAL DATA SHEET

GP®1

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)

GROUND GAS PROTECTION
GP®1 SAM
TECHNICAL DATA SHEET

JUTA | TITANTECH®



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/m²

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

BBA APPROVAL INSPECTION CERTIFICATION CERTIFICATE 22/6078

Please Scan

CE UK CA UK NI

Rev 2024

GROUND GAS PROTECTION
GP®1 SAM
TECHNICAL DATA SHEET

GP®1 SAM

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)	>380 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	> 270 N
	Resistance to Fire	EN 13501	E - 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

Technical Datasheet

Visqueen Gas Barrier NF-400

Features & benefits

- BDA Agrement 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 Agrement 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
- Visqueen TreadGUARD 1500, 1m x 2m
- Visqueen TreadGUARD 300, 2m x 75m
- Visqueen Ultimate Top Hat Units
- Visqueen NF-Detailing Strip, 300mm 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.

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Visqueen Gas Barrier NF-400

Preparation

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 on the project specification. The lap joints should be firmly compressed using a hand roller during taping to ensure an adequate bond is achieved.

Creating an effective gas barrier often requires complex three-dimensional detailing, such as around internal and external walls, corners, doorway thresholds, service pipes, party walls, and structural columns. Visqueen Detailing Strip (Pro or NF depending on the project specification) is gas resistant and can be used in place of the gas barrier to maintain continuous protection. 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 on 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

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Visqueen Gas Barrier NF-400

construction.

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/m²	>370	>370
Tensile strength - machine direction	BS EN 12311-2 method B	N/mm²	MDV	26.3
Tensile strength - cross direction	BS EN 12311-2 method B	N/mm²	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	MDV	400
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/m²/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/m²/day/atm	MDV	13.2
Methane gas transmission rate - welded membrane joint	BS ISO 15105-1	ml/m²/day/atm	MDV	15
Carbon dioxide gas transmission rate	BS ISO 15105-1	ml/m²/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

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Visqueen Gas Barrier NF-400

Tensile yield strength - cross direction	ASTM D4885-02	kN/m	MDV	7.3
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

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 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.

Visqueen CPD Seminars

Visqueen's CPD Seminars offer insights into Building Regulations, Standards, and industry guidance related to

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Visqueen Gas Barrier NF-400

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

Based at our Derbyshire facility, the Visqueen Training Academy offers a variety of training programs across the UK. These include one-day product awareness sessions for distributors and builders' merchants, and intensive two-day courses for hands-on product installation training. Contact us for more information.

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Technical Datasheet

VisqueenPro Detailing Strip, 300mm 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.

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 peal back the VisqueenPro Detailing Strip release film and apply the pressure sensitive, self adhesive face to the prepared substrate. Apply pressure by rollering 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

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Technical Datasheet

VisqueenPro Detailing Strip, 300mm x 10m

VisqueenPro Detailing Strip data table

Property	Value
Width	300mm
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 (smooth)	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)

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VisqueenPro Detailing Strip, 300mm x 10m

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APPENDIX 3

JUTA GP1 INSTALLATION GUIDANCE

GROUND GAS PROTECTION
GP®1 INSTALLATION GUIDANCE

JUTA | TITANTECH®



Installation Guidance

GP®1 is a high quality proprietary gas resistant damp proof membrane, manufactured from low density reinforced polyethylene (LDPE). This products is ideal for use on sites where ground gas contamination is present.

GP®1 incorporates an aluminium foil core, offering additional protection against Methane and Carbon Dioxide in addition to Radon and Bulk Ground gas. GP®1 can be used on any site where carbon dioxide, methane, bulk ground gas and/or radon is present up to and including BS8485:2015 + A1 2019 Characteristic situation (CS) 6. The barrier is sufficiently resistant to the ingress of harmful gases into a building. On more heavily contaminated sites, a passive or active venting system in addition to a gas barrier may be required to dilute the gases down to acceptable levels and specific design advice should be sought.

JUTA UK – radon, ground gas, vapour, air and moisture barrier characteristic properties:

- **High Chemical Resistance**
- **High resistance to Ground Gasses**
- **Long Term Durability (Performance guaranteed for the lifetime of the building)**
- **Compatible with all building materials**
- **Manufactured to meet the most up to date British Standards and guidance.**

Width	2 m
Length	50 m
Coverage	100 m^2 / roll
Weight	40 kg

GROUND GAS PROTECTION
GP®1 INSTALLATION GUIDANCE

GP®1

Additional Products & Accessories:

- **GP® SAM** Gas Resistant Self Adhesive variant of GP®1, is a bituminous gas proof and waterproof sheet, composed of self-adhesive SBS polymer modified bitumen in conjunction with an inner aluminium foil core and external HDPE carrier film. The lower surface finish of siliconized polypropylene release film is removed at the point of use. GP® SAM is used for the Gas/waterproofing of underground structures where harmful ground gasses are anticipated, or available in a 300 mm wide detailing strip to aid with corner sealing and penetration sealing with the GP®1 membrane system.
- **WP SAM** Waterproofing - Self Adhesive Membrane, is a bituminous water proof sheet, which provides resistance to Radon, composed of self-adhesive SBS polymer modified bitumen with an upper surface finish of cross laminated HDPE and a lower surface finish of paper release film. JUTA WP SAM is used for the Radon/waterproofing of underground structures where harmful ground gasses are anticipated, or as a detailing strip to aid with corner sealing and penetration sealing with the GP®2 and GP®4 membrane system.
- **GP® Tape** is a double sided thermoplastic sealant tape with high surface tack suitable for sealing membrane overlap joints. All seam joints should be rolled using a 40mm silicone seam roller to remove any trapped air and ensure adhesion between the membranes. Rolls sizes: 50mm x 10m.
- **GP® Lap Tape** is a single sided sealant tape with aluminium foil with high surface tack suitable for sealing membrane joints. All seam joints should be rolled using a 40mm silicone seam roller to remove any trapped air and ensure adhesion between the membranes. Rolls sizes: 75mm x 50m.
- **GP® DPC** is a gas resistant DPC which is used with Juta Gas Barriers depending on site requirements. Roll sizes: 1.3m x 20m.
- **GP® Primer** is a quick drying bitumen primer to give a key prior to applying GP® SAM. Juta GP® Primer can be used /on concrete, cementitious screeds and renders, steel and iron. It should be applied without thinning and should be scrubbed in by brush to ensure an even coverage. Coverage rate 6-10m2 / litre depending on porosity of substrate, and drying time 3-4 hours depending on conditions. Supplied in 25 litre drums.
- **GP® Radon Sump** is a lightweight and easy installed HDPE unit. It can be converted to an active sump system if needed using activation of fans. All sumps must be linked by appropriate pipe work. Outlet positions for standard 110mm vent pipes for extraction and dispersion should be connected to the sump relative to site requirements.
- **GP® Void Vent** is a geocomposite void former composed of a cuspated High Density Polyethylene (HDPE) Drainage core with a non-woven polypropylene (PP) geotextile separator/filter bonded to one side. The Void Vent is supplied in either 25mm or 40mm void depth. Material is joined by overlapping of the loose edge of geotextile for full coverage, or laid in strips as per the ventilation design. Roll sizes are 0.9m x 50m for the Void Vent 25, and 0.97m x 25m for the Void Vent 40.
- **GP® Protection Board** is a high density board which are supplied in 3.0mm x 1.2m x 2.4m sizes.
- **GP® Protection Fleece** is a 300g nonwoven geotextile and is supplied in 2m x 100m rolls.

GROUND GAS PROTECTION
GP®1 INSTALLATION GUIDANCE

GP®1

General Precautions:

- It is recommended that JUTA Gas Barrier systems are installed in ambient air temperatures in excess of 5ºC.
- Ingress of water into the installation area should be prohibited.
- In all cases, the surface onto which the barrier is to be laid should be smooth, dry, clean and free from debris or detritus material which may cause damage to the Barrier.
- In all cases it is recommended the installation of barrier geomembranes is completed by a suitably qualified and accredited installer (NVQ level 2/TWI/CSWIP or equivalent). JUTA UK can offer advice as to suitable/recommended installers.
- Appropriate PPE should be worn at all times during handling, placement and fixing of the Barrier.
- Vehicular traffic directly on top of the Barrier should be avoided.
- Foot traffic directly on top of the Barrier should be restricted.
- Where either Vehicular or Foot traffic is unavoidable, protective measures should be utilised to prevent damage to the Barrier. (Use of protection fleece and/or protection boards)
- GP® Membrane should not be left exposed for prolonged periods and should be covered as soon as practically possible, and within 1 month of installation. Where extended periods of exposure to UV are anticipated, protection measures should by employed to reduce exposure of the GP® membranes.
- Smoking, and naked flames are strictly prohibited.

Preparation:

- Prior to laying the GP® membrane ascertain that any sub floor gas venting or ventilation components are in their respective and appropriate positions. Individual components should be secured to avoid potential disruption or undue movement during the installation process.
- Where geo-composite void formers or graded stone venting layers are being deployed, sand, granite dust, etc., requires to be isolated to prevent fines from infiltrating ventilation voids. An appropriate separation layer / geotextile should be installed to prevent such occurrences.
- Masonry and other substructure elements within the membrane footprint should be checked for sharps and rough surfaces that may cause unintentional damage to overlying membrane(s).
- Warning signs should be displayed to discourage unwarranted foot traffic.
- All unnecessary vehicular access should be denied.

GROUND GAS PROTECTION
GP®1 INSTALLATION GUIDANCE

GP®1

Substrate Preparation:

Substrates for installation of the GP® membrane systems need to have sufficient stability to avoid movement during the installation and subsequent construction works. The substrate preparation should include the following:

- A clean, dry, uniform, smooth surface free from debris and detritus, ponding water (damp or slightly wet is acceptable), oil and grease.
- Open Voids (> 12mm depth or width) must be filled before the installation of the membrane system.
- Where the substrate contains changes in elevation of >12mm, or particle protrusions from the substrate exceed 12mm, a protection fleece should be utilised to protect the membrane from damage from the substrate.
- Generally a sand blinding with a minimum thickness of 30mm, or a 300TT protection fleece would provide a suitable laying surface in lieu of concrete blinding.

We would encourage the use of a subgrade acceptance form prior to installation of the GP® membranes. Any issues of concern with the suitability of the subgrade can be highlighted and addressed prior to laying of the membrane.

