

Ground Gas Protection System

Verification Plan:

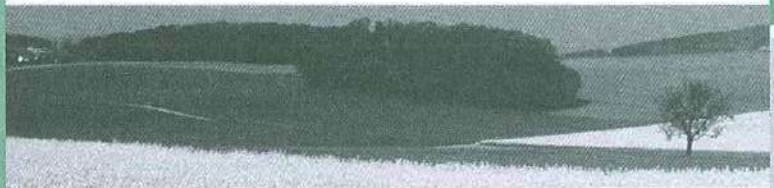
Proposed Residential Development
Phases 2B, 2C & 2D
Herbert Road
Newport

PREPARED FOR:

Engie

February 2019

Job No:12032



terrafirma

REPORT TITLE : **Ground Gas Protection System Verification Plan: Proposed Residential Development, Phases 2B, 2C & 2D, Herbert Road, Newport**

REPORT REFERENCE : **TFW_0219_12032_GGVP_V03**

JOB NUMBER : **12032**

DATE : **February 2019**

PREPARED BY :



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Mr James Rhys-Williams

APPROVED BY :



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Dr Gwyn C Lake

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SECTION 1 Introduction and Proposed Development

1.1 Introduction

Engie is proposing the construction of a residential housing development comprising 195 units in two phases (Phase 2 & Phase 3) at land off Herbert Road, Newport.

Terra Firma (Wales) Limited have been commissioned by Engie to prepare a ground gas protection system verification plan (Verification Plan) for Phases 2B, 2C and 2D only. It is understood that Phase 2A does not require the installation of a ground gas protection system. Furthermore, it is understood that Phase 3 is to be constructed under a separate contract.

Previous investigations and assessments undertaken at the site have identified that ground gas presents a significant risk to the health of future site users. The incorporation of a ground gas protection system will be required for the proposed development.

This report presents a detailed Verification Plan for the proposed development based on available previous investigations and assessments.

1.2 Objectives

The objective of the Verification Plan is to detail the remedial steps that are required to render the proposed development fit for its intended use and to provide a detailed methodology to facilitate the validation of the ground gas protection system installation.

1.3 Previous Investigations and Assessments

The Verification Plan is based on the findings of previous investigations and assessments. This report shall be read in conjunction with the following documents.

- WYGE Ground Investigation (2003) – Ref E3808/CBP/GIR/OCT2003/V1
- WYGE Ground Investigation (2004) – Ref E3808/AE/CBP/SIFactualrep/Jan2005/V1
- White Young & Green Environmental Planning Support Land Gas Monitoring and Risk Assessment Report (2005) – E3808/JC/Landgas/planningsupport/May05/V1
- Terra Firma Wales Ltd Geotechnical and Geo-Environmental Report (2013) – No. 12032
- Terra Firma Wales Ltd Gas Protection Letter (2014) – Ref RH/12032/let14
- Terra Firma Wales Ltd Geo-Environmental Report Phase 3 North of Reen (2018) No. 12032/P3

1.4 Roles and Responsibilities

Table 1.1 Roles and Responsibilities	
Organisation	Names
Client/ Project Manager/ Principal Contractor	Engie (Thomas James)
Architect	Hammonds Architectural Ltd
Local Authority	Newport City Council
Geotechnical & Geo-environmental Consultant	Terra Firma Wales Ltd
Validator	Terra Firma Wales Ltd

1.5 Limitations and Exceptions

This report has been prepared for the sole internal reliance of Engie and its design and construction team. This report shall not be relied upon or transferred to any other parties without the express written authorisation of Terra Firma (Wales) Limited. If an unauthorised third party comes into possession of this report they rely on it at their peril and the authors owe them no duty of care and skill. The report represents the findings and opinions of experienced geo-environmental and geotechnical consultants. Terra Firma (Wales) Limited does not provide legal advice and the advice of lawyers may be required.

It is not within the scope of Terra Firma (Wales) Limited to:

- Provide Method Statements and Risk Assessments for the installation of ground gas protection systems.

1.6 Verifier Competency

The principal Verification Office at Terra Firma (Wales) Ltd is Mr James Rhys-Williams.

Mr Rhys-Williams is currently enrolled on the ABBE Quality Accredited Level 4 NVQ Diploma in Verification of Ground Gas Protection Systems and has previously attended a one-day practical course on membrane installation and verification, conducted by Mr N. Salvidge at Capital Valley Plastics Ltd in 2018. Furthermore, he is an associate member of the British Verification Council (BVC) with instant access to industry peers.

Mr Rhys-Williams has extensive experience in brownfield land investigation, risk assessment and site remediation gained while working for various geotechnical and geo-environmental contractors and consultants since 2014.

Mr Rhys-Williams holds a bachelor honours degree in Geology obtained from the University of Bristol in 2010 and is a fellow of the Geological Society of London, maintaining regular industry related continuous professional development.

SECTION 2 Site Characteristics

2.1 Site Location and Description

The development site centres on an approximate National Grid Reference of 331690 189280 occupying a plan area of approximately 4.52 Hectares.

The site is currently undeveloped brownfield land, cleared and ready for development.

A drainage channel (reen) passes from east to west towards the north of the site, draining into the Usk, which is located to the immediate west of the site. A railway line runs along the eastern boundary of the site beyond which situates residential housing. Glan Usk Primary School locates to the north and commercial land to the south.

The site level is approximately 10m AOD.

The proposed site layout showing construction phases can be seen on **Figure 2.1**.

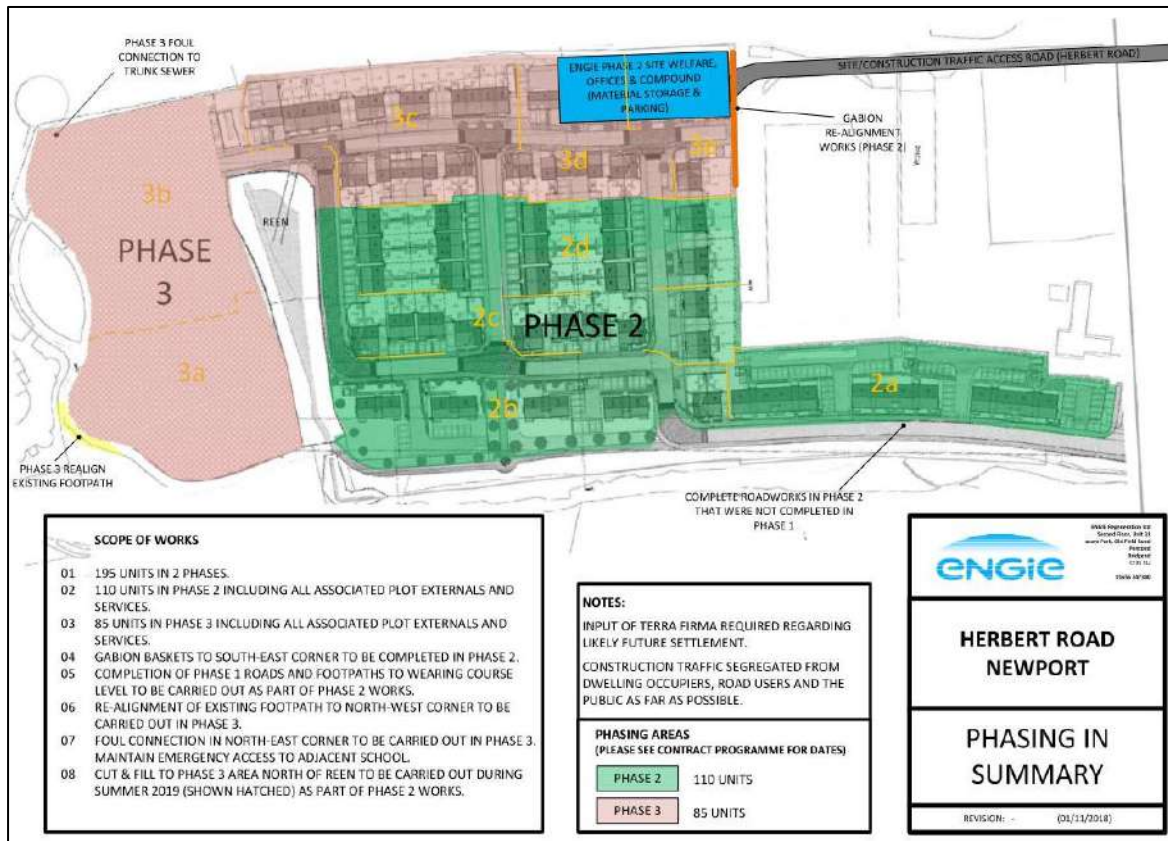


Figure 2.1 - Site Layout

2.2 Historical Site Investigation Summary

Previous investigations and extensive ground gas monitoring programs identified significant concentrations of Methane and Carbon Dioxide across the site, likely associated with organic rich alluvium including peat bands and unsaturated made ground deposits. Specific source, pathway, receptor linkages were risk assessed resulting in a moderate to high risk for future residents. It was concluded that the installation of a suitable ground gas protection system would be required in all dwellings.

Historically the site was part of a larger area (comprising the site and land to the north, beneath the current school) subject to investigation and extensive remediation in the latter part of 2008 following the identification of ground contaminated by PCBs. This relates to historical tipping on site, and some 778 drums of PCB type material were removed, as well as 2000 tonnes of impacted soils. Following remediation, a soil cap of minimum 600mm thickness was laid across the site, where an orange geotextile was placed at the base of the capping. Most of this capping layer was removed in 2015 for use as fill in the earthworks being undertaken south of the reën. The orange geotextile layer that defined the base of this layer was evident at or close to the surface after completion of these works.

Contemporary soil laboratory testing carried out by Terra Firma Wales Ltd identified residual PCB's in soils at trace levels, marginally above laboratory limits of detection. Due to the potential risk of volatiles generation from residual PCBs, the incorporation of VOC protection was subsequently recommended.

2.3 Geology & Ground Conditions

The ground conditions encountered during the site investigation can in general be summarised as shown in **Table 2.1**.

Table 2.1 Summary of Ground Conditions				
Depth (m)		Thickness (m)	Stratum	
0.00	- 0.20/3.30	0.30/3.30	MADE GROUND comprising loose to medium dense SAND and GRAVEL locally ashy	
0.20/3.30	- 3.90/10.30	2.20/8.40	Very soft to firm dark grey CLAY	
3.90/10.30	- 4.10/8.60	0.60/2.30	PEAT	
4.10/8.60	- 5.90/9.70	0.0/1.80	SAND & GRAVEL (Intermittent)	
5.90/10.30	- 10.00/12.70	0.50/4.10	Firm becoming very stiff red brown gravelly CLAY	
10.0/12.70	- >12.90	-	MUDSTONE	

2.3.1 Radon

Basic radon protection will be required for any new development at the site.

2.4 Groundwater

Water seepages were generally encountered at the base of the made ground, retained above the underlying clay.

Groundwater was recorded at variable depths between 2.40m and 9.30m during Terra Firma Wales Ltd 2013 site investigation.

2.5 Hydrogeology & Hydrology

Surface runoff is likely to naturally drain into soils underlying the site and on-site reën which crosses the site east to west emptying into the river Usk. Shallow groundwater is also likely to flow westwards towards the river Usk.

The topography of the site generally slopes shallowly down towards the south, therefore, the likely flow of surface and shallow groundwater would be towards this direction and the above mentioned water feature.

Deeper groundwater flow within the underlying bedrock will be controlled by the strata dip and any fractures or bedding planes within the rock units.

The hydraulic gradient will be at its steepest during periods of heavy rainfall and aquifer recharge.

The bedrock and localised superficial deposits beneath the site have an aquifer designation of 'Secondary A'. These are permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. Superficial deposits along the sites western boundary are designated as unproductive strata.

2.6 Identified Contamination

2.6.1 Ground Gasses

Gas monitoring results in White Young & Green (2005) and Terra Firma Wales (2013) Reports locally recorded significant levels of methane and carbon dioxide gas at the site.

Methane levels varied between 0 and 80.6% V/V.

Carbon dioxide levels varied between 0.2% and 22.0% V/V.

The gas flow rate from the boreholes was also assessed. A maximum flow rate of 3.8l/hr was recorded.

Based on a flow rate of 3.8l/hr and the highest recorded methane concentration of 80.6%, a gas screening value of 3.06l/hr is calculated, as follows:

$$(80.6/100) \times 3.8 = 3.06\text{l/hr}$$

When this result is compared with Table 8.5 of CIRIA report C665:2007, the site is classified as 'Gas Characteristic Situation 3'.

Terra Firma Wales Ltd Gas Monitoring Letter (2014) explores in detail the available ground gas monitoring results from multiple studies and authors and concludes on the basis of variable flow rates and limited peak data that a lower classification of 'Gas Characteristic Situation 2' to be adequate. Maximum flow rates exceeding 0.5l/hr were recorded on two occasions only and atypical of all other eleven monitoring rounds and the wider site results. When gas characteristic values are calculated for all other monitoring wells positions then the site is comfortably classified as 'Gas Characteristic Situation 2', i.e. <0.7l/hr with typical methane values <20%.

As a precautionary approach it is recommended the site should still meet Gas Characteristic Situation 3 requirements.

2.6.2 Volatile Organic Compounds (VOC)

White Young Green (2005) recorded maximum VOC values of 351.2ppm with typical values generally well below 10ppm. Anomalous high values were recorded on one monitoring visit only. The author considered the source to be organic rich alluvium and peat and higher recorded values correlated with higher methane levels. Further specific consideration of vapours and associated risk was not given due to the apparent low risk.

Soil laboratory testing reported in Terra Firma Wales Ltd (2018) identified residual PCB's in soils at trace levels, marginally above laboratory limits of detection. Subsequent leachate testing demonstrated that PCBs were not leachable at concentrations above guideline levels. PCBs have the potential to volatilise and in-lieu of additional monitoring a precautionary approach is to be adopted, incorporating VOC protection as standard in all proposed structures.

SECTION 3 Sources of Contamination Requiring Remediation

The summary of the site conceptual model is presented in **Table 3.1** and based on findings of previous investigations and assessments, detailing significant pollutant linkages requiring remediation or mitigation.

Table 3.1 Summary of Significant Pollutant Linkages		
Contamination Source	Pathway	Receptor
Methane and Carbon Dioxide from underlying Peat and Alluvium deposits	Migration through permeable strata, historical boreholes or around the annulus of piles – through floor slab and service penetrations – accumulation in buildings.	Site End Users
Carbon Dioxide from Made Ground deposits		
Volatile organic compounds from residual PCBs in soils		
Radon from underlying bedrock		

SECTION 4 Proposed Ground Gas Remedial Measures

4.1 General

Based on the finding of previous investigations and assessments and the identified significant pollutant linkages the following ground gas remedial measures have been devised for the site.

Specific validation requirements for the proposed remedial measures are discussed in the following section.

4.2 Methane, Carbon Dioxide and Volatile Gasses

4.2.1 Protection of Site End Users

Site end users are at risk of explosion or asphyxiation from the migration through strata and accumulation indoors of methane, carbon dioxide and volatile gasses.

Gas protection measures will be required at the site to effectively sever the link between the source and receptor.

CIRIA report C665:2007 Table 8.5 classifies the whole site as 'Gas Characteristic Situation 3' (GSC3).

In accordance with Table 4 of BS8485:2015 a minimum gas protection score of 4.5 is required for a 'Type A' structure. Type A structures are privately owned buildings with no management controls limiting internal alterations.

To achieve a gas protection score of 4.5 the following gas protection measures are proposed.

Table 4.1 Gas Protection Score	
Gas Protection Method	Score
Pre-cast suspended segmental subfloor (i.e. beam and block)	0
Passive sub floor dispersal Layer: Very good performance. Clear void.	2.5
Gas resistant membrane (satisfying BS8485:2015 Table 7 requirements)	2

Validation of gas protection measures will be required in accordance with CIRIA publication C735:2014.

4.3 Radon Gas

Ground gas protection measures as proposed in **Section 4.2** would also provide adequate 'basic' protection against Radon. No additional protection measures would therefore be required.

Specific advice relating Radon protection measures for new buildings is detailed in BRE211:2015.

SECTION 5 Validation of Remedial Measures

Ground gas protection system installation will require verification and inclusion within a Validation Report.

Verification of the ground gas protection system will be carried out in accordance with CIRIA publication C735:2014.

Verification of the gas protection system should be carried out by a suitably experienced, qualified, trained and independent verifier. Documents demonstrating the above shall be included in the Validation Report.

5.1 Risk Assessment

In general accordance with CIRIA C735:2014 risk based verification approach the proposed development is considered to be an **Intermediate Risk**. This assessment is based on the maximum level of unmanageable risks as summarised in **Table 5.1**. It is considered the highlighted high risk factors will be manageable using this document.

Table 5.1 Perceived Risk Assessment			
Risk Factors	Risk Level		
	Low	Intermediate	High
Gas Regime - CS3			
Possible VOCs – Precautionary protection required			
Design Complexity – 6No. styles			
Number of Plots – 98 (Large)			
Installation Workforce – Groundworker with one day installation training			
Construction Type – Piled foundation, suspended floor slab			
Shallow Ground Conditions – Low impermeable Clay with Peat			
Groundwater – >2.40m bgl			
Historical Investigations – Numerous boreholes, unknown reinstatement			

5.2 Gas Protection Measure Construction Details

The development comprises 98No. detached and semi-detached 'Type A' residential structures. Individual structure styles are summarised in **Table 5.2**.

Table 5.2 Structure Style Summary					
Style	Length (m)	Width (m)	Plan Area (m ²)	Internal Corners	External Corners
Type K	8.46	7.75	65.60	10	0
Type H	7.99	6.68	53.37	8	0
Type D	8.98	5.28	48.73	6	2
Type E	9.43	5.33	49.10	6	2
Type C	8.98	4.84	43.43	4	0
Type A	9.88	4.90	48.38	4	0

Technical drawings showing the proposed gas protection measure are presented in **Annex A**.

5.2.1 Structural Barrier

All structure styles will incorporate a beam and block suspended subfloor below insulation and reinforced concrete screed.

Structural barriers of this nature provide no reliable ground gas protection.

5.2.2 Ventilation

An open void space of minimum height 150mm is proposed below the suspended beam and block floor.

The open void space is to be vented to atmosphere using a Manthorpe Telescopic Vent with G930 air brick. These air bricks have a maximum ventilation area of 6450mm².

Development housing dimensions, and void space typically correspond to the 'model house' as described in NHBC:2007, the finding of which have been used in this ventilation assessment and considered conservative given housing style plan areas are between 10- and 30% smaller than the 'model house' scenario. Thus, reducing the volume void space beneath the property and likely increasing daily volume changes.

As a worst-case scenario NHBC:2007 guidance considers the ventilation rate within the subfloor void of the 'model house' (64m²) will be and will be subject to a complete volume change every 24hrs, which is regarded highly conservative. The ventilation rate for the 'model house' is therefore 0.40m³/hr.

Therefore, the permitted GSV for Amber 2 to Red threshold based on the 'model house' in NHBC:2007 is 1.56l/hr with an equilibrium concentration of 2.5%v/v Methane.

It is considered based on the White Young & Green Environmental Planning Support Land Gas Monitoring and Risk Assessment Report (2005) and Terra Firma Wales Ltd Gas Monitoring Letter (2014) that due to flood protection clay capping up to 2.0m thick, the subsequent consolidation of peat bands within the alluvium, and the action of alluvium sealing around pile annuli, the source and pathway potential will be significantly reduced. It is considered that a GSV of <0.7l/hr is appropriate as discussed in **Section 2.6.1**.

Estimation of the passive ventilation performance for each structure style have been prepared based on worse case conditions and presented in **Annex B**. Calculations indicate that required ventilation meets Building Regulation (<1500mm²/m) and concentrations of Methane will not exceed 5% within 10h of still wind conditions.

Based on the above assessments, housing styles at the development site do not require further protection measures.

For structures up to 15m wide the minimum area of side ventilations should be 1500mm²/m run of wall.

Ventilation should therefore be installed at a minimum frequency of one vent per 4.2m of wall on at least two opposite sides of the structure. Vents should only be positioned between beams and away from level thresholds.

Internal obstructions to air flow such as beams should also incorporate sufficient ventilation. A minimum ventilation area of 6000mm²/m run of the obstruction will be required.

Void space height and ventilation frequency should be verified on-site upon completion of construction.

5.2.3 Membrane

The membrane shall be installed by trained groundworkers. It is understood that all groundworkers involved in the installation of membranes will undertake as a minimum a one day course on the installation of membrane and accessory products.

The Client has specified that SOLSHIELD Ultra Gas Barrier is to be used.

The membrane is to be placed above the floor insulation board and should be taken through the blockwork and incorporated below the damp proof course cavity tray in the outer leaf. Detailed drawings showing the required installation across the cavity wall are shown in **Annex A**. A polyform cavity fill or similar material to support the membrane should be used. Cavity wall support such as a polyform fill should be placed beneath the membrane.

Table 5.3 Membrane Compliancy	
SOLSHIELD Ultra Gas Barrier Membrane Specification	Compliant
Virgin polymer	YES
Thickness – 0.6mm (suitable for welding) sufficiently strong to withstand the installation process. Puncture resistance 1.25kN.	YES
Methane gas transmission rate of <0.09 ml/day/m ² /atm tested in accordance with BS IOS 15105-1	YES
Sufficiently durable and strong, the product will not be damaged by normal foot traffic.	YES
The product is resistant to volatile organic vapours (VOCs) only. Tested against Diesel, Xylene, Toluene, Petrol to ISO 6179:2010 Method B. Maximum transmission rate (Toluene) 0.583g/m ² /h	YES
Satisfies standards to be used as a damp proof membrane. Approved document C, Requirements C2(a), Section 4.6	YES
Radon resistant	YES
CE marked	YES
NHBC Standards 2017 – Satisfied	YES

It is considered that performance specification of SOLSHIELD Ultra Gas Barrier Membrane satisfies the requirements of BS8485:2015 Table 7 and key performance properties reported in CIRIA C748:2014.

During storage membrane rolls must be stacked on a flat surface, kept under cover and protected from sunlight and mechanical damage.

The membrane should not be installed in temperatures below 4°C.

Prior to membrane installation, all surfaces should be dry and without debris. Any remaining debris could puncture the membrane post installation compromising the gas protection system.

The membrane should be rolled out with the embossed surface facing up.

Joints should be overlapped by at least 150mm and bonded with Solco Double Sided Butyl Jointing Tape. Laps should be further sealed using Solco Foil Lap Tape. Lap tape should only be installed post verification of the membrane installation to allow for visual inspection and air lance integrity testing. Alternatively, joints may be welded as per the manufacture specification. However, installers will require additional training to operate welding equipment.

Given the low risk of volatile generation from residual PCB contamination the use of Butyl Tape is considered suitable protection in this instance. Furthermore, the membrane is not expected to come into contact with groundwater and subsequent free product during the lifetime of the development.

It is intended that prefabricated Top Hat Unit and Clip will be used. Top-hats are to be supplied by Solco and must be installed as per the manufacture specification. Penetrations should be installed away from walls, obstructions and other penetrations to allow for the correct installation.

Membrane and accessory data sheets, certificates and installation guides are presented in **Annex C**.

Upon completion of membrane installation workmanship should be verified by a suitably experienced, qualified, trained and independent verifier.

It is recommended that Installers prepare a daily log sheet during the works which can conveniently be used to record progress made, materials used (batch ID etc), repairs or defects. This log sheet should be submitted to the verifier to aid in the verification process. An example daily log sheet is presented in **Annex D**.

The membrane is to be covered by a 75mm reinforced concrete screed as soon as practicably possible post installation. The membrane is to be protected from reinforcement steels by protective feet. Extreme care is to be taken during reinforcement placement. Visual verification of the membrane must be undertaken prior to screed covering by a suitably experienced, qualified, trained and independent verifier to check for potential damage caused during the reinforcement placement.

Any rips, punctures or defects identified during the verification process will be recorded by the verifier, repaired by the installer and re-inspected at a later date to check for conformance.

5.3 Proposed Development Programme

Construction of foundations and floor slabs is expected to take place towards the end of February 2019 and scheduled to take approximately 3 months.

It is understood that each membrane will be installed, reinforcement placed and screeded over the course of two consecutive days. This process will continue for Phases 2B, 2C and 2D until completed.

5.4 Maintaining the Integrity of Gas Protection Measures

In the intervening period between installation of the membrane and floor screed covering, membrane must be protected from high footfall traffic. Protection matting should be used if deemed suitable. If during verification of the membrane frequent damage is observed, protection matting will be recommended.

Follow on contractors should be made aware of the ground protection system in place. It is essential that the integrity of all gas protection measures is maintained post-verification and not damaged by any subsequent construction works.

Prior to the commencement of the membrane installation a tool box talk on safeguard and upkeep measures should be undertaken. Site management along with membrane installers, ground workers the verifier and other subcontractors (if applicable) should be present.

Accidental damage to the membrane system should be reported to the verifier, rectified and re-inspected at a later date.

A final inspection may be required.

Ventilation air bricks surrounding the property need to be protected from soft and hard landscaping following completion of the structure. Contractors need to be made aware of the significance of maintaining ventilation in these areas.

5.5 Required In-situ Integrity Testing & Evidence

With respect to the perceived risk assessment (**Table 5.1**) and in general accordance with CIRIA C735 Table A3 the level of verification and integrity testing to be included within the Validation Report should include:

- Groundworker to provide the Verifier photographic evidence of all plots sub-floor void height and all internal obstructions ventilation, with inclusion of a measuring staff in all photos for scale.
- Verifier to conduct a thorough visual verification of all plots. Photographic evidence and verification pro formas to be prepared by the Verifier.
- All joints, pipe penetrations and corners to be air lanced to ASTM D4437-08:2013 by Verifier. Integrity testing pro formas to be produced by the Verifier.
- Verifier to conduct a thorough visual verification of all plots post installation of reinforcement, prior to floor screeding. Photographic evidence and verification pro formas to be prepared by the Verifier.
- Verifier to inspect all ventilation vents and compliance to minimum ventilation frequency. Photographic evidence and verification pro formas to be prepared by the Verifier.

Consideration will be given to the need for further integrity testing if concerns are raised by visual and air lance testing. If further integrity is carried out appropriate pro formas are to be produced by the Verifier.

5.6 Gas Validation Report

The Validation Report should present a detailed description of the ground gas protection measures applied and lines of evidence gathered during verification processes to confirm that protection measures have been installed as per the Verification Plan and satisfy the remedial objectives, severing the pathway between the source and receptor.

As a minimum the Validation Report should include.

- Description of the as-built protection measures installed and any variation in design from the Verification Plan.
- Details of the Installer and relevant qualifications
- Details of the Verifier independency and relevant qualifications
- Verifier proformas and integrity testing results
- Visual inspection photographic evidence
- Installer daily log sheets
- Details of non-conformances and how they were rectified
- Statement based on the presentation of lines of evidences and review of the site conceptual model confirming that the discussed gas protection measures achieve the remedial objectives set out in the Verification Plan

References

- BRE (2001) Protective measures for housing on gas-contaminated land, BRE Report 414
- BRE (2015) Radon Guidance on protective measures for new buildings, BRE Report 211
- BS 5925 (1991) Ventilation principles and designing for natural ventilation
- BS 8485 (2015) Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings
- BS 8576 (2013) Guidance on investigations for ground gas. Permanent gases and Volatile Organic Compounds (VOCs)
- CIRIA C735 (2014) Good practice on the testing and verification of protection systems for building against hazardous ground gases
- CIRIA C748 (2014) Guidance on the use of plastic membranes as VOC vapour barriers
- CIRIA R149 (1995) Protecting development from methane
- D4437-08 (2013) Standard practice for non-destructive testing (NDT) for determining the integrity of seams used in joining flexible polymeric sheet geomembranes
- NHBC (2007) Guidance on evaluation of development proposals on sites where methane and carbon dioxide are present, report edition no.4
- OVE ARUP & PARTNERS (1997) Passive venting of soil gases beneath building. Research Report. Guide for design.
- WILSON S, CARD G and HAINES S (2009) Ground Gas Handbook

ANNEX A
Technical Drawings

Project No. 1839
HERBERT ROAD, NEWPORT



APARTMENT DETAILS : Index 1 of 2

Dwg No.	Drawing Title.	Rev.
A-B1	PART M ENTRANCE	B
A-B2	NON PART M ENTRANCE	B
A-B3	EXTERNAL WALL / SLAB EDGE	B
A-B4	NON LOADBEARING INTERNAL PARTITION / FLOOR	B
A-B5	PARTYWALL / FLOOR	-
A-W1-B	WINDOW CILL WITHIN BRICKWORK	-
A-W1-R	WINDOW CILL WITHIN RENDER	-
A-W2-B	WINDOW HEAD WITHIN BRICKWORK	-
A-W2-R	WINDOW HEAD WITHIN RENDER	-
A-W3	1800MM DEEP WINDOW	-
A-W4	WINDOW BOXING	-
A-W5-B	WINDOW/DOOR CHECK REVEAL BRICKWORK	-
A-W5-R	WINDOW/DOOR CHECK REVEAL RENDER	-
A-W6	SEPARATING WALL PLANS	-
A-C1	INTERNAL DOOR SIZES	A
A-C2	SVP BOXING	-
A-C3	LOW LEVEL BOXING	-
A-C4	SAFETY GLAZING	-
A-F1	SEPARATING FLOOR / EXTERNAL WALL	-
A-F2	SEPARATING FLOOR / SEPARATING WALL	-
A-F3	SERVICE PIPES THROUGH SEPARATING FLOOR	-
A-F4	NON LOAD BEARING WALL / SEPARATING FLOOR JUNCTION	-

B	Notes added to B1-4, B5 added, addition added to C1	06.02.19
A	B1-4 slab updated	28.11.18
REV.	DESCRIPTION	DATE



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e. info@hammond-ltd.co.uk

Project No. 1839

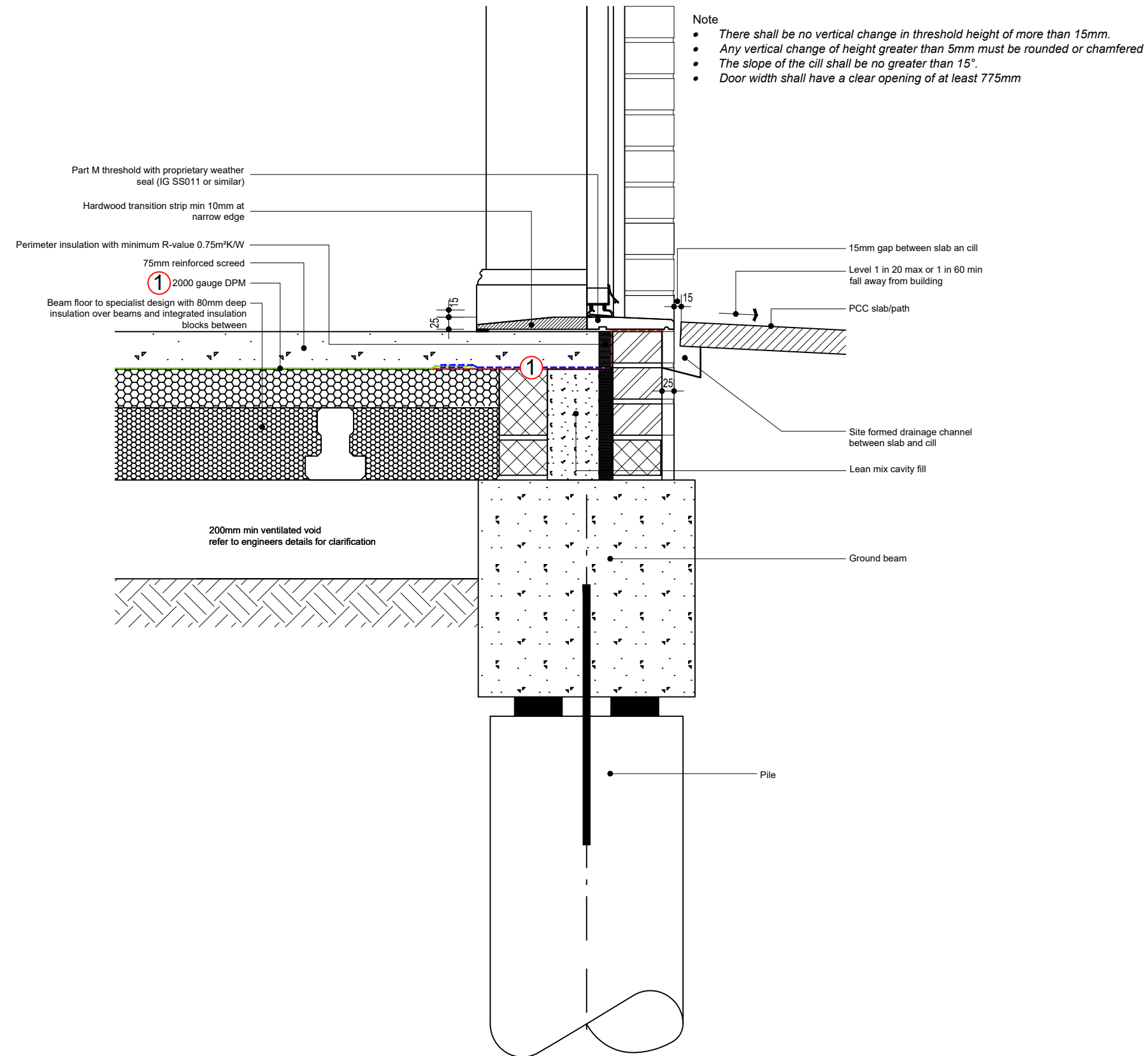
HERBERT ROAD, NEWPORT

APARTMENT DETAILS



UNITS 37 ONWARDS REQUIRE GAS CATEGORY 3 PROTECTION

- ① VOC Barrier - BS8485:2015 compliant DPM's / DPC's.
- ② Additional telescopic vents to external cavity walls may be required. *TBC*
- ③ Cavity support to membrane between vents, in the form of rigid insulation. *TBC*