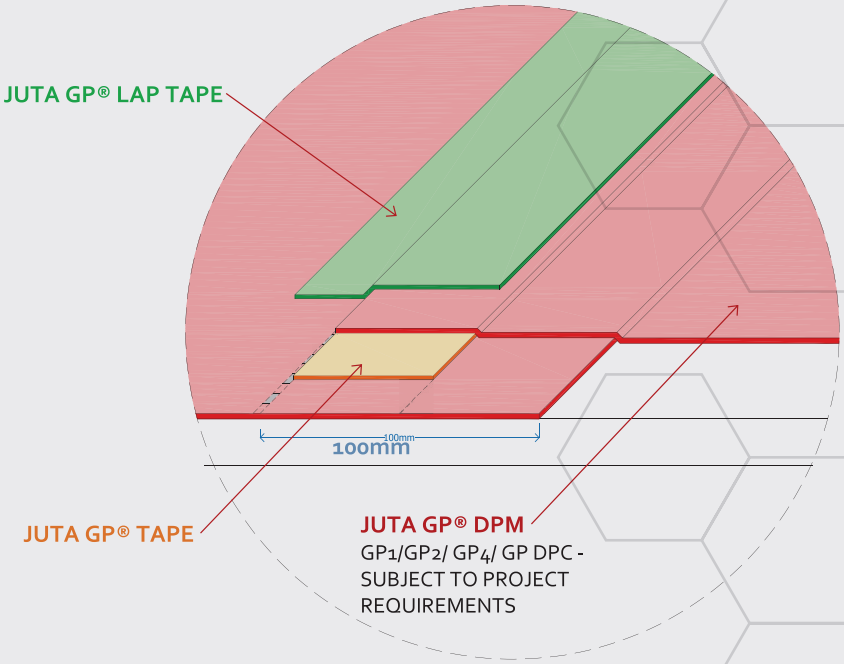
GROUND GAS PROTECTION
GP®1 INSTALLATION GUIDANCE

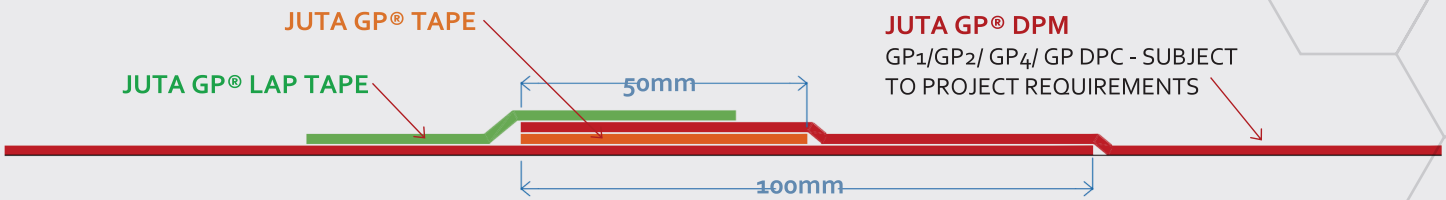
GP®1

Jointing and Sealing using Tapes:

Where design service life does not exceed 25 years:

- A 100mm overlap print line is provided on products to assist with overlapping, jointing and sealing.
- For taped joints, GP® Tape (50mm wide) can be utilised. The GP® Tape is double sided for ease of use.
- To joint using tapes, ensure the first panel of GP® Membrane Barrier is laid, and the surface is clean, dry, and free from dust. Begin by peeling one side of the protective coating from the tape, applying the tape within the 100 mm guide line area; such that the tape is within 100 mm line and the Barrier roll edge. Best practice recommends that the tape should be firmly adhered to the base membrane. This is best achieved by applying pressure with a silicone roller.
- Unroll the second layer of GP® Membrane Barrier ensuring a minimum 50 mm overlap (GP® Tape width) is present along the entire length of the lap. Slowly removing the upper layer of protective film from the Tape, and pressing firmly on the taped joint with a silicone roller will help to remove trapped air and ensure positive adhesion. (Note – taped joints have the highest failure rate when tested to ASTM D4437-08:2013 –therefore it is imperative that pressure sealing with silicone roller is implemented).
- Optional: Finish the joint by application of appropriate sealing tape over the joint to provide a smooth finish.(See below)





GROUND GAS PROTECTION
GP®1 INSTALLATION GUIDANCE

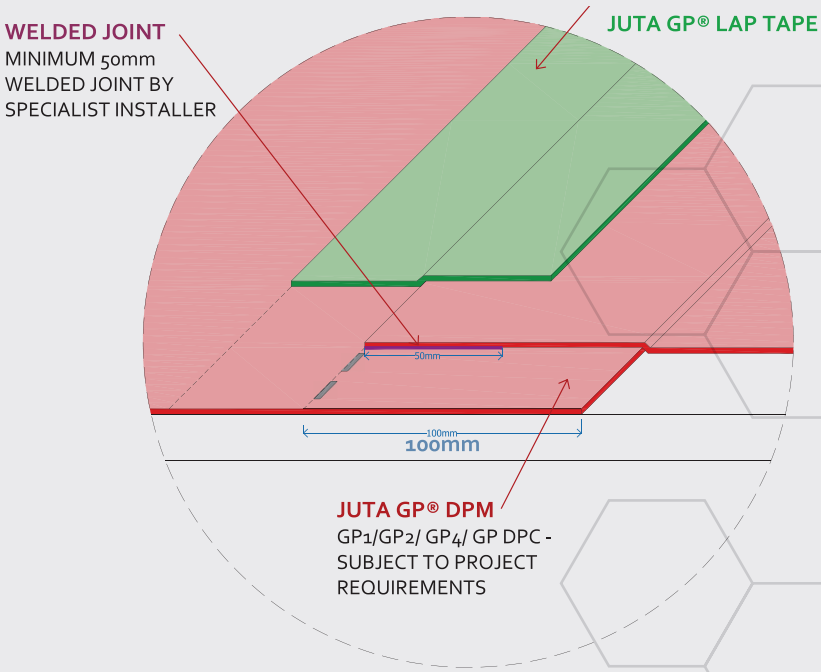
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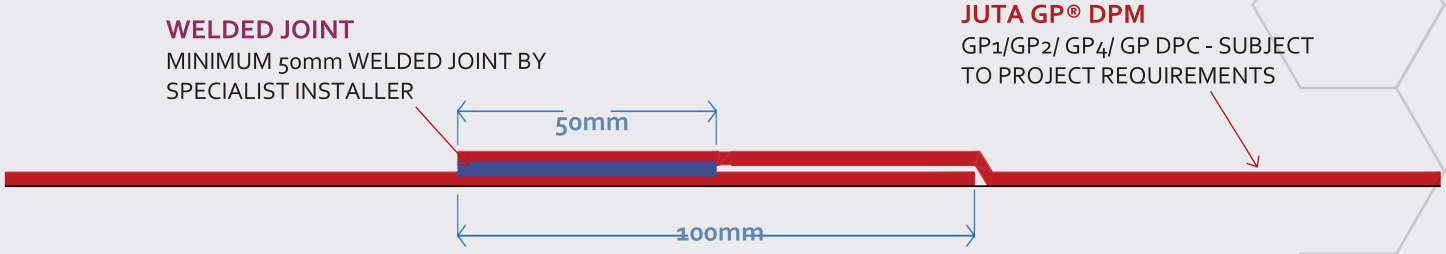
Jointing and Sealing using welding:

Where design service life is required to exceed 60 years:

- Prior to commencing welding work, trials must be completed to determine the operating window for the welding equipment and materials. It is widely acknowledged that ambient air temperature, power supply and the condition of welding equipment can affect the working window.
- Welding window for GP® gas barriers is 180-240°C at a suggested rate of 3.0 m/min on low air flow.
- JUTA UK recommends that any heat welding is carried out by a Construction Skills NVQ Level 2 qualified installer. (Or equivalent) The membranes should be overlapped by at least 100mm and care should be taken to ensure a seal between the joint.
- The printed 100mm overlap line should be used as a guide to ensure suitable jointing.
- A minimum welded overlap joint of 50mm wide should be achieved – it should be noted that the suitability of the welded joint is defined by the joint integrity, as tested in accordance with C735 (most commonly air lance

  –ASTM D4437-08:2013), if a welded joint passes integrity testing, it would be deemed acceptable.





GROUND GAS PROTECTION
GP®1 INSTALLATION GUIDANCE

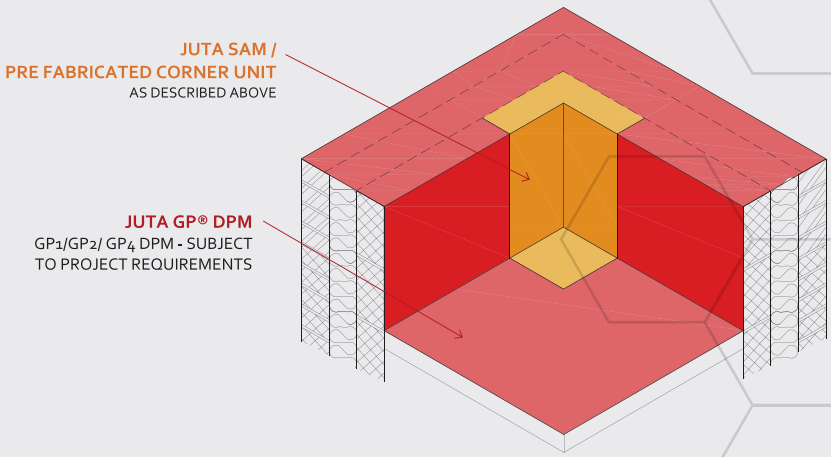
GP®1

Pre-fabricated corner units:

- Please refer to TD-JUTA.PFC.001 for Pre-Formed Corner Unit detail. Please contact JUTA UK for standard sizes or to request bespoke sizes.
- Build the masonry up to the height of the horizontal joint where the cavity tray is to be built in. Place the preformed upstand unit tight into the corner of the masonry wall.
- Remove the protective paper from the back of the GP® Tape and apply it to the upstand unit at a height that will ensure a good overlap when the downstand unit is in place. Remove the protective paper from the face of the tape.
- Place the preformed downstand unit tight into the corner with the horizontal element sitting on the masonry wall. Press the vertical leg of the downstand unit firmly against the upstand unit, starting at the internal corner and working outwards. Wherever possible, a silicone roller should be used to apply pressure and expel trapped air.
- Apply two lengths of double sided tape vertically across both upstand and downstand units, one on each return wall, ready to receive the lengths of cavity tray. When the cavity trays are sealed to the upstand units, join them to the floor membrane.
- **If prefabricated units are sealed with thermal jointing – tapes are not required.**

Sealing with Self-adhesive membrane:

- Sealing around corners, upstands and penetrations can be achieved with the compatible self-adhesive membrane variant; GP®1 SAM for GP®1 installation and WP SAM for GP®2 and GP®4 installation.
- In all cases, the surface onto which the Barrier is to be laid should be smooth, dry, clean and free from debris or detritus material which may cause damage to the Barrier.
- With the GP® membrane in place, self-adhesive membrane is cut and applied to the corners/ upstands/penetrations to create a good seal extending a minimum 100mm up the vertical face then overlap and seal to the GP® Membrane providing a minimum horizontal 100mm lap.

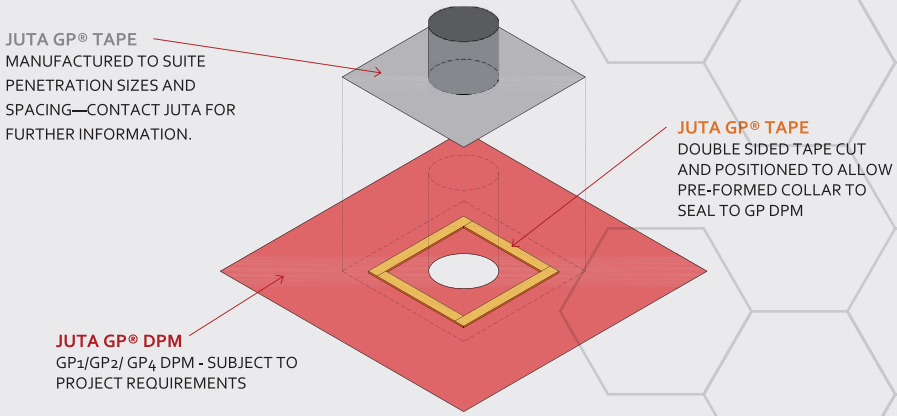


GROUND GAS PROTECTION
GP®1 INSTALLATION GUIDANCE

GP®1

Pre-fabricated top-hats:

- Cut a circular hole in the membrane as close as possible to the pipe, or pipe socket. Ensure that service penetrations do not occur at joints in the membrane.
- With the pipe in position, slide the Preformed Top hat Unit over the pipe (various diameters are available –110 mm 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 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.
- **If prefabricated top-hats are sealed with thermal jointing – tapes are not required for sealing to the base membrane.**



GROUND GAS PROTECTION
GP®1 INSTALLATION GUIDANCE

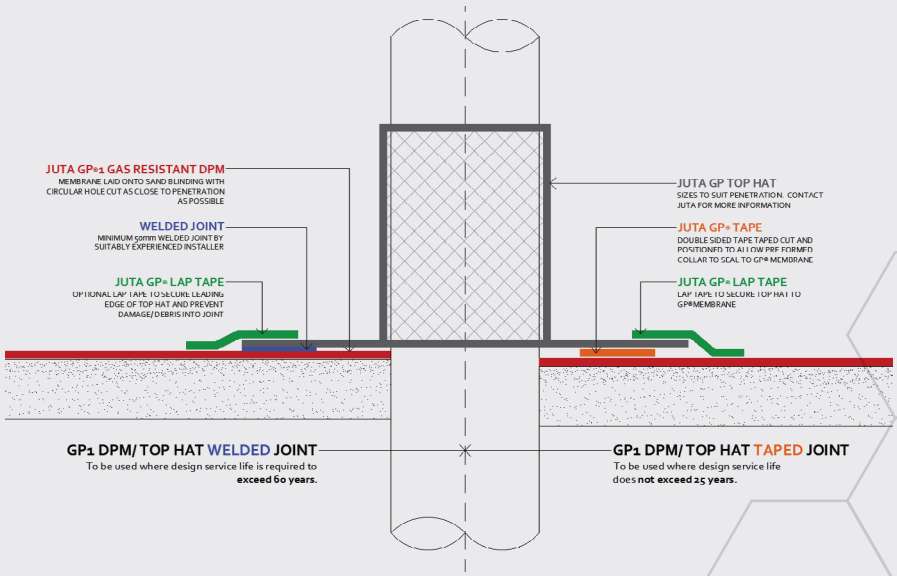
GP®1

GP® SAM (Self-adhesive Membrane) detailing strip:

Corner detailing and pipe penetrations may be formed and sealed using the 300mm wide GP® SAM ensuring 150mm overlaps onto the horizontal surface.

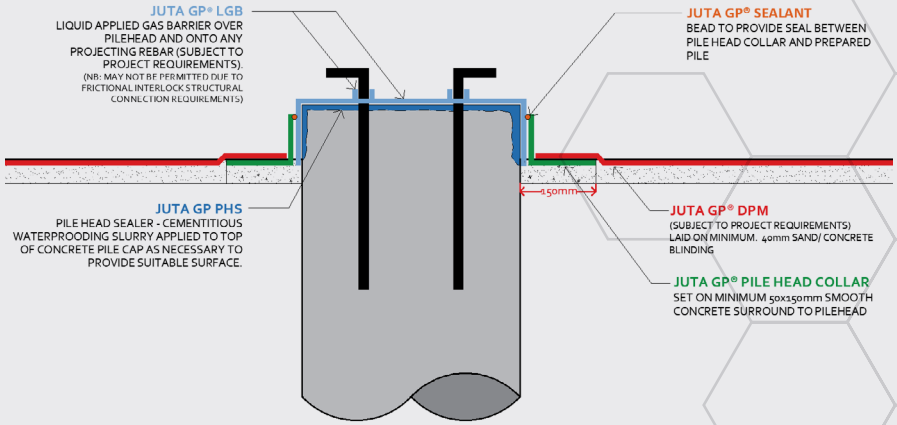
Top Hat Pipe Penetration Sealing Options:

Pre Formed Pipe collars can also be welded to membrane where required.



Pile Head/Rebar Penetrations:

Sealing around pile caps and concrete reinforcement is achieved by application of JUTA Liquid Gas Barrier, or a layer of JUTA GP® SAM. In hydrostatic applications, the use of JUTA Crystalline Active Barrier (CAB) may be required to seal the capillaries of the pile cap and to create a monolithic bonding surface prior to application of the gas barrier.



GROUND GAS PROTECTION
GP®1 INSTALLATION GUIDANCE

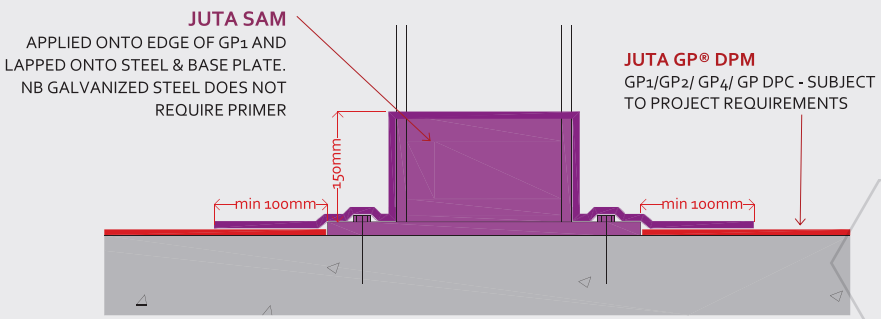
GP®1

Sealing around stanchion details:

Sealing around stanchion details can be achieved with a couple of options:

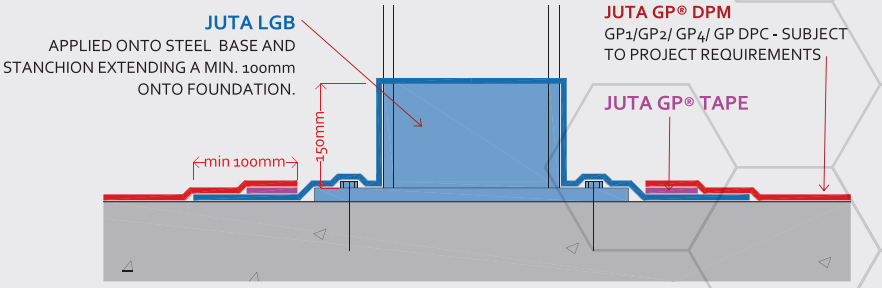
OPTION 1:

- Cut square or rectangle in the GP1® Membrane to suit the steel baseplate dimensions. Ensure that membrane is laid as tightly as possible around the baseplate.
- With the membrane in place, self-adhesive JUTA GP1® SAM is cut and applied to the steel around the flanges to create a good seal extending a minimum 150mm up the vertical face of the steel. The GP1 SAM should then overlap and seal to the GP1® Membrane providing a minimum horizontal 100 mm lap.



OPTION 2:

- Liquid Applied JUTA LGB is paint applied to the steel baseplate and extending a minimum 100mm onto the concrete foundation. LGB should also extend up the vertical face of the steel a minimum 150 mm.
- Cut square or rectangle in the GP1® Membrane to suit the steel baseplate dimensions. Ensure that the cut is tight as possible around the baseplate. Apply 4 lengths of double sided JUTA GP Tape around the perimeter of the baseplate and overlap GP1 membrane and seal using silicone roller.



Repairing Punctures:

Should tears, or punctures occur in the membrane, these can be patched using a piece of the same material, sized to overlap at least 150mm beyond the extent of the puncture/tear. Lap should be bonded with JUTA UK GP® tape, in accordance with the instructions above, or welded to provide a continuous sheet.

Note – Where this is not practical (IE – small punctures) isolated repairs may be completed in the same fashion without adhering to the 150mm guide value. It should be noted that the suitability of the repair is determined by its integrity, as tested in accordance with C735, if a repair passes integrity testing, it would be deemed acceptable.

Membrane Integrity / Protection Measures:

It is critical that gas protection membranes retain their physical properties before, during and after installation. In consideration of potential damage that may by caused as a result of foot traffic, during and immediately following installation, the area(s) concerned should be cordoned with access restricted only to authorised persons.

Consideration should be given to the following issues:

The underside of the membrane should be protected from puncture by sharps and /or uneven protrusions. A sand blinding or similar layer should be used. If this is not possible, or it is impractical then protection fleece or boards can be utilised to afford the appropriate level of protection.

Similarly the upper surface of the membrane also requires to be protected from punctures, cuts, hot particles, distortion / stretching, etc.

Damage is frequently caused by sharps carried on the soles of safety footwear, dropped tools, reinforcing steels, and localised pressure transmitted via spacer bars, “high chairs”, etc. Unintentional damage can occur from hot sparks generated during abrasive cutting of steels. In foil core membranes, this type of damage can melt through the upper polythene film exposing the aluminium to the onset of corrosion.

The form(s) of protective covering and physical capabilities should be considered in respect of the conditions on site and the nature of the installation.

APPENDIX 4

GAS MEMBRANE WARNING POSTER

IGE consulting

WARNING

GAS BARRIER INSTALLED ON THIS SITE



KEEP OFF AND DO NOT PUNCTURE

APPENDIX 5

GEOCOMPOSITE VOID FORMER TECHNICAL DATASHEETS AND JUTA INSTALLATION GUIDANCE

GROUND GAS PROTECTION
GP® VOID VENT
TECHNICAL DATA SHEET

JUTA | TITANTECH®



GP® VOID VENT

GP® VOID VENT is a cuspated HDPE core with a geotextile filter/separator bonded to a single side, in either 25 mm or 45 mm depth. The intended use of the void vent is to provide a means of ventilation when used in conjunction with an approved gas protection barrier, in accordance with the recommendation(s) contained within NHBC guidance and BS8485:2015 + A1 2019.

Optimised for maximum strength and performance, providing high levels of air/gas flow. Complies with the latest codes of practice as published by BRE, CIRIA and NHBC. Void Vent is independently tested and verified by UKAS accredited bodies.

Handling

Roll weights can be between 50 kg and 100 kg hence appropriate equipment is required for unloading and handling.

Storage

GP® VOID VENT is supplied in packaging designed to protect the product from damage during handling and storage, and degradation as a result of UV exposure. GP® VOID VENT should be kept in the supplied packaging until such time as it is required for installation.

GP® VOID VENT 25 mm

Thickness	27 mm
Width	0.9 m
Length	50 m
Weight	60 kg

GP® VOID VENT 40 mm

Thickness	42 mm
Width	0.97 m
Length	25 m
Weight	50 kg

Named Accessory in Certification

Please Scan

CE UK CA UK NI

Rev 2024

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.

GROUND GAS PROTECTION
GP® VOID VENT
TECHNICAL DATA SHEET

GP® VOID VENT

Feature	Characteristics	Test Method	GP® VOID VENT 25 mm	GP® VOID VENT 40 mm
Physical Properties	Thickness	EN ISO 9863-1	27 mm	42 mm
Mechanical Properties	CBR Puncture Resistance	EN ISO 12236	1.4 (-0.14) kN	1.4 (-0.14) kN
	Tensile Strength (MD/CMD)	EN ISO 10319	20/15 (-2.0/-1.5) kN/m	10/10 (-1.0/-1.0) kN/m
	Compressive Strength	EN ISO 25619-2	300 kPa	200 kPa
Hydraulic Properties	Pore Size (O_{90}) [geotextile]	EN ISO 12956	80 (± 20) µm	80 (± 20) µm
	Permeability (H_{50}) [geotextile]	EN ISO 11058	100 (-20) l/m²/s	100 (-20) l/m²/s
	Water Flow Capacity [Composite] (200 kPa, (i)=1)	EN ISO 12958	5 l/m/s	>5 l/m/s
	Gas Flow Capacity [Composite]	Calculated (a)	0.024 m³/s	0.033 m³/s
Material Dimensions	Roll Width	N/A	0.9 m	0.97 m
	Roll Length	N/A	50 m	25 m
	Gross Roll Weight	N/A	60 kg	50 kg
Product Information	Polymer	High Density Polyethylene		
	Biological Resistance	HDPE does not support bacterial growth		
	Chemical Resistance	HDPE is highly resistant to acids and alkalis		

(a) Gas flow calulated based on a discharge coefficient of 0.61 with a pressure difference of 10kPa and a standard air density of 1.29 kg/m³

JUTA UK

Please contact JUTA UK Directly for more information on GP® VOID VENT

Installation

Refer to specific GP® Void Vent installation guidance. Detailed assistance is available from JUTA UK.