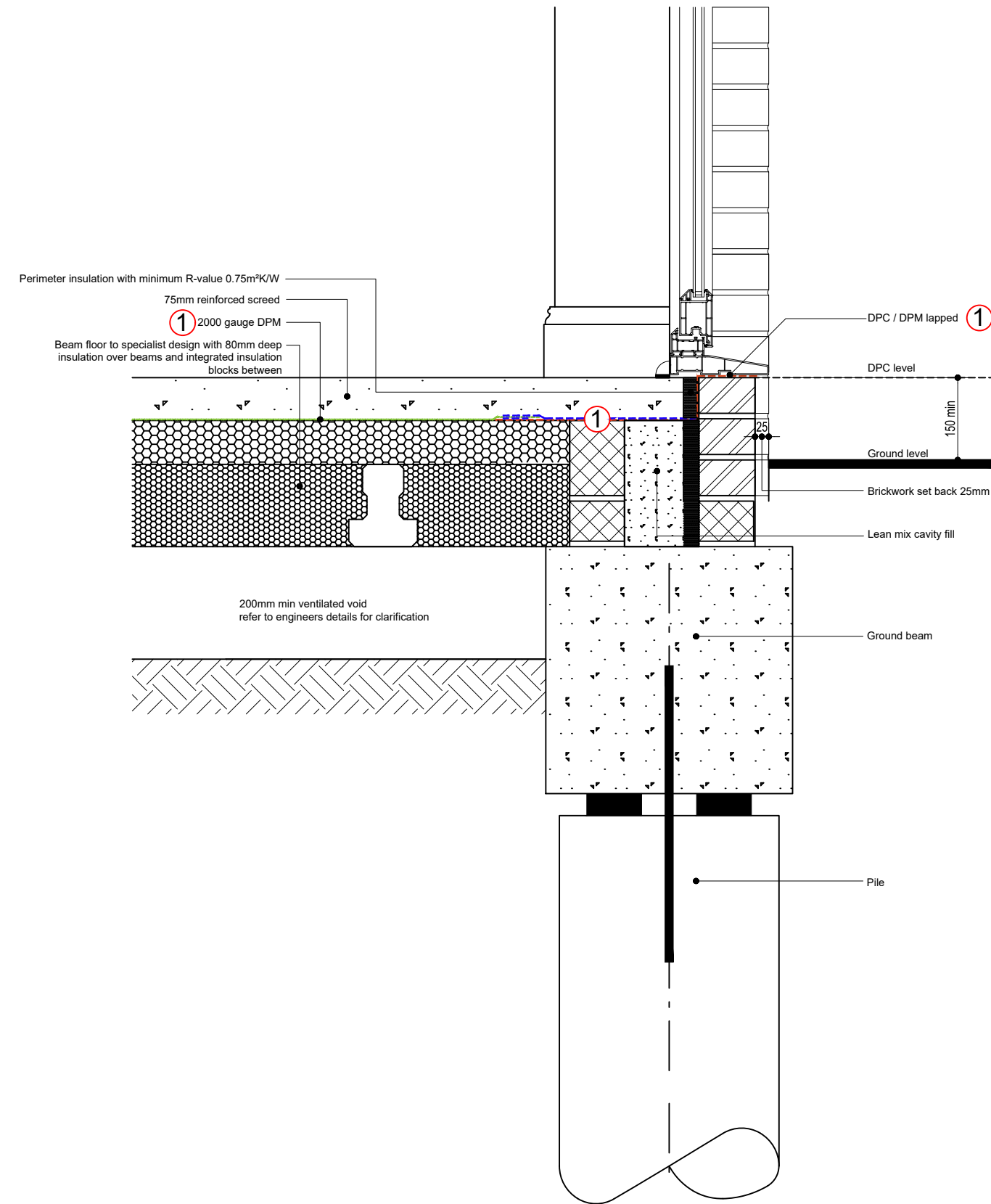
A-B1: PART M ENTRANCE

Issue: November 2018
Revision: B
Scale - 1:10

Project No. 1839

HERBERT ROAD, NEWPORT

APARTMENT DETAILS



- UNITS 37 ONWARDS REQUIRE GAS CATEGORY 3 PROTECTION**
- ① VOC Barrier - BS8485:2015 compliant DPM's / DPC's.
 - ② Additional telescopic vents to external cavity walls may be required. *TBC*
 - ③ Cavity support to membrane between vents, in the form of rigid insulation. *TBC*



A-B2: NON PART M ENTRANCE

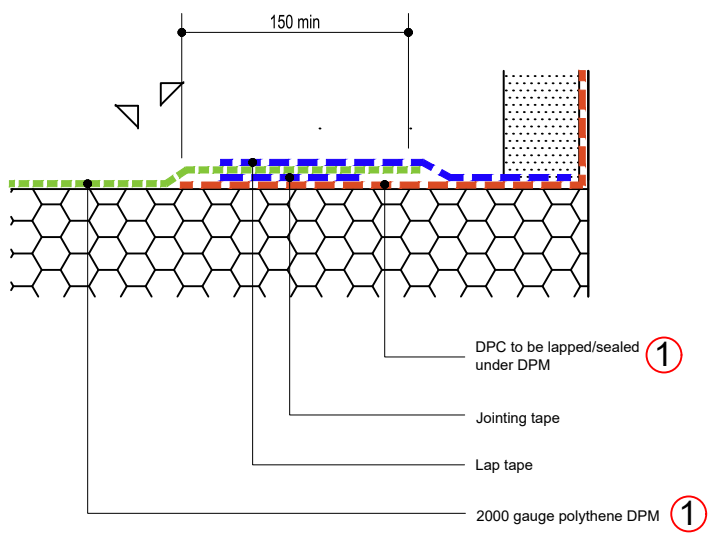
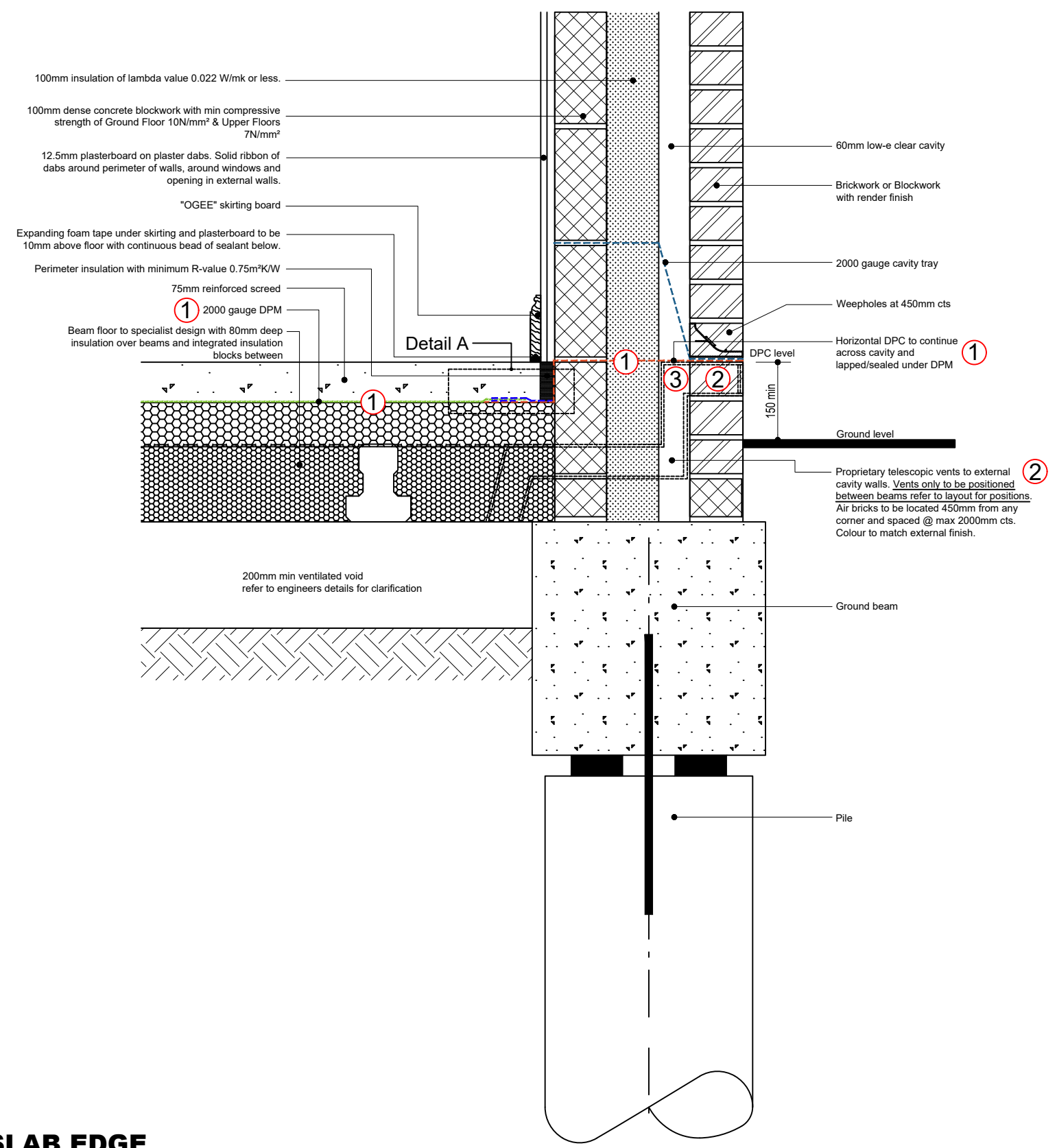
Issue: November 2018
Revision: B
Scale - 1:10

Project No. 1839
 HERBERT ROAD, NEWPORT
APARTMENT DETAILS



- UNITS 37 ONWARDS REQUIRE GAS CATEGORY 3 PROTECTION**
- ① VOC Barrier - BS8485:2015 compliant DPM's / DPC's.
 - ② Additional telescopic vents to external cavity walls may be required. *TBC*
 - ③ Cavity support to membrane between vents, in the form of rigid insulation. *TBC*

① NOTE Barrier required across whole floor area
 Minimum membrane to be 2000 gauge polythene sheet. All joints, cavity and service entries in barrier to be sealed



Detail A
 Indicative lap & seal joint.
 Refer to manufactures details for further information



A-B3: EXTERNAL WALL / SLAB EDGE

Issue: November 2018
Revision: B
Scale - 1:10

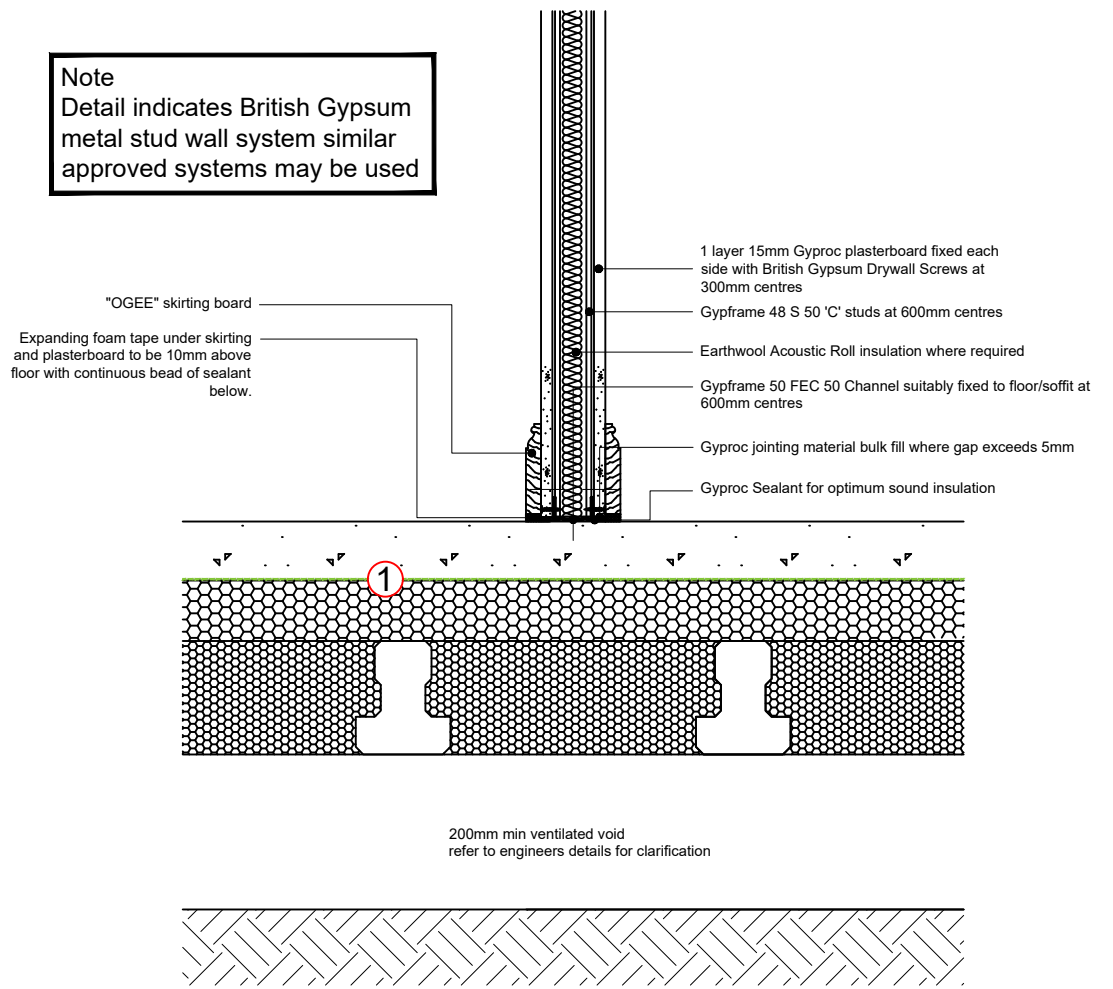
Project No. 1839

HERBERT ROAD, NEWPORT

APARTMENT DETAILS



- UNITS 37 ONWARDS REQUIRE GAS CATEGORY 3 PROTECTION**
- ① VOC Barrier - BS8485:2015 compliant DPM's / DPC's.
 - ② Additional telescopic vents to external cavity walls may be required. *TBC*
 - ③ Cavity support to membrane between vents, in the form of rigid insulation. *TBC*