Accessory Products

- GP® Vent Box (Ground level)
- GP® Air Bricks

Technical Datasheet

Visqueen Gas Vent Mat

Features & benefits

- Large format rolls - rapid installation
- Less contaminated soil to be removed compared to pipe and gravel systems
- System achieves between 0.5 and 1.5 points in accordance with BS8485:2015 + A1:2019
- Range of system components - provides various methods of exhausting gases to atmosphere

Product description

Visqueen Gas Vent Mat is a geocomposite void former comprising a cuspated high density polyethylene (HDPE) core bonded to a nonwoven polypropylene geotextile filter membrane. Visqueen Gas Vent Mat is 25mm thick and supplied in rolls 900mm x 50m.

Approvals and standards

- 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 Vent Mat is designed to create a 25mm deep void beneath reinforced concrete ground floor slabs. Hazardous ground gases including radon and volatile organic compounds (VOCs) are collected within the void and dispersed to atmosphere via a designed arrangement of Visqueen connectors and venting components, collectively managing and effectively diluting the collected gases.

Where high gas concentrations have been recorded the vent mat can be laid in a blanket format with the individual mats being butted together. Where the gas concentrations are low or where pressure relief is required the vent mat can be laid in a strip format with the mat being laid at predetermined spacings.

System components

- VisqueenPro Detailing Strip, 300mm x 10m

Storage and handling

Visqueen Gas Vent Mat should be stored on end, under cover in the original packaging.

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

Preparation

Visqueen Gas Vent Mat should be installed on a substrate appropriate for the specification, free from voids or protrusions.

To prevent wind uplift when working on exposed sites, it is advisable to consider loading the vent mat with sandbags or other ballast as installation progresses.

The vent mat can be cut with a sharp retractable safety knife.

Installation

Unroll Visqueen Gas Vent Mat in position. Turn over so that the geotextile filter membrane layer faces downwards i.e. towards the substrate.

When laid in a blanket format, all joints should be butted with the overlap strip of geotextile filter membrane extending beneath the adjacent vent mat.

When laid in strip format, end laps should be butted with the overlap strip of geotextile filter membrane, when present, extending beneath the adjacent vent mat.

Where necessary the vent mat can be cut around columns, pipes and other such penetrations.

For effective gas dispersal, the vent mat should be connected to a means of exhausting the collected gases to atmosphere e.g. Visqueen Adjustable Z Vents and Airbricks, Visqueen Pro Gas Vent Boxes or Visqueen Gas Vent Bollards.

Usable temperature range

There are no temperature range restrictions for installing Visqueen Gas Vent Mat and associated system components.

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+44 (0) 333 202 6800 I enquiries@visqueen.com I www.visqueen.com

Visqueen Gas Vent Mat

Additional information

When designing the venting or pressure relief system careful consideration should be given to the substructure elements such as positioning of foundation pads and ground beams so as to avoid over complex detailing.

For assistance with gas venting or gas pressure relief design and detailing, 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	Value
Width		mm	900
Length		m	50
Thickness	BS EN ISO 9863-1	mm	25
Compressive strength	BS EN ISO 25619-2	kN/m²	300
Roll weight		kg	74
Roll diameter		m	1.3
In-plane air flow capacity with soft/hard platens @ 20mm and 100kPa	BS EN ISO 12958	l/m/s	155
Shear Strength	BS EN ISO 13426-2	kN	1
Ventilation free path (indicative)	Calculated	mm²/m	14,400

Health and safety information

Refer to the Visqueen Gas Vent Mat 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 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.

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Visqueen Gas Vent Mat

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.

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

Based at our Derbyshire facility, the Visqueen Training Academy offers a variety of training programs across the UK. These include one-day product awareness sessions for distributors and builders' merchants, and intensive two-day courses for hands-on product installation training. Contact us for more information.

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GROUND GAS PROTECTION
GP® VOID VENT INSTALLATION GUIDANCE



GP® VOID VENT

Installation Guidance

GP® VOID VENT is a geocomposite void former composed of a cuspated High Density Polyethylene (HDPE) Drainage core with a non-woven polypropylene (PP) geotextile separator/filter bonded to one side.

GP® VOID VENT is designed to be used below ground level structures to provide a void in which harmful gases have a preferential pathway to flow through the underside of the building and discharge at the perimeter via suitable outlet accessories dependent on the design.

GP® VOID VENT should be used in conjunction with an approved Gas Protection Barrier and in accordance with the recommendations contained within BS8485:2015 + A1 2019.

Approved Gas Barriers:

JUTA GP2® BBA certified High performance Damp proof membrane is specifically designed and manufactured to perform as a high performance damp proof membrane, Radon (BRE 211), air and moisture protection system, as well as low level protection to carbon dioxide and methane (NHBC Amber 1). GP®2 can be used on any site where low levels of ground gas is present.

JUTA GP4® BBA certified Radon Barrier is a multilayer, low-density polyethylene membrane. Reinforced with a polypropylene reinforcing grid. GP®4 is specifically designed and manufactured as a high Performance Radon, air and moisture protection system, as well as low level protection to carbon dioxide and methane. GP® 4 can be used on any site where Radon Gas is present.

JUTA GP1® BBA certified gas barrier incorporates an aluminium foil core, offering additional protection against Methane and Carbon Dioxide in addition to Radon and Bulk Ground gas. GP®1 can be used on any site where carbon dioxide, methane, bulk ground gas and/or radon is present up to and including BS8485:2015 + A1 2019 Characteristic situation (CS) 6.

GROUND GAS PROTECTION
GP® VOID VENT INSTALLATION GUIDANCE

GP® VOID VENT

Design & Installation:

Gas venting design should be prepared by a suitably qualified geo environmental engineer with calculations to demonstrate suitable dilution capabilities. JUTA UK recommends the installation of the GP® VOID VENT is completed by a suitably qualified and accredited installers (NVQ level 2). JUTA UK can offer advice as to suitable/recommended installers if required.

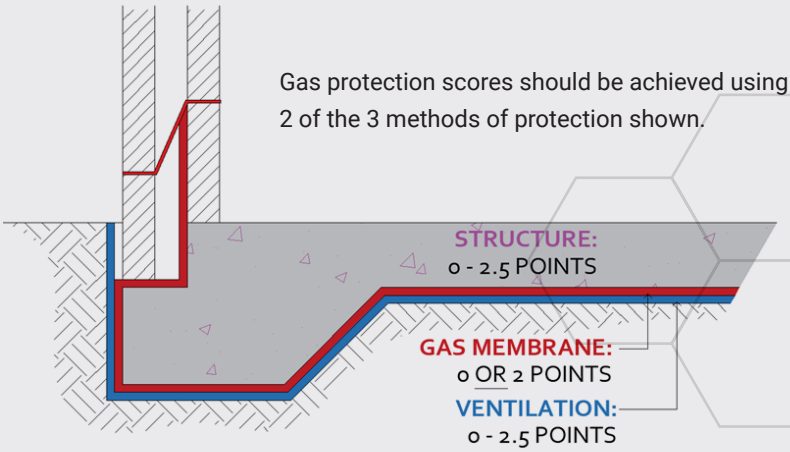
The Void Vent is supplied in either 25mm or 40mm void depth. Material is joined by overlapping of the loose edge of geotextile for full coverage, or laid in strips as per the ventilation design.

Ventilation Design:

Gas Ventilation Design should follow the guidance in BS8485:2015+A1:2019 & Partners in Technology Passive Venting of Soil Gases Beneath Buildings 1997 to allocate gas protection points dependent on the gas risk which is provided in the Phase 3 Interpretative Report or the Phase 4 Remediation Strategy. The designer will propose a gas protection system which should consist of at least two different elements from Structure, membrane and Ventilation. Commons solutions include: a structural barrier element (0-2.5 Points) with a membrane (2 points); or ventilation (0-2.5 points) and a membrane (2 points). GP® VOID VENT can be used as apart of a ventilation system achieving between 0.5 —2.5 points as described in the table shown.

BS8485:2015+A1:2019 Code of Practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings provides guidance and defines protection points for the venting element on table 6.

GP® VOID VENT Physical Properties		
	GP® VOID VENT 25 mm	GP® VOID VENT 40 mm
Overall Thickness	27 mm	42 mm
Roll Width	900 mm	970 mm
Roll Length	50 m	25 m
Gross Roll Weight	60 kg	50 kg
Compressive Strength	300 kPa	200 kPa



Protection Element/System	Score	Comments
a) Pressure Relief Pathway	0.5	This system relies on a continued serviceability of pumps and therefore maintenance schedule
(b) Passive sub floor dispersal system Very Good Performance Good Performance	 2.5 1.5	The ventilation effectiveness of different media depends on a number of different factors including the transmissivity of the medium. The width of the building, the side ventilation spacing and type and the thickness of the layer.
(c) Active Dispersal Layer	1.5-2.5	This system relies on a continued serviceability of pumps and therefore maintenance schedule
(d) Positive Pressurisation	1.5-2.5	This system relies on continued operation of the pumps and therefore alarm and response systems and maintenance schedule should be in place.
(e) Ventilated Car Park	4	Assumes that the car park is vented to deal with car exhaust fumes.

GROUND GAS PROTECTION
GP® VOID VENT INSTALLATION GUIDANCE

GP® VOID VENT

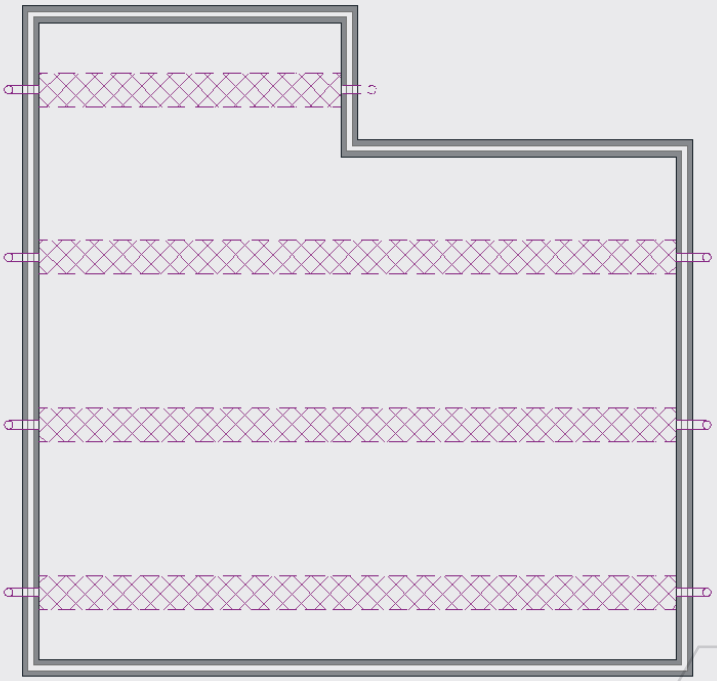
Pressure Relief Pathway

Subject to specialist design, to achieve 0.5 Points

0.5 points can be achieved by installing GP® Void Vent 25 below the slab in strips to create a Pressure Relief Pathway. GP® VOID VENT 25 is installed at pre-determined centres as advised by the designer.

The strips are then terminated into GP® VENT BOXES/ Telescopic Vents (subject to design) along the 2 longest lengths of the perimeter to allow the harmful gases to be diluted to an acceptable level .

Please refer to project specific design documentation for quantity and spacing of venting components



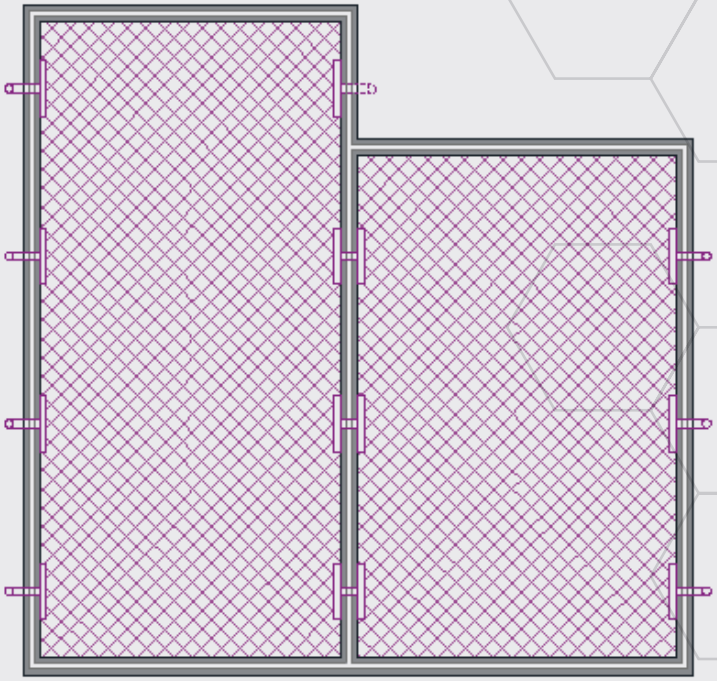
Full Blanket System

Subject to specialist design, can achieve 1.5—2.5 Points

Good (1.5) and Very Good Performance (2.5) can be achieved by installing GP® VOID VENT 25/40 as a full blanket and terminated into GP® VENT BOXES/ Telescopic Vents to the building perimeter at pre-determined centres advised by the designer.

This method should have a site specific design with a defined level of performance and supporting dilution calculations to qualify for the 1.5 – 2.5 protection points (as detailed in Table 6 above)

Please refer to project specific design documentation for design calculation and outlet quantity and spacing as applicable.

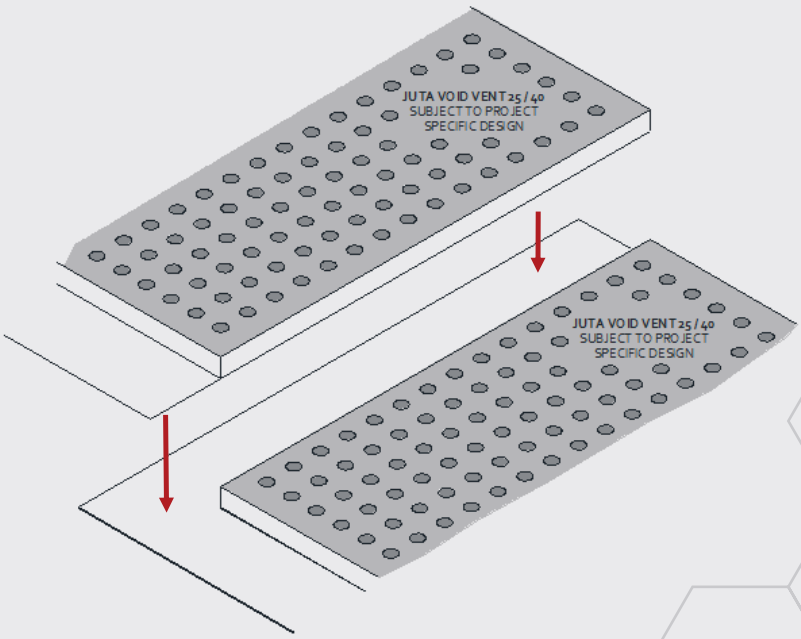


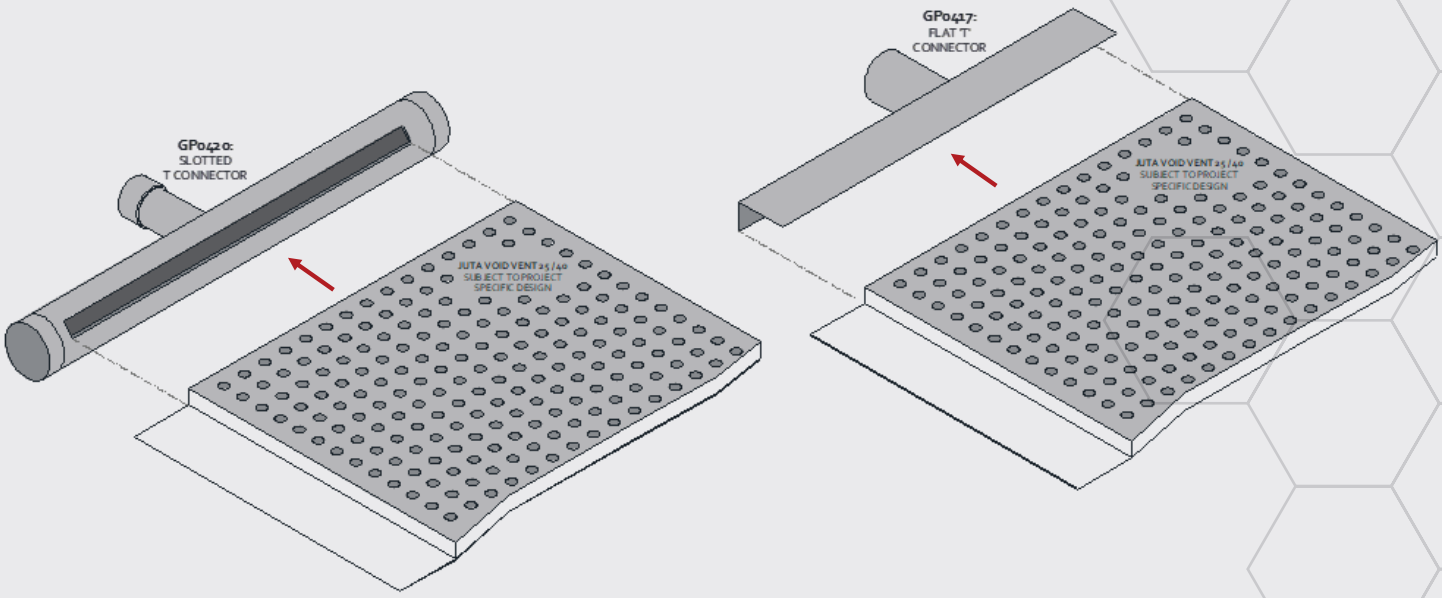
GROUND GAS PROTECTION
GP® VOID VENT INSTALLATION GUIDANCE

GP® VOID VENT

Installation Methodology:

- GP® VOID VENT should be unrolled across the length of building as per vent layout drawing and flipped over so that the geotextile is facing down onto a suitably prepared sub base of 50mm sand. The Void Vent should be cut to suit the length of the building.
- If the building is longer that the roll lengths (25m /50m), GP® VOID VENT can be butt jointed at roll ends where there is a overlap of geotextile for lapping. If proving a full blanket system laps between rolls of Void Vent (end side laps) are also achieved by butt jointing the products and overlapping the leading edge of geotextile.
- At the building perimeters, the Void Vent roll ends should be inserted into the Slotted T Connector or placed below the Flat T Connectors as indicated below:





GROUND GAS PROTECTION
GP® VOID VENT INSTALLATION GUIDANCE

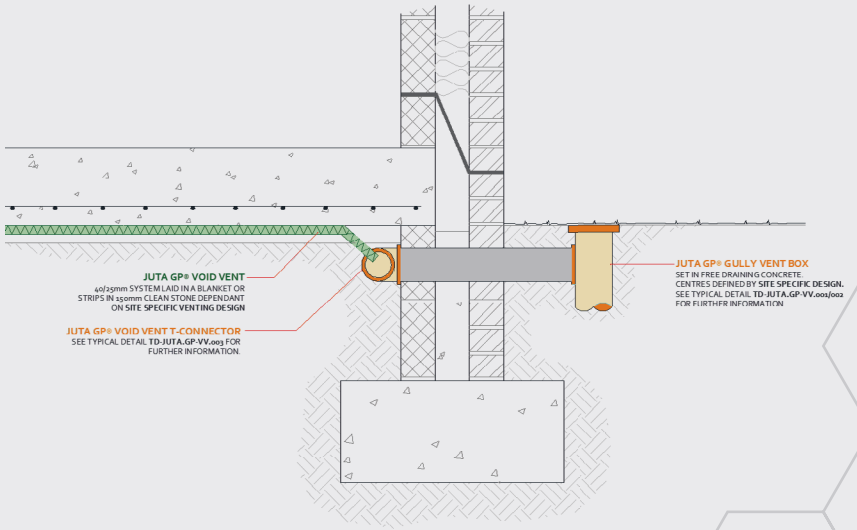
GP® VOID VENT

Installation Methodology Continued:

External Walls

Once the Void Vent has been laid and perimeter connectors are in place, a 110mm PVC-U pipe is used to provide continuity through the external walls and subsequent connection to a suitable discharge point (GP® VOID VENT). The PVC-U pipe connects to the T/ Flat connector below the slab internally and to a ground vent box externally as per Vent Box detailing overleaf.

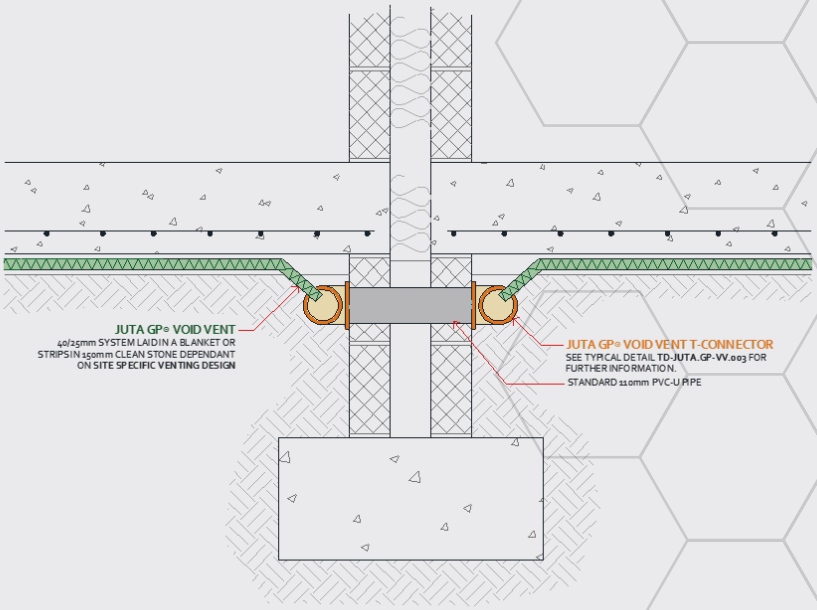
PERIMETER CONNECTION TO OUTLET - TYPICAL DETAIL



Internal Walls

Where internal walls extend down to foundation, continuity is achieved using a length of 110mm PVC-U Pipe through the walls. Cut the PVC-U pipe to size (to suit wall width) and connect to 2 Void Vent Connectors (T or Flat connector subject to project requirements) at either side as indicated to provide a continuous system.