A-B4: NON LOADBEARING INTERNAL PARTITION / FLOOR

Issue: November 2018
Revision: B
Scale - 1:10

Project No. 1839

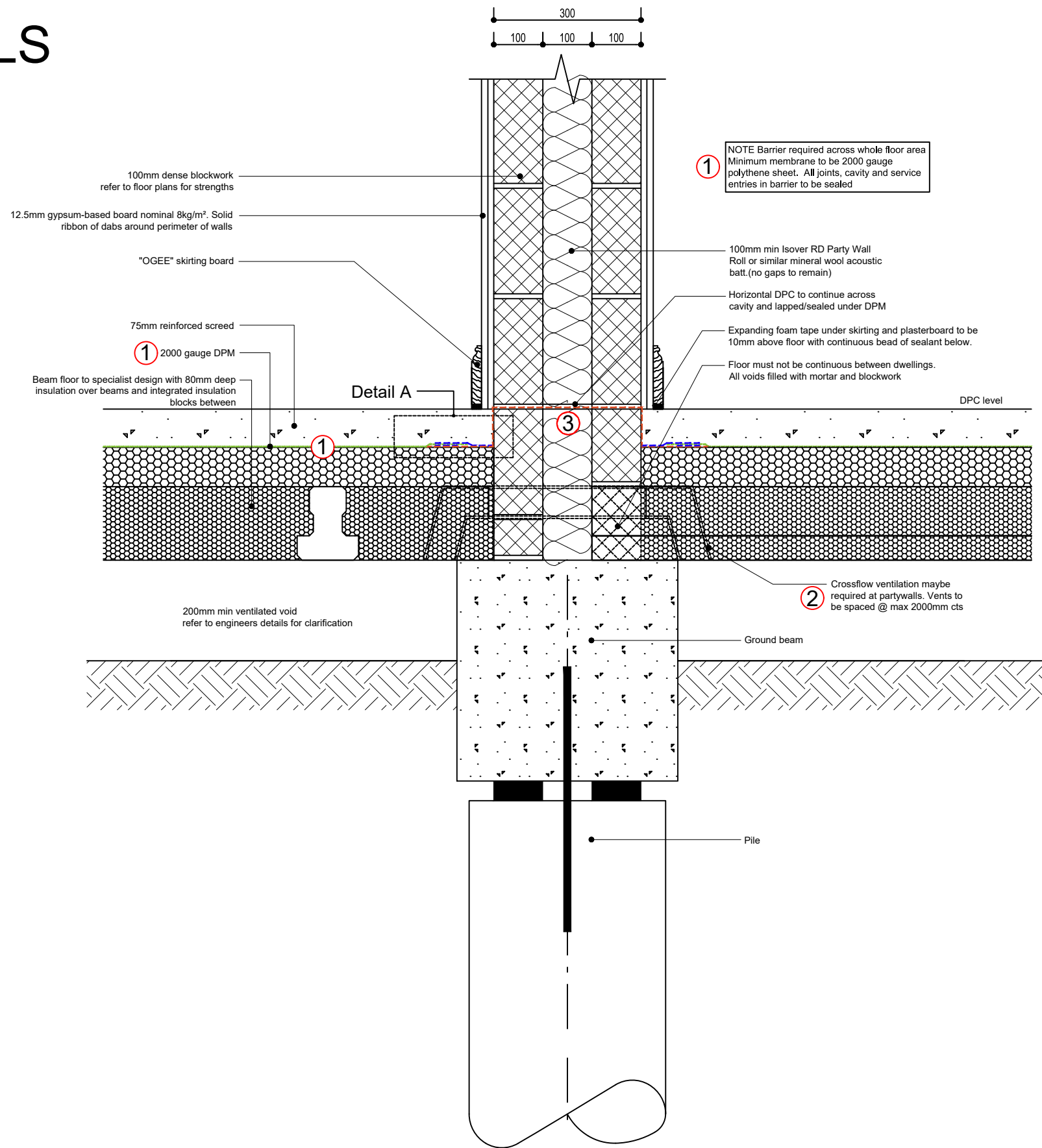
HERBERT ROAD, NEWPORT

APARTMENT DETAILS



UNITS 37 ONWARDS REQUIRE GAS CATEGORY 3 PROTECTION

- ① VOC Barrier - BS8485:2015 compliant DPM's / DPC's.
- ② Additional telescopic vents to external cavity walls may be required. *TBC*
- ③ Cavity support to membrane between vents, in the form of rigid insulation. *TBC*



A-B5: PARTYWALL / FLOOR

Issue: February 2019
Revision: -
Scale - 1:10

Project No. 1839
 HERBERT ROAD, NEWPORT



HOUSE TYPE DETAILS : Index 1 of 2

Dwg No.	Drawing Title.	Rev.
H-B1	PART M ENTRANCE	-
H-B2	NON PART M ENTRANCE	-
H-B3	EXTERNAL WALL / SLAB EDGE	-
H-B4	PARTYWALL / FLOOR	-
H-B5	NON LOADBEARING INTERNAL PARTITION / FLOOR	-
H-B6	TYPICAL STUD BUTTRESS WALL	-
H-W1-B	WINDOW CILL WITHIN BRICKWORK	-
H-W1-R	WINDOW CILL WITHIN RENDER	-
H-W2-B	WINDOW HEAD WITHIN BRICKWORK	-
H-W2-R	WINDOW HEAD WITHIN RENDER	-
H-W3	1800MM DEEP WINDOW	-
H-W4	WINDOW BOXING	-
H-W5-B	WINDOW/DOOR CHECK REVEAL BRICKWORK	-
H-W5-R	WINDOW/DOOR CHECK REVEAL RENDER	-
H-W6	SEPARATING WALL PLANS	-
H-C1	INTERNAL DOOR SIZES	-
H-C2	SVP BOXING	-
H-C3	LOW LEVEL BOXING	-
H-C4	SAFETY GLAZING	-
H-F1	FLAT OVER GARAGE - FLOOR / EXTERNAL WALL	-
H-F2	ROOF OVER PROJECTING BAY	-

REV. DESCRIPTION DATE



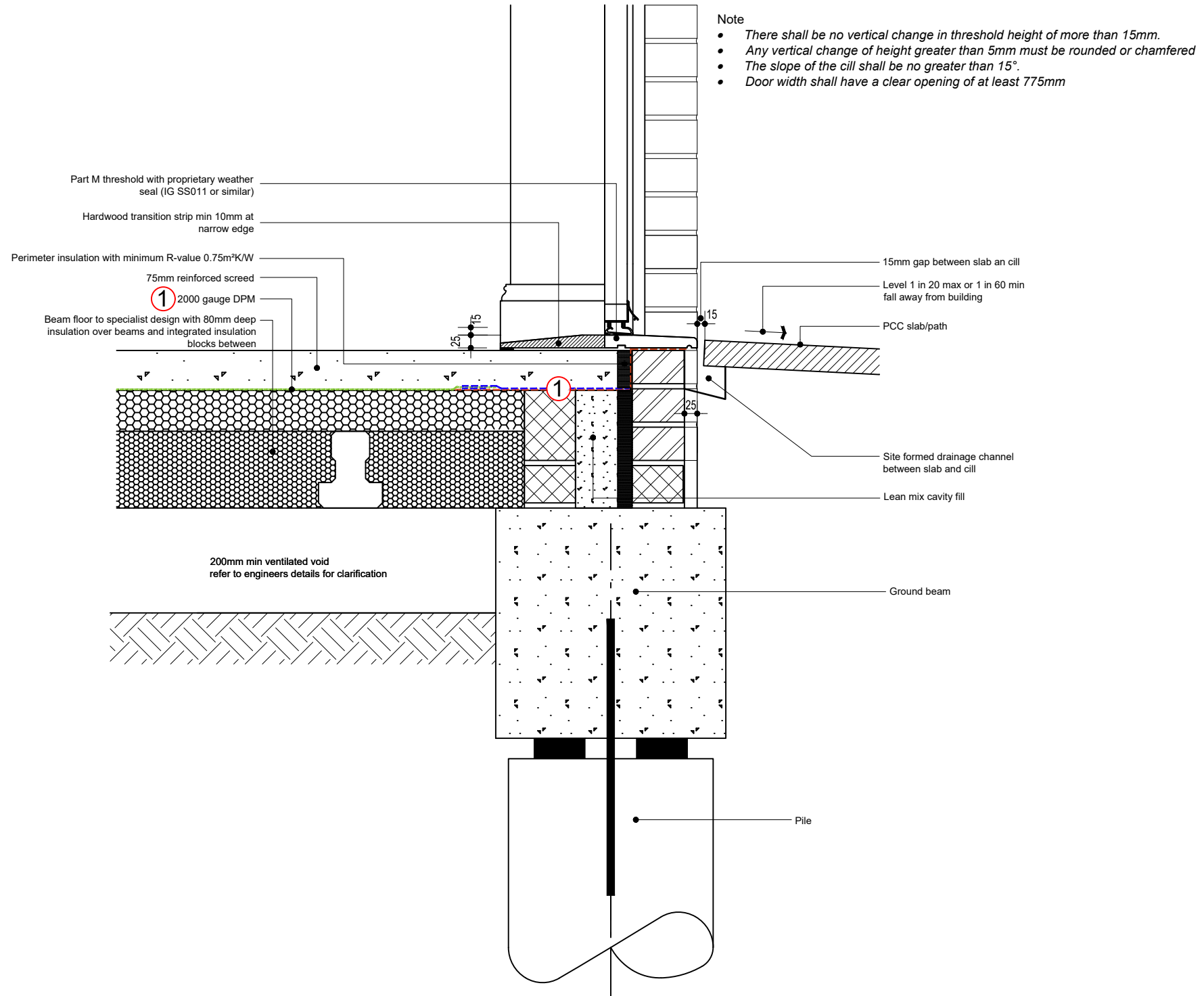
10 Goldtops
 Newport
 NP20 4PH
 t. 01633 844970
 e. info@hammond-ltd.co.uk

HOUSE TYPE DETAILS



UNITS 37 ONWARDS REQUIRE GAS CATEGORY 3 PROTECTION

- ① VOC Barrier - BS8485:2015 compliant DPM's / DPC's.
- ② Additional telescopic vents to external cavity walls may be required. *TBC*
- ③ Cavity support to membrane between vents, in the form of rigid insulation. *TBC*



H-B1: PART M ENTRANCE

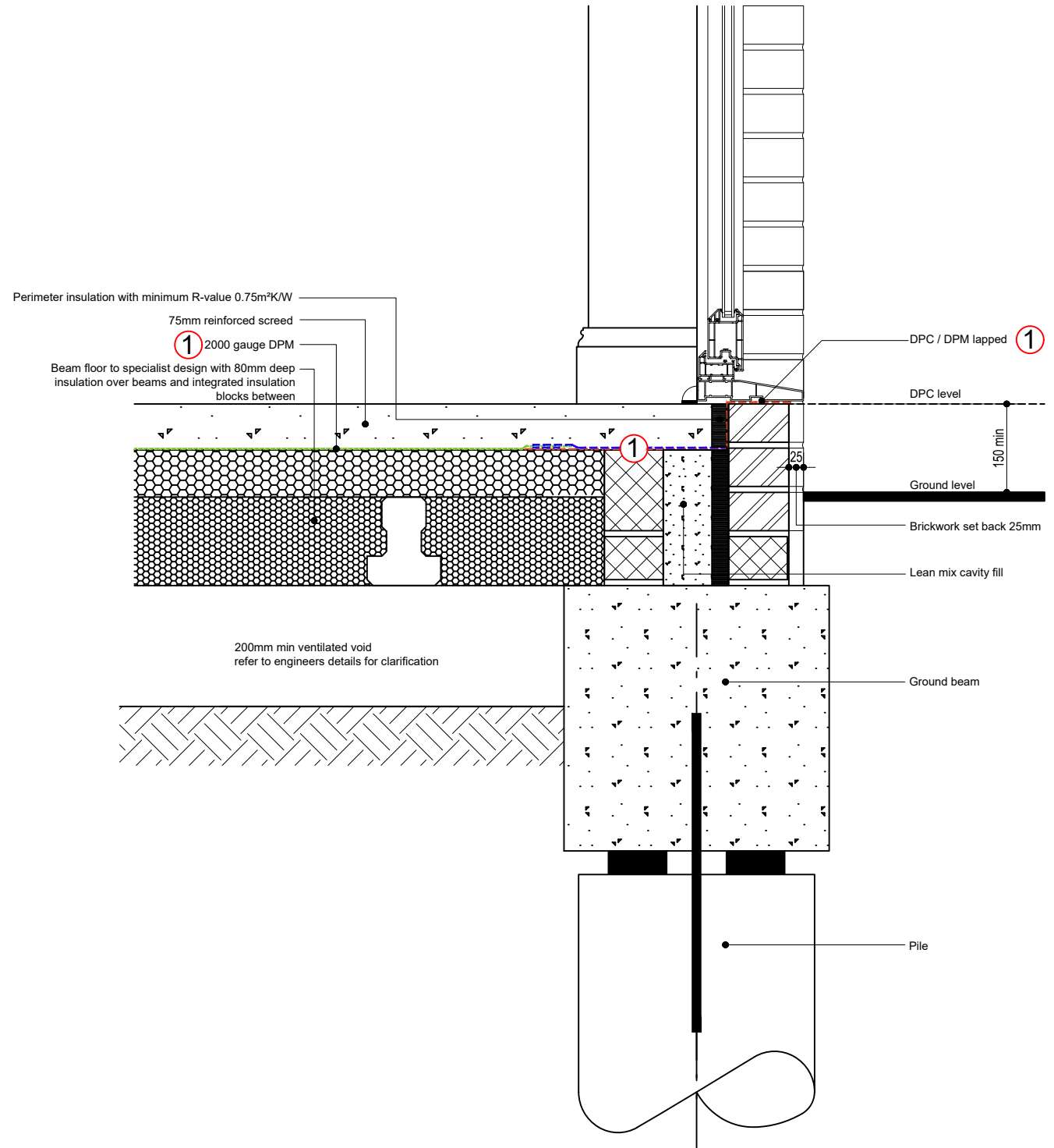
Project No. 1839

HERBERT ROAD, NEWPORT

HOUSE TYPE DETAILS



- UNITS 37 ONWARDS REQUIRE GAS CATEGORY 3 PROTECTION**
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 - ② Additional telescopic vents to external cavity walls may be required. *TBC*
 - ③ Cavity support to membrane between vents, in the form of rigid insulation. *TBC*