INTERNAL WALL CONTINUITY - TYPICAL DETAIL



GROUND GAS PROTECTION
GP® VOID VENT INSTALLATION GUIDANCE

GP® VOID VENT

Void Vent Outlet Accessories:

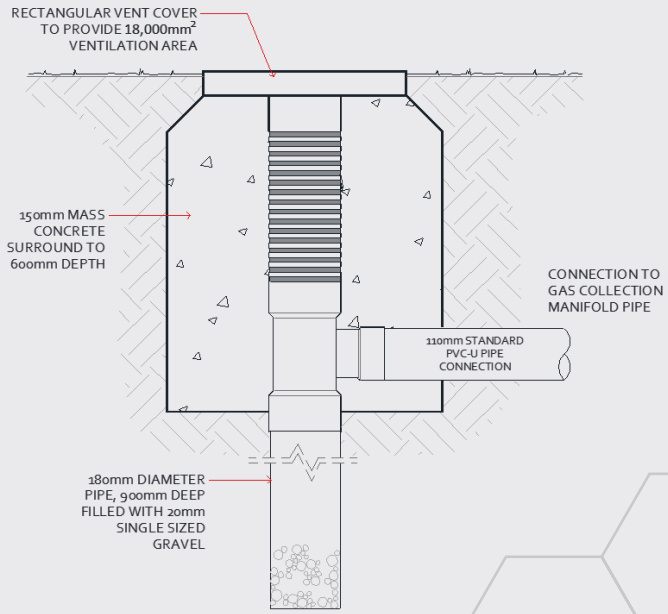
JUTA UK provide a bespoke range of venting accessories (referred to as inlets/outlets in construction drawings) to be used in conjunction with Void Vent to ensure the harmful gases disperse into the atmosphere external to the building.

GP® VENT BOX can be installed around the perimeter of the building to provide a suitable discharge point for gases flowing through the Void Vent system.

The quantity and location of vent boxes should be determined by the gas ventilation designer and should be indicated on the project specific drawings, level with the finished ground level (unless otherwise stated).

The 110mm PVC-U collection pipe taken through perimeter walls should fit snuggly onto the base connector as indicated adjacent. Please contact JUTA for further details on GP Vent Box products.

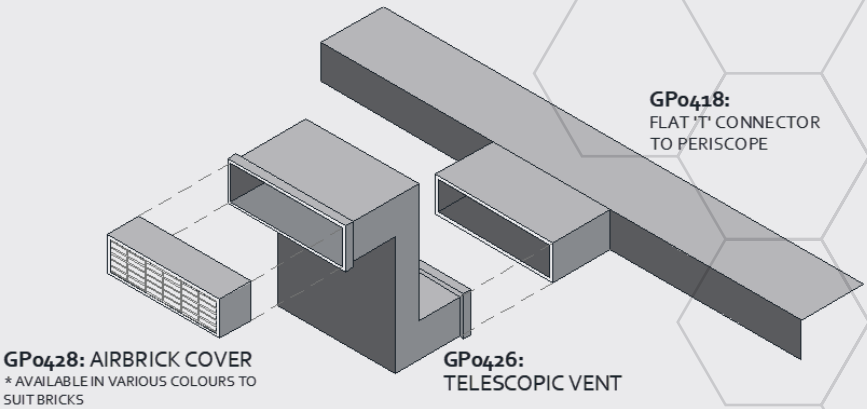
TYPICAL VENT BOX DETAIL



JUTA Telescopic Vents can also be used to as suitable discharge points installed within cavity walls at pre-determined centres as per project specific design. The periscopic vent is built into the cavity wall construction on site. Slotted and Flat T connectors can be supplied with rectangular connections to link to the lower level of telescopic vent below the slab. Vertical height extension pieces can be added to ensure termination min 150 mm above external FGL.

Please contact JUTA for further details on GP® VENT BOX products.

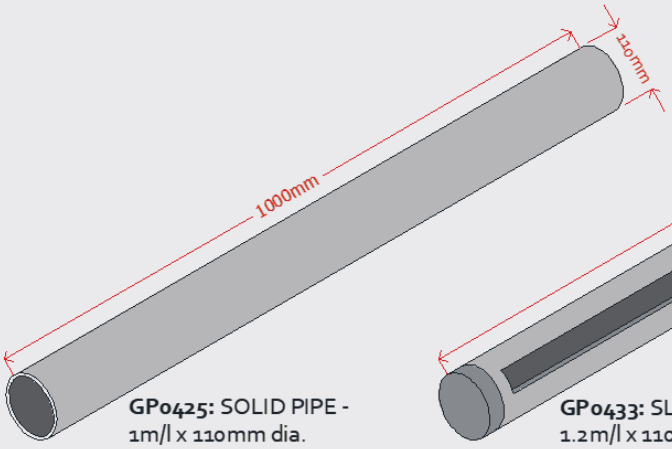
TYPICAL TELESCOPIC VENT CONFIGURATION



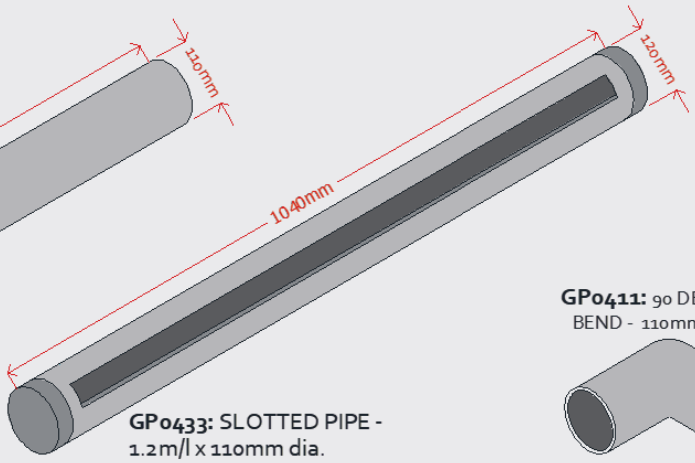
GROUND GAS PROTECTION
GP® VOID VENT INSTALLATION GUIDANCE

GP® VOID VENT

JUTA offer a wide range of ancillary products to for connection of JUTA Void Vent products. Each product has an individual product codes for reference but please refer to GP® VOID VENT & GP® VENT BOX Technical Datasheets and Typical detail for further information or contact JUTA if you need project specific advice.

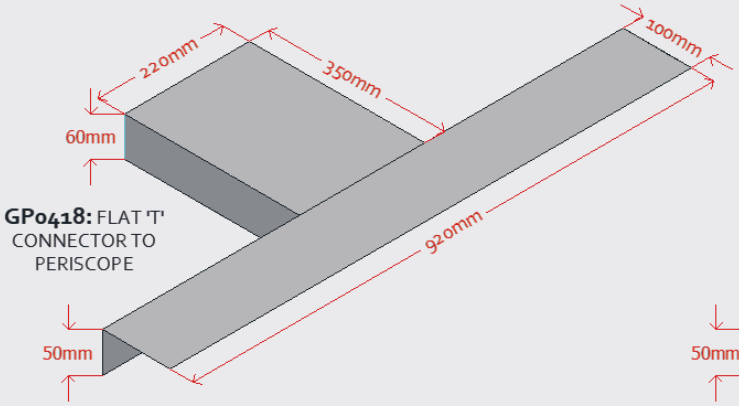


GP0425: SOLID PIPE - 1m/l x 110mm dia.



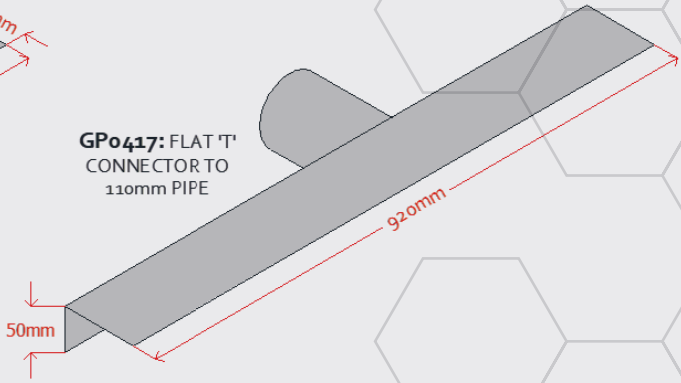
GP0433: SLOTTED PIPE - 1.2m/l x 110mm dia.

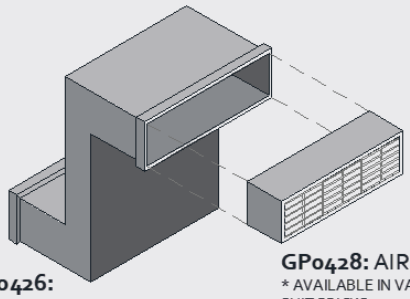
GP0411: 90 DEGREE BEND - 110mm dia.



GP0418: FLAT 'T' CONNECTOR TO PERISCOPE

GP0417: FLAT 'T' CONNECTOR TO 110mm PIPE

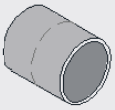




GP0426: TELESCOPIC VENT

GP0428: AIRBRICK COVER
* AVAILABLE IN VARIOUS COLOURS TO SUIT BRICKS

GP0432: COUPLING FOR 110mm PIPES



GP0416: END CAP FOR 110mm PIPES



GROUND GAS PROTECTION
GP® VOID VENT INSTALLATION GUIDANCE

GP® VOID VENT

Maintenance

There is no maintenance required for GP® VOID VENT layer. However, as with all gas venting system a maintenance schedule should be put in place to ensure that all gully vent boxes are kept clear of debris such as leaves etc. The venting system has been designed with levels of redundancy which take into account the short term blockage of some vents, however these should be inspected on a monthly basis for blockage and/ or damage.

Supply/ Storage

GP® VOID VENT is delivered on pallets containing 2 rolls and supplied in packaging designed to protect the product during handling and storage and degradation as a result of UV exposure. Void Vent should be kept in the supplied packaging until such a time as it is required for unloaded and handling.

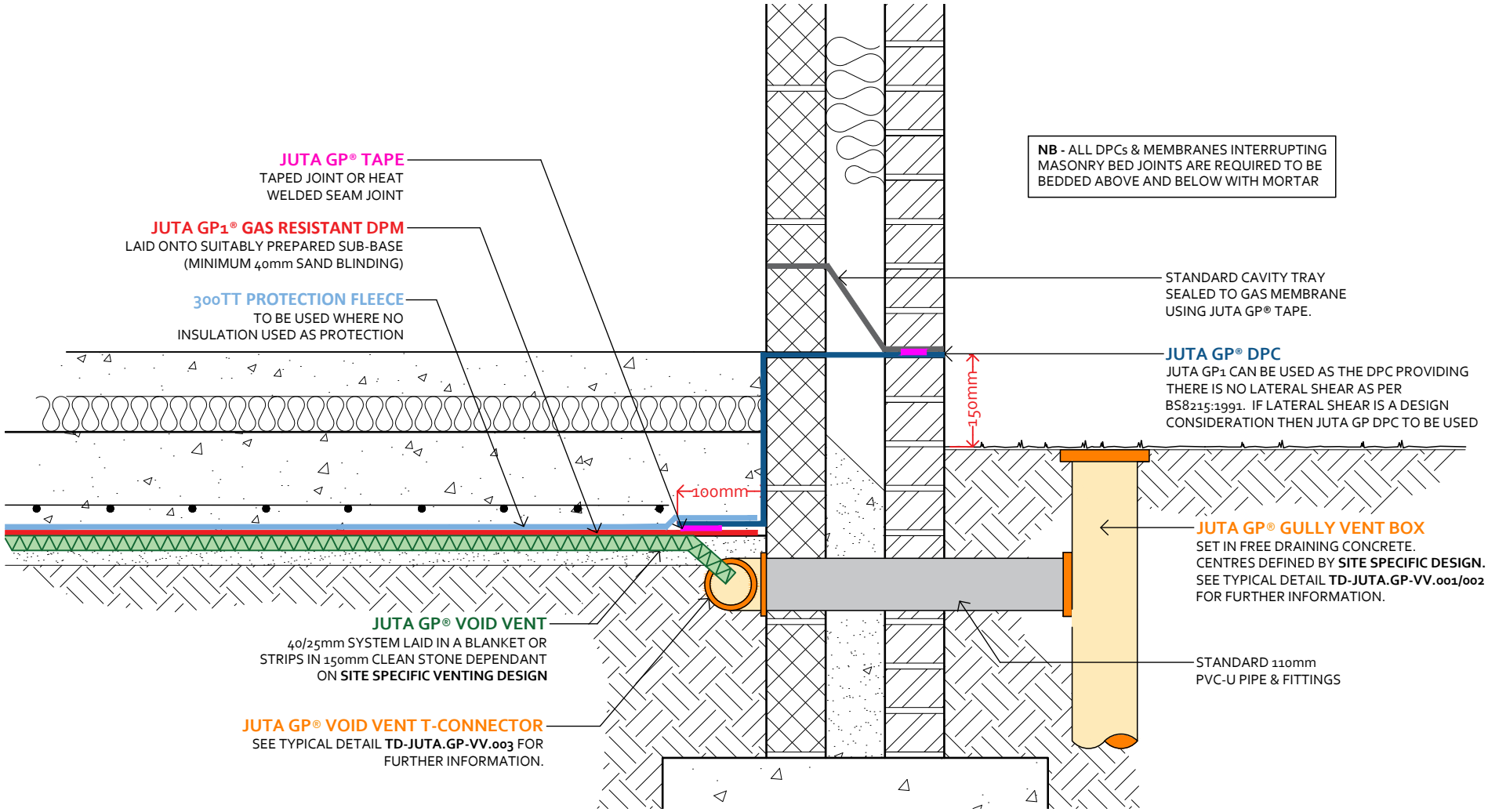
Additional Information

For additional information or assistance, please contact JUTA UK directly.

GP® VOID VENT ACCESSORY PART LIST		
	Part No.	Component Description
GP® VOID VENT	GP0400	GP® VOID VENT 25MM VENT MAT - 0.9 X 50M ROLLS
	GP0401	GP® VOID VENT 40MM VENT MAT - 0.97 X 25M ROLLS
	GP0402	GP® VOID VENT 25MM VENT MAT - 0.45 X 50M ROLLS
INLETS / OUTLETS	GP0426	GP® VOID VENT - TELESCOPIC UNDERFLOOR VENT (20 PER BOX)
	GP0427*	GP® VOID VENT VERTICAL EXTENSION – (5 PER BOX)
	GP0428	GP® VOID VENT AIRBRICK - TERRACOTTA – (20 PER BOX)
	GP0429	GP® VOID VENT GULLY VENT UNIT (HSF/CIRCULAR) - 1.5M DEPTH
	GP0430	GP® VOID VENT GULLY VENT UNIT (HSF/ RECTANGULAR) - 1.5M DEPTH
	GP0421	GP® VOID VENT GULLY VENT UNIT (ALLOY/CIRCULAR) - 1.5M DEPTH
	GP0415*	GP® VOID VENT BOLLARD - 750MM X 110MM
PIPEWORK / CONNECTORS	GP0416*	GP® VOID VENT END CAPS - 110MM
	GP0417	GP® VOID VENT FLAT TEE CONNECTOR TO 110MM PIPE (V36)
	GP0418	GP® VOID VENT FLAT TEE CONNECTOR TO PERISCOPE (V34)
	GP0420	GP® VOID VENT 950MM SLOTTED T CONNECTOR WITH END CAPS (1.2M LENGTH)
	GP0410*	GP® VOID VENT 450MM SLOTTED T CONNECTORS WITH CAPS
	GP0424	GP® VOID VENT SOLID CARRIER PIPE - 3M LENGTH
	GP0425	GP® VOID VENT SOLID CONNECTOR PIPE - 110MM X 1M
	GP0432*	GP® VOID VENT 110MM COUPLING
	GP0433*	GP® VOID VENT 110MM SLOTTED CARRIER PIPE (1.2M LENGTH)

APPENDIX 6

JUTA STANDARD DETAIL DRAWING (GUIDANCE ONLY)



CLIENT
JUTA UK LTD

PROJECT
GP®1 Standard Details

JUTA

NOTES
- Detail is generic to application so should be used as a guide not a specific installation detail.
- GP® 1 is a proprietary gas resistant DPM, manufactured and certified to adhere to the requirements of BS8485: 2015 +A1: 2019 as a radon, carbon dioxide and methane barrier.
- GP® 1 provides radon protection, in accordance with Approved Doc C (UK) and Technical Guidance Document C (Ireland).
- Jointing and sealing using tapes is acceptable where anticipated design service life does not exceed 25 years.
- Jointing and sealing by hot air welding is recommended where the anticipated design service life is required to exceed 60 years.
- The use of butyl and bitumen based tapes in environments where VOC and Hydrocarbons are a perceived risk should be avoided. A thermal/welded joint system should be adopted.
- It should be noted that the suitability of the welded joint is defined by the joint integrity, as tested in accordance with CIRIA C735: 2014. This is most commonly tested by air lance integrity testing to ASTM D4437-08: 2013. If the joint passes this test it is deemed acceptable in the verification process.
- In all cases it is recommended the installation of gas barrier geomembranes is completed by a suitably qualified and accredited installer (NVQ L2/TWI/CSWIP or equivalent). Juta UK can offer advice as to the suitable/recommended installers.
- The gas protection system installation should be subject to third-party independent verification, in accordance with BS8485: 2015 +A1: 2019 and CIRIA C735: 2014.
- All design decisions made by others that might have an impact on the gas and waterproof design performance should be brought to the attention of the design team and Juta UK Ltd. Final decisions and/or any recommendations should be approved by the design team and Juta UK Ltd.
- Dimensions are not to be scaled from this drawing. All written measurements are to be checked on site by the contractor.
- All rights described in chapter IV of the copyright, design and patents act 1988 have been generally asserted.

DRAWING TITLE
JUTA GP®1 GAS MEMBRANE
GROUND BEARING SLAB, PERIMETER DETAIL: VOID VENT + MEMBRANE BELOW SLAB

DRAWING NUMBER
JUTA.GP1.018

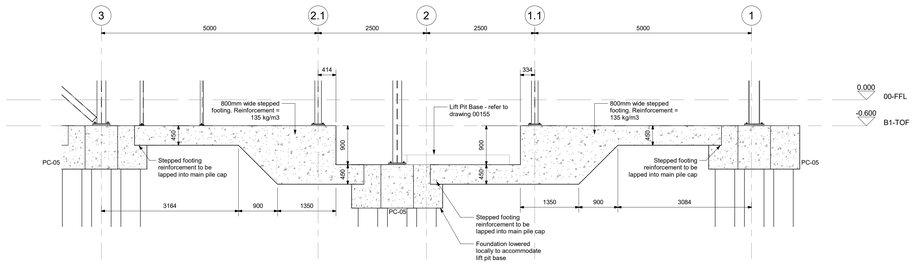
DRAWN BY	CHECKED BY	SCALE	DATE
PD	PF	Not to Scale	Aug. 2020

MELTON GROVE WORKS
BLACKPOOL ROAD
LYTHAM
FY8 5PL

Tel: 01772 754177

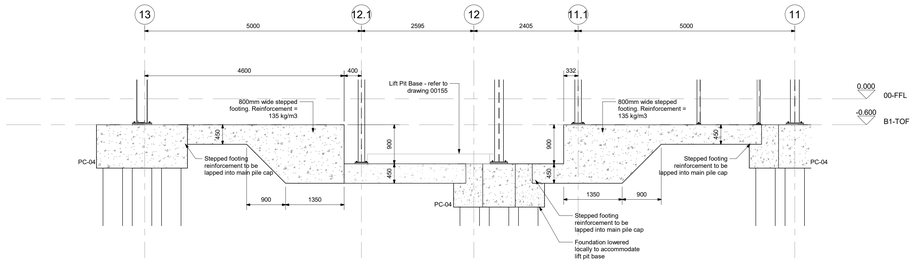
APPENDIX 7

CALIBRE CONSULTING ENGINEERS LTD DETALED DESIGN DRAWINGS



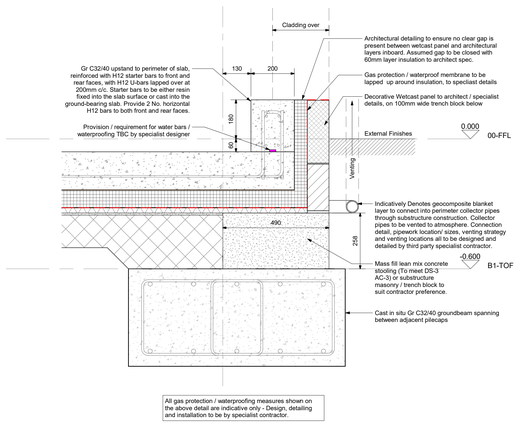
1 Elevation on Stepped Footings 01 & 02

Scale: 1 : 50



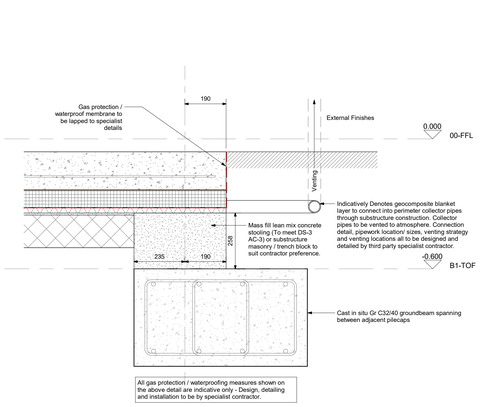
2 Elevation on Stepped Footings 03 & 04

Scale: 1 : 50



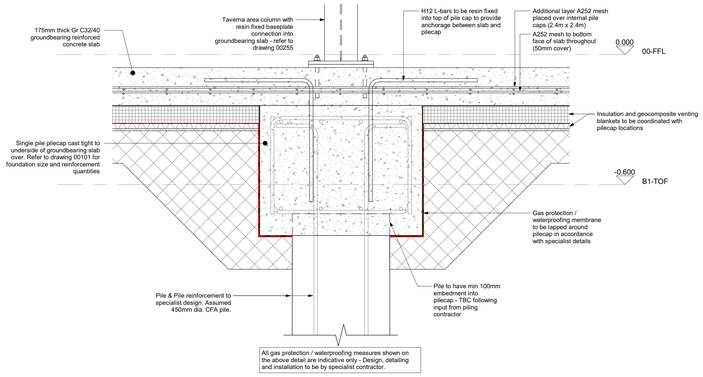
8 Typical Slab Edge Detail

Scale: 1 : 10



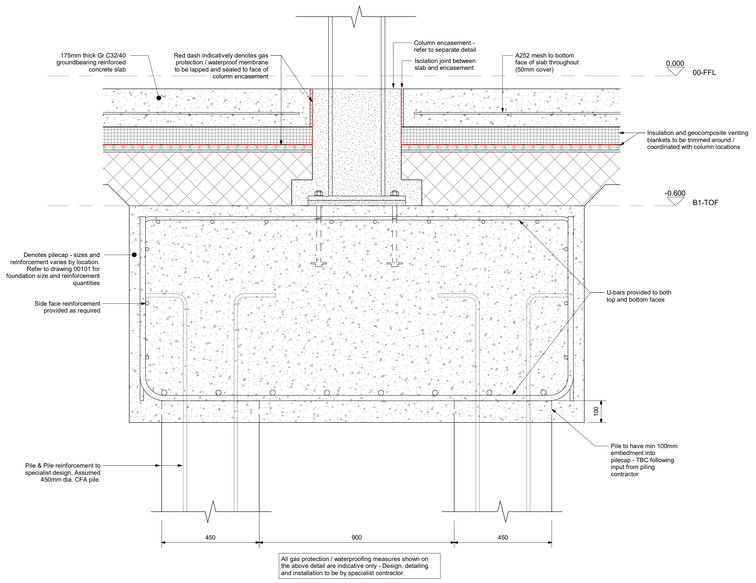
9 Typical GFL Threshold Detail

Scale: 1 : 10



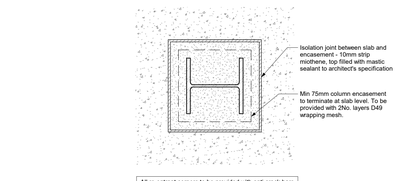
4 Typical Single Pile Pilecap Anchorage Detail