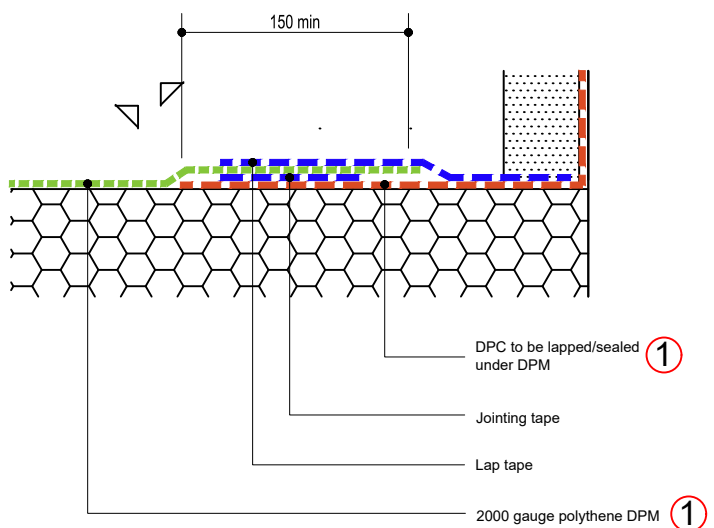
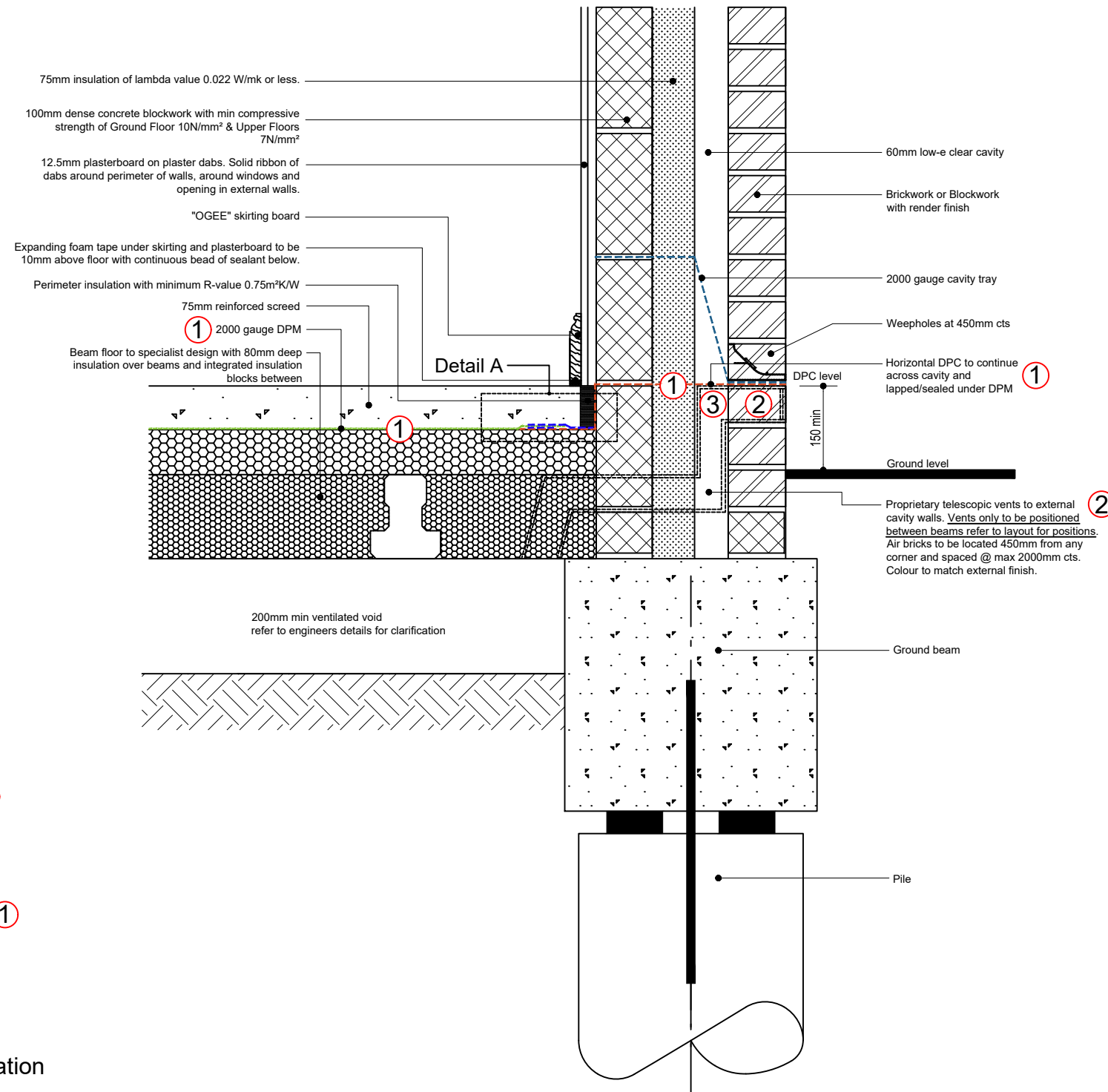
H-B2: NON PART M ENTRANCE

Issue: FEBRUARY 2019
Revision: -
Scale - 1:10

HOUSE TYPE DETAILS

① NOTE Barrier required across whole floor area
Minimum membrane to be 2000 gauge polythene sheet. All joints, cavity and service entries in barrier to be sealed

- UNITS 37 ONWARDS REQUIRE GAS CATEGORY 3 PROTECTION**
- ① VOC Barrier - BS8485:2015 compliant DPM's / DPC's.
 - ② Additional telescopic vents to external cavity walls may be required. *TBC*
 - ③ Cavity support to membrane between vents, in the form of rigid insulation. *TBC*



Detail A
Indicative lap & seal joint.
Refer to manufactures details for further information



Project No. 1839

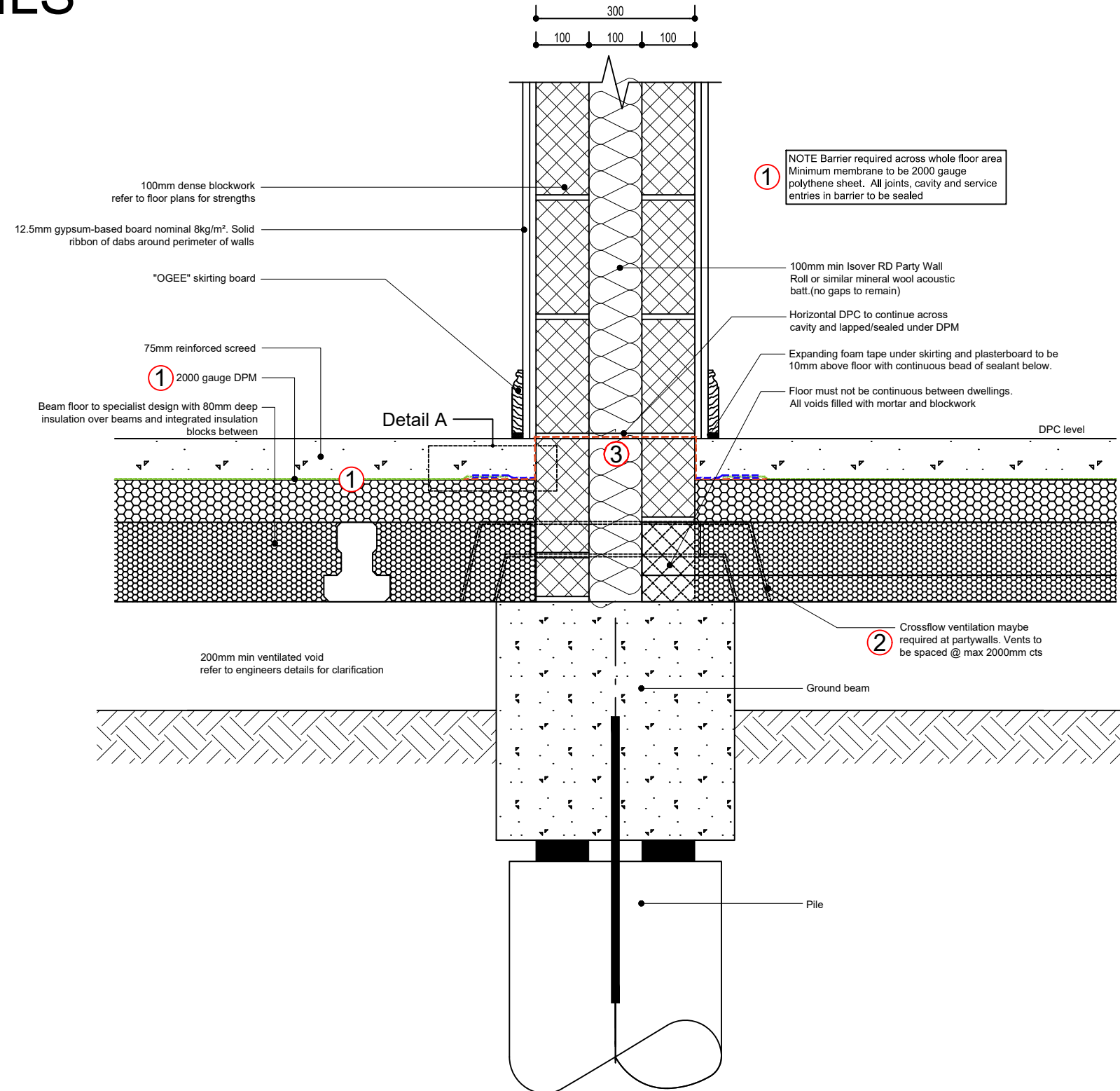
HERBERT ROAD, NEWPORT

HOUSE TYPE DETAILS



UNITS 37 ONWARDS REQUIRE GAS CATEGORY 3 PROTECTION

- ① VOC Barrier - BS8485:2015 compliant DPM's / DPC's.
- ② Additional telescopic vents to external cavity walls may be required. *TBC*
- ③ Cavity support to membrane between vents, in the form of rigid insulation. *TBC*



H-B5: PARTYWALL / FLOOR

Issue: February 2019

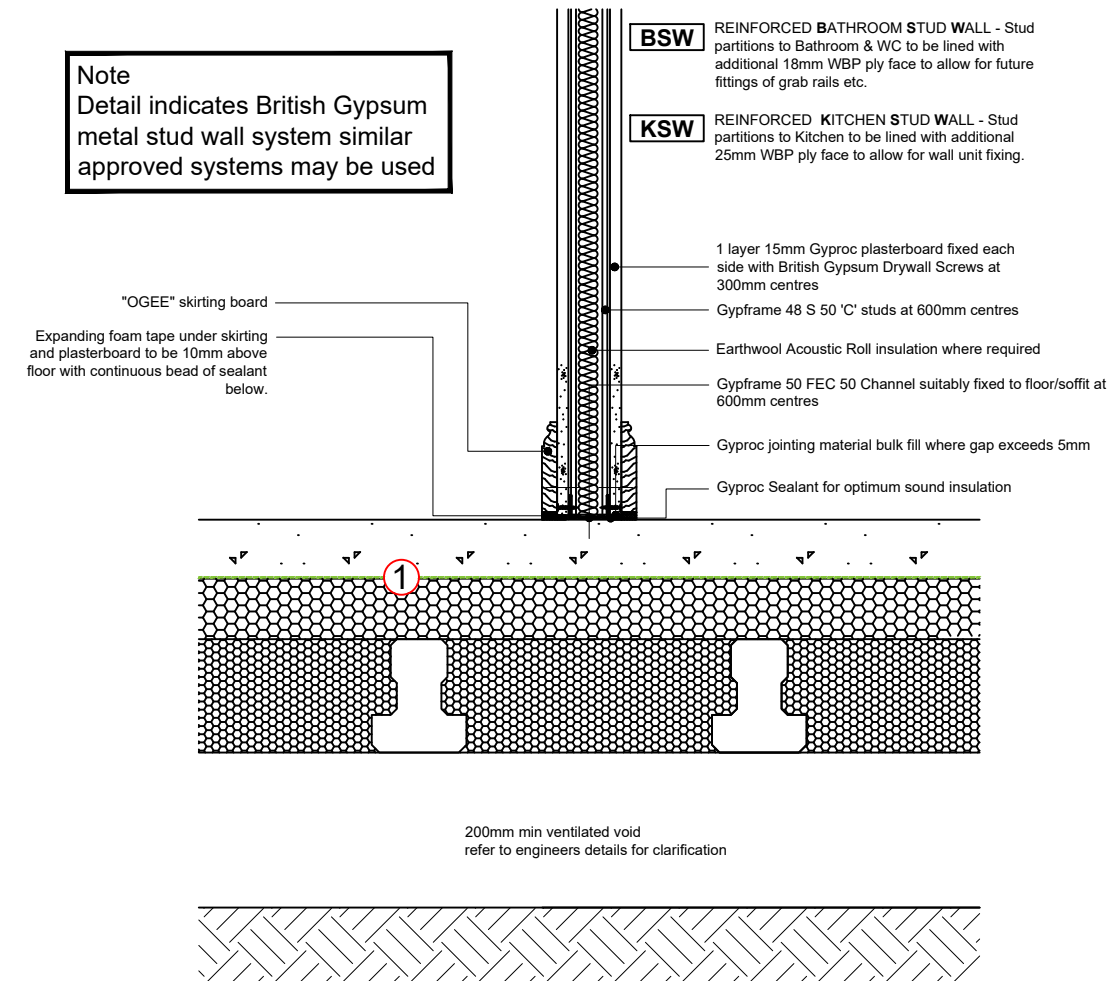
Revision: -

Scale - 1:10

Project No. 1839
 HERBERT ROAD, NEWPORT
HOUSE TYPE DETAILS



- UNITS 37 ONWARDS REQUIRE GAS CATEGORY 3 PROTECTION**
- ① VOC Barrier - BS8485:2015 compliant DPM's / DPC's.
 - ② Additional telescopic vents to external cavity walls may be required. *TBC*
 - ③ Cavity support to membrane between vents, in the form of rigid insulation. *TBC*



H-B4: NON LOADBEARING INTERNAL PARTITION / FLOOR

Issue: FEBRUARY 2019
 Revision: -
 Scale - 1:10

ANNEX B
Passive Ventilation Calculation Sheets

Estimation of Passive Ventilation Performance

Type A

(WILSON S, CARD G and HAINES S (2009) Ground Gas Handbook)

Calculation of required fresh air flow rates (CIRIA R149)

Maximum gas concentration	80.6 % v/v	(1)
Maximum Flow Rate	3.8 l/h	(2)
Surface emission rate of gas	0.30628 l/h/m ²	(3)
Convert (3) to m ³	0.000306 m ³ /h/m ²	(4)
Structure width	9.88 m	(5)
Structure length	4.9 m	(6)
Structure area	48.41 m ²	(7)
Total surface emission rate of gas into void	q = 0.014828 m ³ /h	(8)
Required design concentration of gas	1 % v/v	(9)
Design fresh air flow rate required	Q = 1.80 m ³ /h	(10)

Vent Sizing (BS5925:1991)

Void height	0.15 m	(11)
Height above ground level of ventilation	z = 0.15 m	(12)
Hourly mean wind speed at 10m height (Figure 5 BS5925:1991)	U ₅₀ = 4.5 m/s	(13)
Correction ratio at 80% (Table 9 BS5925:1991)	0.46	(14)
Factored wind speed	U _m = 2.07 m/s	(15)
Factor K (Table 8 BS5925:1991)	K = 0.35	(16)
Factor a (Table 8 BS5925:1991)	a = 0.25	(17)
Referenced wind speed	U _r = 0.45 m/s	(18)
Discharge coefficient for a narrow opening	C _d = 0.61	(19)
Orientation of structure (assumed)	ΔC _p = 0.4	(20)
Covert (10) to m ³ /s	Q = 0.0005 m ³ /s	(21)
Area of ventilation required	A _w = 2874 mm ²	(22)
Ventilation required per meter of structure length	587 mm ² /m	(23)
Is (23) < 1500 mm ² as dictated by Building Regulation?	Yes	
Time to fill to 5% methane if there is no wind	24 h	(24)
Is (24) >10h (max period of still wind as reported in the Partners in Technology report)	Yes	

Estimation of Passive Ventilation Performance

Type C

(WILSON S, CARD G and HAINES S (2009) Ground Gas Handbook)

Calculation of required fresh air flow rates (CIRIA R149)

Maximum gas concentration	80.6 % v/v	(1)
Maximum flow rate	3.8 l/h	(2)
Surface emission rate of gas	0.30628 l/h/m ²	(3)
Convert (3) to m ³	0.000306 m ³ /h/m ²	(4)
Structure width	8.98 m	(5)
Structure length	4.84 m	(6)
Structure area	43.46 m ²	(7)
Total surface emission rate of gas into void	q = 0.013312 m ³ /h	(8)
Required design concentration of gas	1 % v/v	(9)
Design fresh air flow rate required	Q = 1.80 m ³ /h	(10)

Vent Sizing (BS5925:1991)

Void height	0.15 m	(11)
Height above ground level of ventilation	z = 0.15 m	(12)
Hourly mean wind speed at 10m height (Figure 5 BS5925:1991)	U ₅₀ = 4.5 m/s	(13)
Correction ratio at 80% (Table 9 BS5925:1991)	0.46	(14)
Factored wind speed	U _m = 2.07 m/s	(15)
Factor K (Table 8 BS5925:1991)	K = 0.35	(16)
Factor a (Table 8 BS5925:1991)	a = 0.25	(17)
Referenced wind speed	U _r = 0.45 m/s	(18)
Discharge coefficient for a narrow opening	C _d = 0.61	(19)
Orientation of structure (assumed)	ΔC _p = 0.4	(20)
Covert (10) to m ³ /s	Q = 0.0005 m ³ /s	(21)
Area of ventilation required	A _w = 2874 mm ²	(22)
Ventilation required per meter of structure length	594 mm ² /m	(23)
Is (23) < 1500 mm ² as dictated by Building Regulation?	Yes	
Time to fill to 5% methane if there is no wind	24 h	(24)
Is (24) >10h (max period of still wind as reported in the Partners in Technology report)	Yes	

Estimation of Passive Ventilation Performance

Type D

(WILSON S, CARD G and HAINES S (2009) Ground Gas Handbook)

Calculation of required fresh air flow rates (CIRIA R149)

Maximum gas concentration	80.6 % v/v	(1)
Maximum flow rate	3.8 l/h	(2)
Surface emission rate of gas	0.30628 l/h/m ²	(3)
Convert (3) to m ³	0.000306 m ³ /h/m ²	(4)
Structure width	8.98 m	(5)
Structure length	5.28 m	(6)
Structure area	47.41 m ²	(7)
Total surface emission rate of gas into void	q = 0.014522 m ³ /h	(8)
Required design concentration of gas	1 % v/v	(9)
Design fresh air flow rate required	Q = 1.80 m ³ /h	(10)

Vent Sizing (BS5925:1991)

Void height	0.15 m	(11)
Height above ground level of ventilation	z = 0.15 m	(12)
Hourly mean wind speed at 10m height (Figure 5 BS5925:1991)	U ₅₀ = 4.5 m/s	(13)
Correction ratio at 80% (Table 9 BS5925:1991)	0.46	(14)
Factored wind speed	U _m = 2.07 m/s	(15)
Factor K (Table 8 BS5925:1991)	K = 0.35	(16)
Factor a (Table 8 BS5925:1991)	a = 0.25	(17)
Referenced wind speed	U _r = 0.45 m/s	(18)
Discharge coefficient for a narrow opening	C _d = 0.61	(19)
Orientation of structure (assumed)	ΔC _p = 0.4	(20)
Covert (10) to m ³ /s	Q = 0.0005 m ³ /s	(21)
Area of ventilation required	A _w = 2874 mm ²	(22)
Ventilation required per meter of structure length	544 mm ² /m	(23)
Is (23) < 1500 mm ² as dictated by Building Regulation?	Yes	
Time to fill to 5% methane if there is no wind	24 h	(24)
Is (24) >10h (max period of still wind as reported in the Partners in Technology report)	Yes	

Estimation of Passive Ventilation Performance

(WILSON S, CARD G and HAINES S (2009) Ground Gas Handbook)

Type E

Calculation of required fresh air flow rates (CIRIA R149)

Maximum gas concentration	80.6 % v/v	(1)
Maximum flow rate	3.8 l/h	(2)
Surface emission rate of gas	0.30628 l/h/m ²	(3)
Convert (3) to m ³	0.000306 m ³ /h/m ²	(4)
Structure width	9.43 m	(5)
Structure length	5.33 m	(6)
Structure area	50.26 m ²	(7)
Total surface emission rate of gas into void	q = 0.015394 m ³ /h	(8)
Required design concentration of gas	1 % v/v	(9)
Design fresh air flow rate required	Q = 1.80 m ³ /h	(10)

Vent Sizing (BS5925:1991)

Void height	0.15 m	(11)
Height above ground level of ventilation	z = 0.15 m	(12)
Hourly mean wind speed at 10m height (Figure 5 BS5925:1991)	U ₅₀ = 4.5 m/s	(13)
Correction ratio at 80% (Table 9 BS5925:1991)	0.46	(14)
Factored wind speed	U _m = 2.07 m/s	(15)
Factor K (Table 8 BS5925:1991)	K = 0.35	(16)
Factor a (Table 8 BS5925:1991)	a = 0.25	(17)
Referenced wind speed	U _r = 0.45 m/s	(18)
Discharge coefficient for a narrow opening	C _d = 0.61	(19)
Orientation of structure (assumed)	ΔC _p = 0.4	(20)
Covert (10) to m ³ /s	Q = 0.0005 m ³ /s	(21)
Area of ventilation required	A _w = 2874 mm ²	(22)
Ventilation required per meter of structure length	539 mm ² /m	(23)
Is (23) < 1500 mm ² as dictated by Building Regulation?	Yes	
Time to fill to 5% methane if there is no wind	24 h	(24)
Is (24) >10h (max period of still wind as reported in the Partners in Technology report)	Yes	

Estimation of Passive Ventilation Performance

Type H

(WILSON S, CARD G and HAINES S (2009) Ground Gas Handbook)

Calculation of required fresh air flow rates (CIRIA R149)

Maximum gas concentration	80.6 % v/v	(1)
Maximum flow rate	3.8 l/h	(2)
Surface emission rate of gas	0.30628 l/h/m ²	(3)
Convert (3) to m ³	0.000306 m ³ /h/m ²	(4)
Structure width	7.99 m	(5)
Structure length	6.68 m	(6)
Structure area	53.37 m ²	(7)
Total surface emission rate of gas into void	q = 0.016347 m ³ /h	(8)
Required design concentration of gas	1 % v/v	(9)
Design fresh air flow rate required	Q = 1.80 m ³ /h	(10)

Vent Sizing (BS5925:1991)

Void height	0.15 m	(11)
Height above ground level of ventilation	z = 0.15 m	(12)
Hourly mean wind speed at 10m height (Figure 5 BS5925:1991)	U ₅₀ = 4.5 m/s	(13)
Correction ratio at 80% (Table 9 BS5925:1991)	0.46	(14)
Factored wind speed	U _m = 2.07 m/s	(15)
Factor K (Table 8 BS5925:1991)	K = 0.35	(16)
Factor a (Table 8 BS5925:1991)	a = 0.25	(17)
Referenced wind speed	U _r = 0.45 m/s	(18)
Discharge coefficient for a narrow opening	C _d = 0.61	(19)
Orientation of structure (assumed)	ΔC _p = 0.4	(20)
Covert (10) to m ³ /s	Q = 0.0005 m ³ /s	(21)
Area of ventilation required	A _w = 2874 mm ²	(22)
Ventilation required per meter of structure length	430 mm ² /m	(23)
Is (23) < 1500 mm ² as dictated by Building Regulation?	Yes	
Time to fill to 5% methane if there is no wind	24 h	(24)
Is (24) >10h (max period of still wind as reported in the Partners in Technology report)	Yes	

Estimation of Passive Ventilation Performance

Type K

(WILSON S, CARD G and HAINES S (2009) Ground Gas Handbook)

Calculation of required fresh air flow rates (CIRIA R149)

Maximum gas concentration	80.6 % v/v	(1)
Maximum flow rate	3.8 l/h	(2)
Surface emission rate of gas	0.30628 l/h/m ²	(3)
Convert (3) to m ³	0.000306 m ³ /h/m ²	(4)
Structure width	8.46 m	(5)
Structure length	7.75 m	(6)
Structure area	65.57 m ²	(7)
Total surface emission rate of gas into void	q = 0.020081 m ³ /h	(8)
Required design concentration of gas	1 % v/v	(9)
Design fresh air flow rate required	Q = 1.80 m ³ /h	(10)

Vent Sizing (BS5925:1991)

Void height	0.15 m	(11)
Height above ground level of ventilation	z = 0.15 m	(12)
Hourly mean wind speed at 10m height (Figure 5 BS5925:1991)	U ₅₀ = 4.5 m/s	(13)
Correction ratio at 80% (Table 9 BS5925:1991)	0.46	(14)
Factored wind speed	U _m = 2.07 m/s	(15)
Factor K (Table 8 BS5925:1991)	K = 0.35	(16)
Factor a (Table 8 BS5925:1991)	a = 0.25	(17)
Referenced wind speed	U _r = 0.45 m/s	(18)
Discharge coefficient for a narrow opening	C _d = 0.61	(19)
Orientation of structure (assumed)	ΔC _p = 0.4	(20)
Covert (10) to m ³ /s	Q = 0.0005 m ³ /s	(21)
Area of ventilation required	A _w = 2874 mm ²	(22)
Ventilation required per meter of structure length	371 mm ² /m	(23)
Is (23) < 1500 mm ² as dictated by Building Regulation?	Yes	
Time to fill to 5% methane if there is no wind	24 h	(24)
Is (24) >10h (max period of still wind as reported in the Partners in Technology report)	Yes	

ANNEX C
Product Data Sheets

Solco Building Products

Unit 51-52
Portmanmoor Road Industrial Estate
Ocean Park
Cardiff CF24 5HB

Tel: 0845 450 9766

e-mail: enquiries@solco.co.uk

website: www.solco.co.uk



Agrément Certificate

16/5382

Product Sheet 1

SOLSHIELD GAS-RESISTANT MEMBRANE

SOLSHIELD ULTRA GAS BARRIER

This Agrément Certificate Product Sheet⁽¹⁾ relates to Solshield Ultra Gas Barrier, for use as a low-density polythene gas barrier and damp-proof membrane in concrete ground floors, above and below the slab not subject to hydrostatic pressure, to protect the building against moisture, radon, methane and carbon dioxide from the ground.

(1) Hereinafter referred to as 'Certificate'.

CERTIFICATION INCLUDES:

- factors relating to compliance with Building Regulations where applicable
- factors relating to additional non-regulatory information where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production
- formal three-yearly review.



KEY FACTORS ASSESSED

Resistance to water and water vapour — the membrane provides an effective barrier to the passage of liquid water and water vapour from the ground (see section 6).

Resistance to underground gases — the membrane is capable of restricting the ingress of radon, methane and carbon dioxide gases into the building (see section 7).

Resistance to puncture — the membrane has a high resistance to puncture and on a smooth or blinded surface will not be damaged by foot or site traffic (see section 8).

Durability — under normal service conditions the membrane will remain effective against the ingress of water and water vapour, and will restrict the ingress of radon, methane and carbon dioxide during the lifetime of the flooring construction in which it is installed (see section 13).



The BBA has awarded this Certificate to the company named above for the product described herein. This product has been assessed by the BBA as being fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of First issue: 8 February 2017

John Albon – Head of Approvals
Construction Products

Claire Curtis-Thomas
Chief Executive

The BBA is a UKAS accredited certification body – Number 113.

The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at www.bbacerts.co.uk
Readers are advised to check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA direct.

British Board of Agrément

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www.bbacerts.co.uk

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Regulations

In the opinion of the BBA, Solshield Ultra Gas Barrier, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements of the following Building Regulations (the presence of a UK map indicates that the subject is related to the Building Regulations in the region or regions of the UK depicted):



The Building Regulations 2010 (England and Wales) (as amended)

Requirement:	C1(2)	Site preparation and resistance to contaminants
Comment:		The product can contribute to a structure satisfying this Requirement. See section 7.1 of this Certificate.
Requirement:	C2(a)	Resistance to moisture
Comment:		When properly installed in a correctly-designed structure, the product forms an effective barrier to the movement of water within the ground floor slab, enabling compliance with this Requirement. See sections 6.1 and 6.2 of this Certificate.
Regulation:	7	Materials and workmanship
Comment:		The product is of an acceptable material. See section 13.1 and the <i>Installation</i> part of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)	Durability, workmanship and fitness of materials
Comment:		The product can contribute to a construction satisfying this Regulation. See section 13.1 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards applicable to construction
Standard:	3.1	Site preparation — harmful and dangerous substances
Standard:	3.2	Site preparation — protection from radon gas
Comment:		The product will enable a floor to satisfy the requirements of these Standards, with reference to clauses 3.1.2 ⁽¹⁾⁽²⁾ , 3.1.6 ⁽¹⁾⁽²⁾ , 3.1.7 ⁽¹⁾⁽²⁾ , 3.1.8 ⁽¹⁾⁽²⁾ , 3.2.1 ⁽²⁾ and 3.2.2 ⁽¹⁾⁽²⁾ . See section 7.1 of this Certificate.
Standard:	3.4	Moisture from the ground
Comment:		When properly installed in a correctly-designed structure, the product forms an effective barrier to the movement of water within the ground floor slab, enabling compliance with this Standard, with reference to clauses 3.4.2 ⁽¹⁾⁽²⁾ , 3.4.4 ⁽¹⁾⁽²⁾ and 3.4.6 ⁽¹⁾⁽²⁾ . See sections 6.1 and 6.2 of this Certificate.
Standard:	7.1(a)	Statement of sustainability
Comment:		The product can contribute to meeting the relevant requirements of Regulation 9, Standards 1 to 6 and therefore will contribute to a construction meeting a bronze level of sustainability as defined in this Standard.
Regulation:	12	Building standards applicable to conversions
Comment:		Comments in relation to the product under Regulation 9, Standards 1 to 6 also apply to this Regulation, with reference to clause 0.12.1 ⁽¹⁾⁽²⁾ and Schedule 6 ⁽¹⁾⁽²⁾ .

(1) Technical Handbook (Domestic)

(2) Technical Handbook (Non-Domestic).



The Building Regulations (Northern Ireland) 2012 (as amended)

Regulation:	23(a)(i)	Fitness of materials and workmanship
Comment:	(iii)(b)(i)	The product is acceptable. See section 13.1 and the <i>Installation</i> part of this Certificate.
Regulation:	26	Site preparation and resistance to contaminants
Comment:		The product can contribute to a structure satisfying the requirements of this Regulation. See section 7.1 of this Certificate.
Regulation:	28	Resistance to moisture and weather
Comment:		When properly installed in a correctly-designed structure, the product forms an effective barrier to the movement of water within the ground floor slab, enabling compliance with this Regulation. See sections 6.1 and 6.2 of this Certificate.

Construction (Design and Management) Regulations 2015

Construction (Design and Management) Regulations (Northern Ireland) 2016

Information in this Certificate may assist the client, designer (including Principal Designer) and contractor (including Principal Contractor) to address their obligations under these Regulations.

See section: 1 *Description* (1.2) of this Certificate.

Additional Information

NHBC Standards 2017

NHBC accepts the use of Solshield Ultra Gas Barrier, provided it is installed, used and maintained in accordance with this Certificate, in relation to *NHBC Standards*, Chapters 4.1 *Land quality — managing ground conditions* and 5.1 *Substructure and ground bearing floors*.

CE marking

The Certificate holder has taken the responsibility of CE marking the product in accordance with harmonised European Standard EN 13967 : 2012. An asterisk (*) appearing in this Certificate indicates that data shown are given in the manufacturer's Declaration of Performance.

Technical Specification

1 Description

1.1 Solshield Ultra Gas Barrier is a multilayer, low-density polyethylene membrane, reinforced with a polypropylene reinforcing grid with an integral aluminium foil.

1.2 The membrane has the following nominal characteristics:

Thickness* (mm)	0.6 (overall)
Roll length* (m)	various
Roll width* (m)	various
Mass per unit area* ($\text{g}\cdot\text{m}^{-2}$)	350
Tensile strength* ($\text{N}\cdot 50\text{ mm}^{-1}$)	
MD	600
CD	480
Elongation*	
MD	20
CD	20
Nail tear resistance*	
MD	330

CD	400
Watertightness*	pass
Colour	
upper surface	various
lower surface	various.

1.3 Ancillary products for use with the membrane include:

- Solco Double Sided Butyl Jointing tape —for use for joints and laps
- Solco Foil Lap Tape — for securing laps and joints.

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

- Solco Top Hats — to seal around entry points to the membrane
- Solco Internal Corner Cloaks — prefabricated corner details
- Solco External Corner Cloaks — prefabricated corner details
- Solco Bitumen Primer — used to provide adhesion for application of bitumen enhanced geomembranes
- Solshield Gas Venting Mat 25 — cusped HDPE drainage core with a non-woven polypropylene geotextile separator/filter bonded to one side
- Solshield Gas Venting Mat 40 — cusped HDPE drainage core with a non-woven polypropylene geotextile separator/filter bonded to one side
- Solco Protection Fleece — to form a protective layer to prevent damage to the membrane
- Solsheet GR-SAM — gas-resistant self-adhesive membrane.

2 Manufacture

2.1 The product is manufactured by an extrusion/coating process

2.2 As part of the assessment and ongoing surveillance of product quality, the BBA has:

- agreed with the manufacturer the quality control procedures and product testing to be undertaken
- assessed and agreed the quality control operated over batches of incoming materials
- monitored the production process and verified that it is in accordance with the documented process
- evaluated the process for management of nonconformities
- checked that equipment has been properly tested and calibrated
- undertaken to carry out the above measures on a regular basis through a surveillance process, to verify that the specifications and quality control being operated by the manufacturer are being maintained.

3 Delivery and site handling

3.1 Rolls are wrapped in polythene film. Each roll has a leaflet enclosed describing the product and installation details. The BBA logo and Certificate number are printed on the leaflet and pallet label.