Scale: 1 : 10



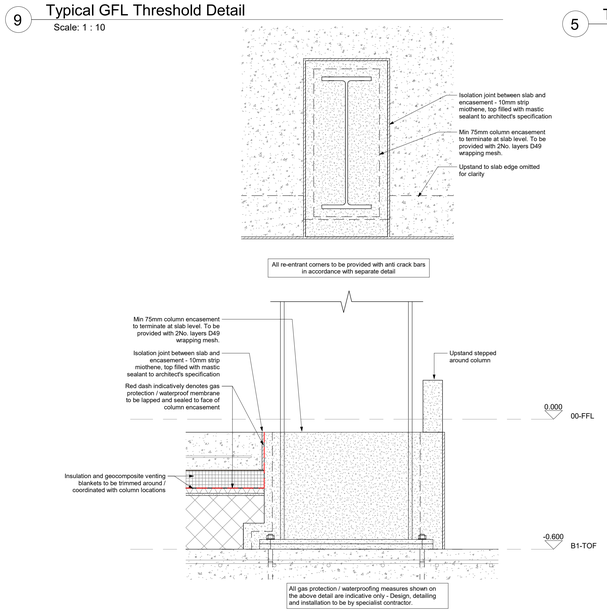
5 Typical Section on Pilecap Reinforcement and Pile Embedment

Scale: 1 : 10



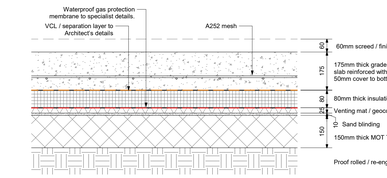
6 Typical Column Encasement Detail (Internal) - ISJ

Scale: 1 : 10



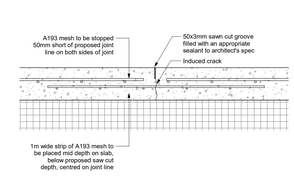
7 Typical Column Encasement Detail (Perimeter) - ISJ

Scale: 1 : 10



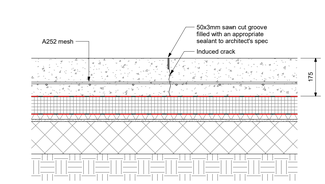
3 Tyical Section Through Ground Bearing Slab

Scale: 1 : 10



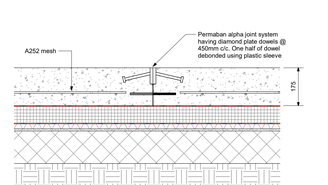
11 Induced Joint Detail - Floating Slab (IJ)

Scale: 1 : 10



10 Induced Joint Detail - Groundbearing Slab (IJ)

Scale: 1 : 10



12 Contraction Joint Detail (CJ)

Scale: 1 : 10

General Notes

1. This drawing is issued for RIBA Stage 3+ spatial coordination only and shall not be used for construction.
2. This drawing is to be read in conjunction with all relevant architectural, structural, MEP, fire strategy, acoustic, façade, roofing and specialist contractor information.
3. Refer to drawings 00900 and 00901 for dead loading and imposed loading plans respectively.
4. For all notes relating to foundations, slabs, steelwork, upstands, etc, refer to the relevant respective GA drawing.

Gas Protection Notes

All waterproofing & gas protection references on the opposite views are indicative only. Design, detailing and installation of gas protection and waterproofing measures is to be to third party specialist contractor design. Refer to drawing 00110 for gas protection system performance requirements, in addition to the IGE Phase 2 SI report.

Notes

1. All dimensions are in millimetres unless noted otherwise
2. All levels shown are in metres unless noted otherwise
3. This drawing is to be read in conjunction with all relevant Architectural & Service Engineer drawings.
4. Do not scale from this drawing. Figured dimensions to be worked to in all cases. If in doubt, contact the Engineer
5. CDM (2015) - This drawing is to be read in conjunction with the Designers Risk Assessment produced for the project

Rev	Date	Description	Drawn
P01	10/07/2026	First Issue	SB

Drawing Status:
RIBA 3+ | S2 - SUITABLE FOR REVIEW

Contract:
PROJECT TAVERNA
MCFC
MANCHESTER

Drawing Title:
SUBSTRUCTURE DETAILS (1OF2)

Scales	Date	Drawn	Checked
As indicated @ A0	10/07/2026	SB	RH

Project	Originator	Zone	Level	Form	Disc.	Number	Rev'n
MCFC	CAL	ZZ	ZZ	DR	S	00150	P01

Calibre Consulting Engineers Ltd.
w: www.calibre-consulting.co.uk
e: info@calibre-consulting.co.uk

APPENDIX 8

VERIFIER QUALIFICATIONS

CERTIFICATE of ACCREDITATION

James Harley

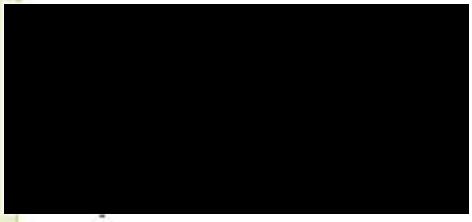
has been awarded the following accreditation

Gas Protection Verification Scheme (GPVS)

Specialist (SGPV)

Certificate No.: F3PsyQJUoZ

Issued: 28 May 2024
Valid for 4 years from the above date



Richard Froggatt
CL:AIRE Chairman

CL:AIRE is a Charitable Company Limited by Guarantee
Registered in England 3740059 / Entrust Enrolment No. 119820 / Registered Charity No. 1075611
?Reading Business Centre, Fountain House, Queens Walk, Reading, RG1 7QF
Telephone: +44 (0)?118 228 1488?? | Email: enquiries@claire.co.uk | Website: www.claire.co.uk

CERTIFICATE of ACCREDITATION

Paul Speakman

has been awarded the following accreditation

Gas Protection Verification Scheme (GPVS)

Specialist (SGPV)

Certificate No.: XCGqqHDyRp

Issued: 29 October 2024
Valid for 4 years from the above date



Richard Froggatt
CL:AIRE Chairman

Gas Protection Verification

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?Reading Business Centre, Fountain House, Queens Walk, Reading, RG1 7QF
Telephone: +44 (0)?118 228 1488?? | Email: enquiries@claire.co.uk | Website: www.claire.co.uk

APPENDIX 9

EXAMPLE IGE CONSULTING ‘GROUND GAS RESISTANT MEMBRANE INSPECTION RECORD’ SHEET

GROUND GAS RESISTANT MEMBRANE INSPECTION RECORD

Project:	
Project No:	
Plot No. Inspected:	
Date of Inspection:	
Inspected By:	
Inspection Method:	

IGE consulting

Floor 1,
15 Oxford Court,
Manchester
M2 3WQ

Tel: 0161 237 9310
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.			

These Plots have PASSED / FAILED inspection.

Additional inspection visit IS / IS NOT required for these plots.

Engineer: …… **Signed:**

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

GROUND GAS RESISTANT MEMBRANE INSPECTION RECORD

Project:	-
Project No:	-
Plot No. Inspected:	-
Date of Inspection:	-
Inspected By:	-
Inspection Method:	VISUAL, PICK WITH AIR LANCE TESTING

IGE consulting

1st Floor
15 Oxford Court,
Manchester
M2 3WQ

Tel: 0161 237 9310
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.	Y	Visqueen Gas Barrier Visqueen 'Pro Detailing Strip'	Y
General Condition Inspect the general condition of the membrane for rips, tears and punctures.	Y	Good condition. Few small holes noted, subsequently patched under inspector supervision.	Y
Jointing Check that all jointing has been carried out to the manufacturer's specification.	Y	Membrane jointed using hand welding with a heat gun to a good standard. Any anomalies picked up by the air lance were marked and re-heated or patched under inspector supervision.	Y
Installation Check that the membrane has been installed correctly across cavities, including correct jointing in these areas.	Y	Correct installation including sufficient coverage of the cavity. Corners and doorways formed using detailing strip. Multiple small patches were added under inspector supervision in doorways where gaps were noted.	Y
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.	Y	Service penetrations were sealed using pro detailing strip to a good standard.	Y
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.	Y	Sufficient air bricks installed.	Y
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.	Y	>150mm clear void.	N

These Plots have PASSED ~~/ FAILED~~ inspection.

Additional inspection visit ~~IS~~ / IS NOT required for these plots.

Engineer: ……James Harley…… **Signed:** [redacted]

PHOTOGRAPHS



Figure 1 – General view of plot.

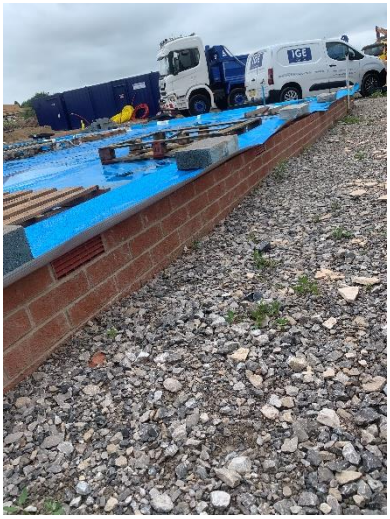


Figure 2 – Sufficient air bricks installed.



Figure 3 – Service penetration correctly installed.



Figure 4 – Corners installed correctly.

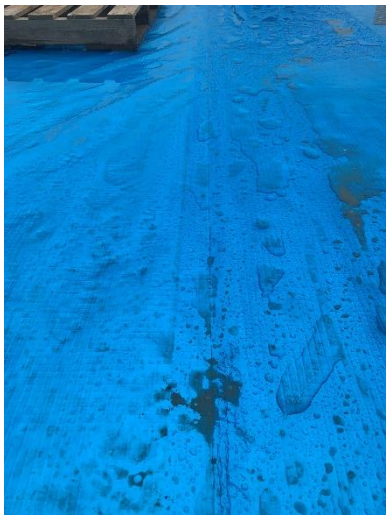


Figure 5 – Correct jointing using hand welding. All joints checked with the air lance.

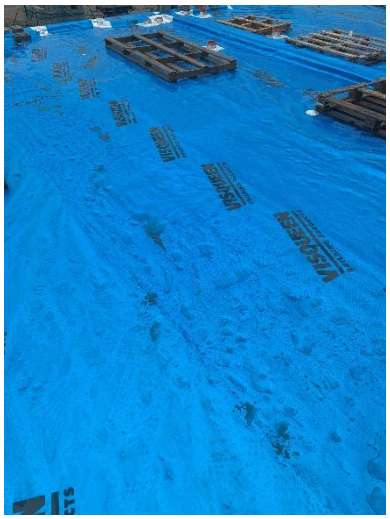


Figure 6 – Membrane in good condition.



Figure 7 – Gap in the pro detailing strip noted within a doorway and subsequently patched.

IGE

consulting

IGE Consulting Ltd: 1st Floor, 15 Oxford Court, Manchester, M2 3WQ

Email: contact@igeconsulting.co.uk