3.2 The rolls must be stacked on a flat surface, kept under cover and protected from sunlight and mechanical damage.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Solshield Ultra Gas Barrier.

Design Considerations

4 Use

4.1 Solshield Ultra Gas Barrier is satisfactory for use as a gas-resistant barrier to restrict the ingress of radon, methane and carbon dioxide gases into buildings from landfill and naturally-occurring sources.

4.2 Buildings in areas of risk should be constructed in accordance with the recommendations of BRE Report BR 211 : 2015 *Radon: Guidance on protective measures for new buildings*, and following the guidance set out in BS 8485 : 2015.

4.3 The product is also satisfactory for use as a damp-proof membrane in accordance with CP 102 : 1973, Section 2 and BS 8000-4 : 1989.

5 Practicability of installation

The membrane is designed to be installed by a competent general builder, or a contractor, experienced with this type of product.

6 Resistance to water and water vapour



6.1 The membrane, including joints, provides an effective barrier to the passage of liquid moisture from the ground.

6.2 When installed in accordance with the following documents, the membrane will comply with the minimum sheet thickness detailed in the national Building Regulations:

England and Wales — Approved Document C, Requirement C2(a), Section 4.6

Scotland — Mandatory Standard 3.4, clauses 3.4.2, 3.4.4 and 3.4.6

Northern Ireland — Regulation 28(a).

6.3 The membrane is impervious to water and provides a waterproof layer capable of accepting minor structural movements without damage.

7 Resistance to underground gases



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

7.2 Measured gas permeability/diffusion values on unjointed membrane are given in Table 1.

Table 1 Gas permeability of Solshield Ultra

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

7.3 BRE Report BR 211 : 2015 recommends a 300 μm thick polyethylene sheet as the minimum required thickness for a radon gas-resistant membrane. It is generally accepted that other materials with comparable or higher gas resistance are suitable, provided they can withstand the construction process. In the opinion of the BBA, the product meets these criteria.

8 Resistance to puncture

8.1 The membrane can be punctured by sharp objects, and care should be taken when handling building materials over the exposed surface.

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

9 Compatibility with other materials

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

10 Underfloor heating

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

11 Effects of temperature

When the membrane is loose-laid and the joints are taped, the installation temperature should not be below 5°C.

12 Maintenance

As the product is confined under concrete and has suitable durability (see section 13), maintenance is not required. However, any damage occurring before enclosure must be repaired (see section 16).

13 Durability



13.1 The membrane will, in normal circumstances, remain effective against the ingress of water and water vapour, and will restrict the ingress of radon, methane and carbon dioxide during the lifetime of the building.

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

Installation

14 General

14.1 Solshield Ultra Gas Barrier must be installed and fixed in accordance with the Certificate holder's instructions, the relevant clauses of BR 211 : 2015 and following the guidance of BS 8485 :2015.

14.2 The membrane can be installed in all normal site conditions, provided that the air temperature is not below 4°C to prevent the risk of surface condensation.

15 Procedure

15.1 The product must only be applied to surfaces that have a smooth finish, ie they should be free from voids, projections and mortar deposits. Surfaces should be dry and free from dust and frost.

15.2 Concrete surfaces should be dense. Vertical surfaces of brickwork and blockwork must be dry and rendered to provide an even surface. Brickwork or blockwork not rendered must be flush pointed to give a smooth surface without sudden changes in level.

15.3 The membrane is rolled out with the coloured surface uppermost , ensuring that it is properly aligned. All end and side overlaps should be a minimum of 150 mm and prepared in accordance with the Certificate holder's instructions.

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

15.5 All surfaces must be dried thoroughly prior to joining. Roll edges can be welded, or taped. A strip of the tape is unrolled over the membrane with its nearest edge 50 mm from the membrane edge. The protective paper is removed

from the butyl tape prior to rolling an adjacent run of the membrane, which must be carefully unrolled over the jointing tape, ensuring a 100 mm overlap.

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

15.7 The continuity of the gas protection must extend over the footprint of the building, and the gas membrane must be sealed to a gas-resistant damp-proof course.

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

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

16 Repair

Any damage to the product must be repaired using a patch of the membrane, and laps welded or sealed with Solco double-sided butyl tape and secured with Solco Foil Lap tape. All patched areas must extend a minimum of 150 mm from the damaged area. If required by the local authority, repair work should be confirmed by an independent validation report, as all gas membrane installation should be subject to third-party validation in accordance with BS 8485 : 2015.

Technical Investigations

17 Tests

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

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

17.2 Tests were carried out to determine

- thickness, width, density and mass per unit area
- dimensional stability, low temperature flexibility and water vapour permeability
- tensile strength and elongation on controls and after 12 weeks heat ageing at 70°C, and after 100 hours UVB exposure
- watertightness on controls and after 12 weeks heat ageing at 70°C
- nail tear strength on controls and after 12 weeks heat ageing at 70°C
- resistance of joints to air pressure
- tensile strength of joints on controls and after 12 weeks heat ageing at 70°C

to assess:

- product characteristics
- durability of the product and joints.

18 Investigations

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

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

18.3 The manufacturing process was evaluated, including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.

Bibliography

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

BS 8485 : 2015 *Code of practice for the characterization and remediation from ground gas in affected areas*

BS EN ISO 9001 : 2008 *Quality management systems — Requirements*

BS EN ISO 14001 : 2004 *Environmental management systems — Requirements with guidance for use*

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

CP 102 : 1973 *Code of practice for protection of buildings against water from the ground*

EN 13967 : 2012 *Flexible sheets for waterproofing — Plastic and rubber damp proof sheets including plastic and rubber*

19 Conditions

19.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page – no other company, firm, organisation or person may hold claim that this Certificate has been issued to them
- is valid only within the UK
- has to be read, considered and used as a whole document – it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English Law.

19.2 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

19.3 This Certificate will remain valid for an unlimited period provided that the product/system and its manufacture and/or fabrication, including all related and relevant parts and processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

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

19.5 In issuing this Certificate the BBA is not responsible and is excluded from any liability to any company, firm, organisation or person, for any matters arising directly or indirectly from:

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

19.6 Any information relating to the manufacture, supply, installation, use, maintenance and removal of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used, maintained and removed. It does not purport in any way to restate the requirements of the Health and Safety at Work etc. Act 1974, or of any other statutory, common law or other duty which may exist at the date of issue or reissue of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care.

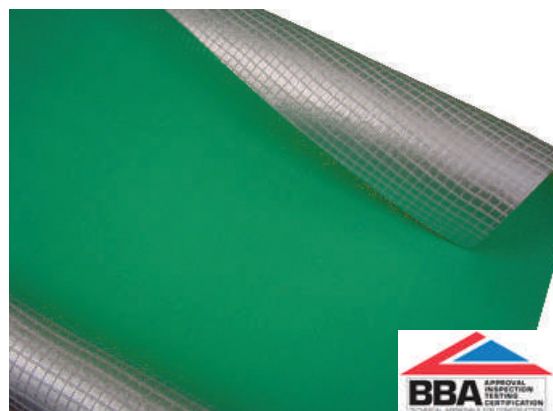
SOLSHIELD Ultra Gas Barrier



Solshield Ultra Gas Barrier is a flexible, loose laid proprietary gas barrier for use on sites with Radon (RN), Carbon Dioxide (Co²), Methane (CH⁴) and Hydrocarbon Vapours.



- **Complies with latest codes of practice as published by BRE, CIRIA & BSI (BS8485:2015).**
- **BBA Cert 16/5382, NHBC Compliant & CE Marked**
- **Suitable to protect against the ingress of Radon (RN), Carbon Dioxide (Co²), Methane (CH⁴) and Hydrocarbon/VOC Vapours.**
- **A multi-layer reinforced polyethylene membrane with integral aluminium foil.**
- **Suitable for use as gas protection for NHBC Green, Amber 1, and Amber 2 site situations.**
- **High resistance to puncture.**
- **Also acts as a damp proof membrane.**



SOLSHIELD - Gas Protection Systems

Last Issue Date:31.01.17
Rev D

Product Description

Solshield Ultra Gas Barrier is a multi layer low density polyethylene gas barrier and damp-proof membrane reinforced with a polypropylene grid with an integral aluminium foil, for use in concrete ground floors, above and below slab not subject to hydrostatic pressure, to protect the building against moisture, radon, methane & carbon dioxide from the ground.

Resistance to Hydrocarbon Vapours - when the membrane is separated from the ground e.g. above a block and beam floor.

Resistance to water & water vapour - the membrane provides an effective barrier to the passage of water & water vapours from the ground

Resistance to puncture - the membrane has a strong resistance to puncture and on smooth surfaces will not be damaged by foot / site traffic

Durability - the membrane remains effective against the ingress of water and water vapour, will restrict the ingress of radon, methane and carbon dioxide during the lifetime of the flooring construction in which it is installed

Compliance

NHBC Standards 2017, Chapters 4.1/5.1.

CE Marking Standard EN13967:2012.

BS8485:2015, CP 102:1973, section 2 & BS8000-4:1989

Solshield Ultra is tested to the agreed standard EN ISO 15105-1 and is suitable for use for NHBC Green, Amber 1 & Amber 2 classifications.

Installation

Solshield Ultra Gas Barrier must be installed and fixed in accordance with BRE 211:2015 and following the guidance of BS8485:2015 & NHBC guidelines. The membrane can be installed in all normal site conditions, provided that the air temperature is not below 4°C to prevent risk of condensation.

The membrane should be installed on a sand blinding layer, Solshield P30 protection fleece or a smooth concrete float finish. In order to provide a continuous barrier across the cavity Solshield Ultra Gas Barrier should be taken through the blockwork and incorporated below the damp proof course cavity tray in the outer leaf.

Solshield Ultra Gas Membrane is suitable for installation with beam and block floor application with 150mm clear void in an Amber 2 category project with hydrocarbons, reinforced raft foundation and in situ suspended slab providing the membrane is laid above the ground and not in direct contact with the source of hydrocarbon/VOC vapour.

Jointing & Welding

Solshield Gas Barriers have excellent welding properties, we would recommend that particularly in situations where site investigation demonstrates chemicals or harmful gases are present in significant concentrations all of our gas barriers are designed to be heat welded or tape jointed, this ensures the integrity of the membrane at the joint location. Seam welding provides maximum performance integrity and enables installers to complete installations quickly and efficiently.

Apply the double sided butyl tape about 50mm from the edge, leaving the backing paper on. Lay the next width of membrane overlapping the first by 150mm. Remove the backing paper from the double sided butyl tape and join the top sheet to the bottom sheet, by applying pressure with a hand roller. Where the membranes overlap apply the Solco single sided foil tape, equidistant on both membranes (see detail). All service entry points must have airtight seals Top hats and corner pre-forms must be sealed using double sided butyl tape.

Storage & Handling on site

Solshield Ultra Gas Barrier is classified as non-hazardous (code of practice CP102 1973).

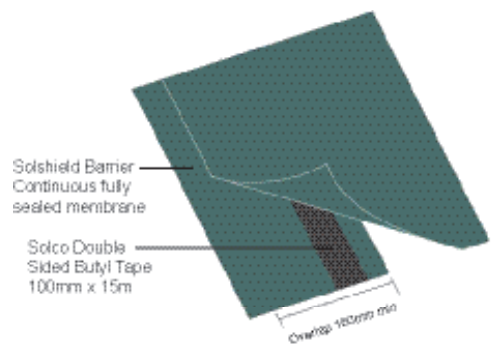
The product is chemically inert and any acids or alkalis present in the subsoil will not affect the membrane.

It is not recommended for use when exposed to sunlight and general outdoor weather conditions for long periods of time. Weathering will not occur when installed.

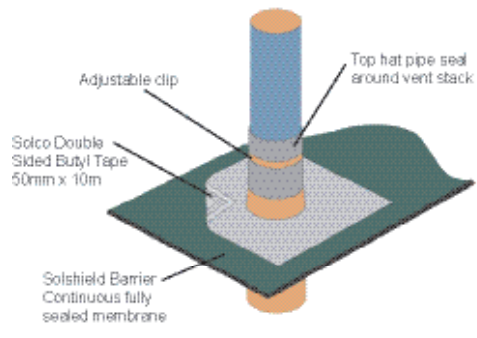
Rolls should be stored undercover, and protected from sunlight.

Quality control during the laying of the membrane is extremely important the membrane should be protected either through the use of temporary protection over its whole area or the immediate laying of the concrete slab.

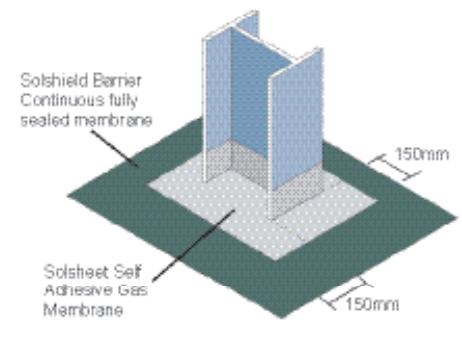
Typical Jointing Details for Solshield Ultra Gas Barrier



Typical Lap Detail



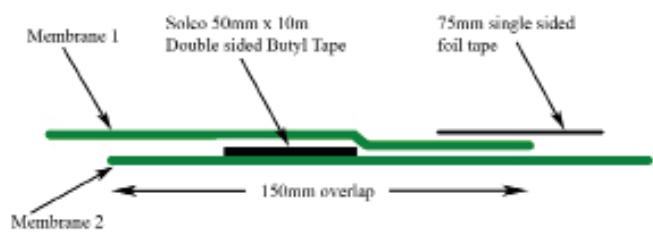
Typical Penetration Detail



Typical Column Detail

Note:

All service entry points must have airtight seals. Top hats and corner pre-forms must be sealed using double sided butyl tape.



Typical Jointing Detail

Venting

Solshield Ultra Gas Barrier can be used on sites where passive or active ventilation is required. Solshield Geocomposite Drainage & Venting Mat should be used in conjunction with the relative vent connectors where required. These types of systems are designed on a bespoke site specific nature, please contact us for our design advice.

Technical Data & Test Results

Characteristic	Test Method	Unit	Size
Thickness	EN 1849 - 2	mm	0.6
Width	EN 1849 - 2	M	Various
Length	EN 1849 - 2	M	Various
Weight	EN 1849 - 2	g/m ²	350
Hydraulic Properties			
Water Column Test	EN 20811		>300
Resistance to Water Penetration	EN 13967, EN 1928		Pass
Durability of watertightness against ageing	EN 1296, EN 13967, EN 1928		Pass
Mechanical Properties			
Resistance to Static Loading	EN 12730 - B	Kg	20
Tensile Strength MD	EN 12311 - 1	N/50mm	600
Tensile Strength CMD	EN 12311 - 1	N/50mm	480
Tensile Elongation MD	EN 12311 - 1	%	20
Tensile Elongation CMD	EN 12311 - 1	%	20
Puncture Resistance	EN 12236	kN	1.25
Resistance to tearing (nail shank) MD	EN 12310 - 1	N	330
Resistance to tearing (nail shank) CMD	EN 12310 - 1	N	400
Durability & Chemical Resistance			
Transmission rate of volatile liquids - Diesel	ISO 6179:2010 (B)	g/m ² /h	0.246
Transmission rate of volatile liquids - Xylene	ISO 6179:2010 (B)	g/m ² /h	0.571
Transmission rate of volatile liquids - Toluene	ISO 6179:2010 (B)	g/m ² /h	0.583
Transmission rate of volatile liquids - Petrol	ISO 6179:2010 (B)	g/m ² /h	0.135
Gas Permeability			
Methane Permeability	BS EN ISO 15105 - 1	ml/m ² /day/atm	<0.09
Carbon Dioxide Permeability	BS EN ISO 15105 - 1	ml/m ² /day/atm	<0.09
Radon Permeability	K124/02/95	m ² /s	8 x 10 ⁻¹⁵

Gas System Accessories



Product	Description	Sizes	Application	Supply
Solco Foil Backed Jointing Tape to BS EN ISO 15105 - 1	Single sided tape for securing laps and joints	75mm x 50m	Securing laps and joints	Rolls
Solco Double sided Butyl Jointing Tape	Butyl Adhesive Tape	50mm x 10m 100mm x 15m	Butyl based double sided tape for joints and laps	Rolls
Solco Top Hat Units	Polymeric	Various	For sealing around penetrations through gas membrane	Each
Solcourse Hydrocarbon DPC	A flexible Tri-polymer DPC	300mm - 1000mm	To prevent the transmission of Radon, CO ₂ , Methane Gas and Hydrocarbons	20m Rolls
Solco Gas Sump Units	Part of the Radon Protection System	430 x 430 x 220mm	Radon Sumps are used in full protection areas, where sub floor depressurisation may be required.	Each
Solco XL Jointing Tape	Reinforcing Tape	100, 150 & 300mm wide	overband tape self-adhesive	20m Rolls
Solseal Bitumen Primer	Primer for SA Membrane	5L & 25L	Surface Primer	Drums
Solco Protection Boards	Bitumen / Polymeric	3mm thick	For heavy duty use	2m x 1m
Solco Corrugated Board	Plastic Corrugated	2mm thick	For light duty use	2m x 1m
Solco P30 Fleece	Geotextile Protection	2 x 50mt	For foot traffic	Roll

Last Issue Date: 30.01.12

Solco Protection Systems

Solco supply a range of high quality protection systems which can be used within the Solco damp proofing & Gas protection systems to ensure the integrity protection of installed membranes.

Solco Protection Fleece (SP30)

Description

SP30 is a medium duty protection system to prevent installed membranes from accidental damage. SP30 is manufactured from 100% polypropylene continuous-filament needle-punched nonwoven geotextile.



Application

SP30 protects loose laid membranes against accidental damage from following trades or the process of the installation of structural reinforcement prior to concrete being laid. SP30 can also be used beneath Solshield Gas Protection Membranes. SP30 is designed for medium duty protection applications, for heavy duty applications please use Solco HD range of protection boards.

Installation

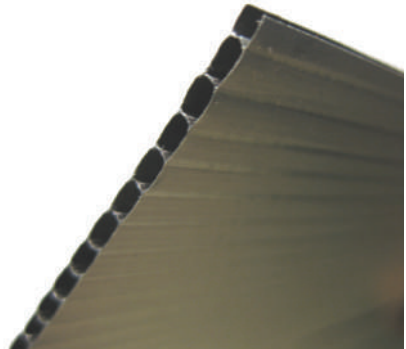
SP30 rolls are loose laid over the membrane and adjacent sheets should be overlapped by at least 150mm and secured using Solco Single Sided Lapping Tape. Ensure surfaces are clean and dry prior to application of tape. In windy conditions SP30 should be weighted down to ensure the fleece remains in position.

Dimension Properties		
Roll Width		2m
Roll Length		50m
Colour		White
Technical Data		
Tensile Strength EN ISO 10319	MD kN/m	20
	CD kN/m	20
Elongation EN ISO 10319	MD kN/m	80
	CD kN/m	75
CBR Puncture Resistance kN EN ISO 12236		2.35
Mass per unit area g/m2 EN ISO 9864		300

Solco Temporary Protection Board

Description

Solco temporary boards are medium duty protection system to prevent installed membranes from accidental damage. The Protection board is an extruded fluted board made from polypropylene granules. The Temporary protection boards are manufactured to Quality Assurance Standard IS09002 and Environmental Standard IS09002.



Application

Temporary protection boards protect loose laid membranes against accidental damage from following trades or the process of the installation of structural reinforcement prior to concrete being laid, it can also be used beneath Solshield Gas Protection Membranes. The temporary protection boards are designed for medium duty protection applications, for heavy duty applications please use Solco HD range of protection boards.

Installation

Temporary protection boards are loose laid over the membrane and adjacent sheets should be secured using Solco Single Sided Lapping Tape, using a stanley knife the boards can be easily cut to size and fitted. Ensure surfaces are clean and dry prior to application of tape.

Dimension Properties	
Sheet Width	1.220m
Sheet Length	2.440m
Thickness	2mm
Colour	Black
Technical Data (BS 3924:1978)	
Slip resistance - Dry BS7976-2:2002 (Pendulum method)	72 (P.T.V.'s)
Slip resistance - Wet BS7976-2:2002 (Pendulum method)	49 (P.T.V.'s)
Crush Resistance (2mm / 250gsm)	300 kN/m2
Stiffness / Flexibility (BS7424: 1991)	200mNm

Solco HD Bitumen Protection Board



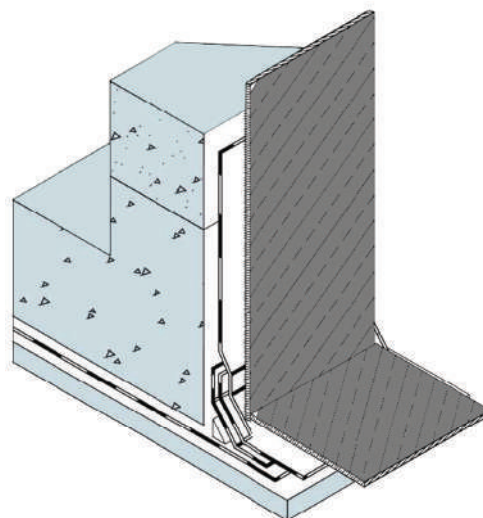
- Weather, warp and rot proof
- Excellent flexibility
- High puncture resistance
- Excellent resistance to chemicals
- Compatible with most waterproofing systems

Description

Solco HD Bitumen Protection Board is a tough, reinforced flexible bitumen modified board for the protection of adhesive waterproofing membrane and other types of waterproofing membranes against damage by abrasive backfill materials and poured concrete

Application

To fix the HD protection boards, double sided tape or adhesive should be used to fix the protection board to the membrane. Lap joints using Solco single sided lapping tape should be staggered as well as staggered over the membrane laps.



Installation

In horizontal applications, boards are loose laid and closely butt jointed. To prevent lateral movement the boards should be overtaped with Solco single sided lapping tape. Jointing applied equidistant over the junction. Ensure surfaces are clean and dry prior to application of tape. Apply pressure to the tape to ensure adhesion.

Dimension Properties		Technical Data	
Sheet Width	1.0m	Bitumen Content	>75%
Sheet Length	2.0m	Flexibility at 250°C	Pass
Thickness	3mm / 6mm	Softening Point	1400°C
Weight	8kg / 16kg	Heat Resistant at 800°C	No Flow
Colour	Black	Water Permeability	Impermeable

In vertical applications, boards should be strip bonded to the membrane with Solco double sided butyl tape and the joints over-taped with Solco single sided lapping tape applied equidistant over the junction. Ensure surfaces are clean and dry prior to application of tape. Apply pressure to the tape to ensure adhesion.

Note: The Typical Data shown in this leaflet is intended as a general guide and is based on tests carried out under controlled conditions. For further information on Product Specification consult Solco Building Products.

Solco System Accessories

Technical Data				
SOLCO Single Sided Lapping Tape	Single sided tape for securing laps & joints	75mm	Securing Laps & Joints	Rolls
SOLCO Double sided Butyl Jointing Tape	Butyl Adhesive Tape	50mm x 10m 100mm x 15m	Butyl based double sided tape for joints and laps	Rolls
SOLCO Top Hat Units	Polymeric	Various	For sealing around penetrations through gas membrane	Each
SOLCOURSE GR DPC	A flexible polyethylene DPC with an aluminium foil	300mm - 1000mm	To prevent the transmission of Radon, CO2 & Methane Gas	20m Rolls
SOLCO Gas Sump Units	Part of the Radon Protection System	430 x 430 x 220mm	Radon Sumps are used in full protection areas, for sub floor depressurisation.	Each
SOLCO XL Jointing Tape	Reinforcing Tape	100, 150 & 300mm	Over-band tape self-adhesive	20m Rolls
SOLCO Primer	Primer for SA Membrane	5L & 25L	Surface Primer	Drums
SOLCO Protection Boards	Bitumen / Polymeric	3mm thick	For heavy duty use	2m x 1m
SOLCO Corrugated Board	Plastic Corrugated	2mm thick	For light duty use	2m x 1m

SOLCO WATERPROOFING & GAS PROTECTION SYSTEM ACCESSORIES



Solco supply a range of high quality construction related waterproofing membranes and damp proof courses. The following components are used within the Solco Waterproofing & Gas protection systems to ensure effective jointing, continuity and protection.

- Solco Double Sided Butyl Tape
- Solco Preformed 'Top Hat' Pipe Collars
- Solco XL Jointing / Reinforcing Tape
- Solco XL Gas Resistant Jointing / Reinforcing Tape



SOLCO - System Components

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Solco Double Sided Butyl Tape

Solco Double Sided Butyl Tape is a preformed high performance polyisobutylene (PIB) based sealing tape with enhanced adhesive characteristics for more demanding applications where there are requirements for a high degree of bonding such as cavity trays & polythene membranes. Solco Double Sided Butyl Tape has an excellent adhesion to a wide range of substrates, with good UV resistance and remains flexible throughout its service life.

Application

Tape for bonding waterproofing and gas protection membranes at overlaps and for bonding membranes to DPCs, and fixing of other accessories such as top hats.

Installation

Ensure all surfaces are clean and dry. Apply tape to the lap area of the laid sheet starting approx 50mm from the membrane edge. Overlap adjoining membrane by minimum 150mm and remove tape release paper. Apply pressure to the jointed area to ensure adhesion. When the weather is cold, store tape in a warm, dry place until required. Installation is not recommended below 5°C.



Dimension Properties	
Roll Width	50 / 100mm
Roll Length	10m
Colour	Black
Technical Data	
Shelf Life	24 Months
Life Expectancy	>25 Years
U.V. Resistance	Excellent
Service Temperature	-40°C to +90°C
Joint Movement	up to 15%
Dynamic tensile tension: Separation rate 100mm/min @ 20°C	20 N/cm ²
Dynamic Shear: Separation rate 200mm/min @ 20°C	22 N/cm ²
Moisture vapour transmission rate : BS 15106-3	0.010 g/m ² /24hr/mm at 25°C & 75% RH

Solco Preformed 'Top Hat' Pipe Collars

Description

A black, rigid polyethylene preformed pipe sleeve unit, available for either 110mm or 135mm external diameter pipes.

Application

Pipe sleeve for effective damp protection around service pipe penetrations.

Installation

Ensure surfaces are clean and dry. Cut a circular hole in the DPM as close as possible to the pipe. Apply Solco Double Sided Butyl Tape to the underside of the unit flange. Remove tape release paper, slide the unit over the pipe and bond to the membrane.

Apply pressure to the jointed area to ensure adhesion. Apply Solco Single Sided Foil backed jointing tape equidistant over the unit flange/membrane lap. Apply pressure to the tape to ensure adhesion. When the top hat is in place using Solco single sided tape, seal the edge of the horizontal skirt to the membrane. Secure the top hat to the pipe by using a jubilee clip.

(For more detailed information on how to make a gas tight seal around pipe penetrations please refer to the details on Page 3).



Solco XL Jointing / Reinforcing Tape

Solco XL Jointing Tape is a 1.5mm thick preformed bitumen compound which is laminated onto an impervious, non-perforated, cross laminated HDPE film.

The tape is protected on the self adhesive side with a silicone coated release film. SOLCO XL Jointing Tape conforms to the requirements of BS 8102 as part of the waterproofing system.

Substrates should be primed with SOLSEAL Bitumen Primer prior to application.

Application

A single sided reinforcing / over-banding tape for securing waterproofing membranes at overlaps edge and corner details.

Installation

Ensure surfaces are clean and dry. Apply tape equidistant over the bonded membrane lap. Apply pressure to the tape to ensure adhesion. When the weather is cold, store tape in a warm, dry place until required. Installation is not recommended below 5°C.



Product Details	
Thickness	1.5mm
Widths (m)	100mm / 150mm / 300mm
Length (m)	20m
Roll Weight	3kg / 4.5kg / 9Kg
Colour	Black

Solco XL Gas Resistant Jointing / Reinforcing Tape

Solco XL Gas Resistant Jointing Tape is a preformed bitumen compound with resistance to Methane, Radon and Carbon Dioxide. Resistance to gas is achieved with a high density polyethylene film (PE) reinforcement bonded to 50-micra aluminium foil, an easily removable silicone film on the underside and thermofusible film on the upper side.

Solco XL Gas Resistant Jointing Tape conforms to the requirements of BS 8102 as part of the Gas Protection System. Substrates should be primed with SOLSEAL Bitumen Primer prior to application. Solco XL Gas Resistant Jointing Tape can be used with Solcourse range of GR DPC's and other Solshield Gas Membranes

Application

A single sided reinforcing / over-banding tape for securing waterproofing membranes at overlaps edge and corner details.

Installation

Ensure surfaces are clean and dry. Apply tape equidistant over the bonded membrane lap. Apply pressure to the tape to ensure adhesion. When the weather is cold, store tape in a warm, dry place until required. Installation is not recommended below 5°C.



Product Details	
Thickness	1.5mm
Widths (m)	100mm / 150mm / 300mm
Length (m)	20m
Roll Weight	3kg / 4.5kg / 9Kg
Colour	Black

Solco Radon Gas Sump Units

Solco Radon Gas Sump Units are part of the Radon Protection System, and are required where sub floor depressurisation is required under full protection.

Application

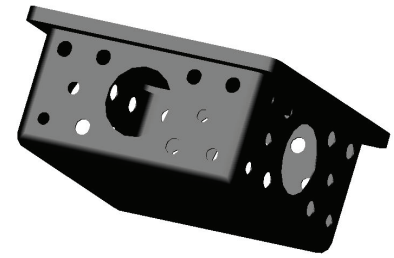
Solco Radon Sumps are prefabricated plastic units designed to act as a collection point for radon gas prior to it being ventilated away.

The sump is installed beneath the floor slab in non suspended floor applications and vented to atmosphere.

Typically a 110mm venting pipe is connected to the sump, and passes through the external wall and brought out above ground level and is connected to an external source and capped off with proprietary products i.e. air bricks & telescopic under floor vents or roof vents

Installation

- A pit should be excavated to ensure that for maximum depressurisation, any fill used beneath the slab does not contain excessive fines.
- The Radon sump is connected with a 110mm diameter PVC-U pipe to one outlet of the sump.
- Extend the pipe horizontally so that it passes through the external wall.
- Ensure that all joints and couplings are airtight.
- Backfill using a clean permeable material.
- Terminate the pipe just above ground level, and cap it.
- Connect to an external source and cap off with proprietary products.
- Provide a plate on the wall to indicate the presence of the radon exhaust pipe.
- Typically sumps are installed either at every 15m radius or 1 number unit per dwelling.



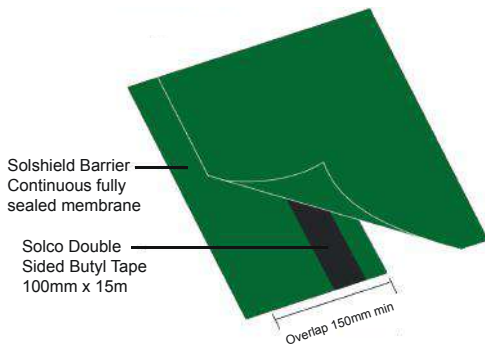
Product Details

Height	220mm
Widths	430mm
Length	430mm

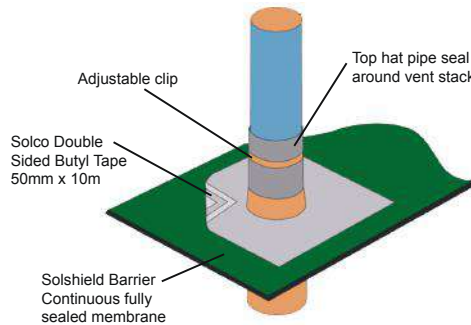
SOLCO - System Components

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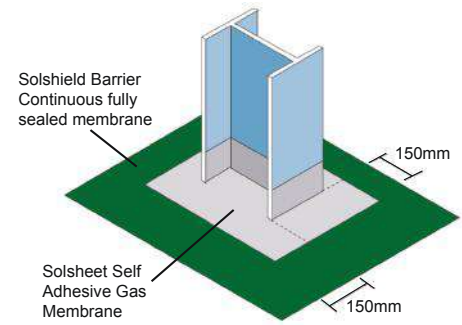
Typical Jointing Details for Waterproofing & Gas Protection Systems



Typical Lap Detail



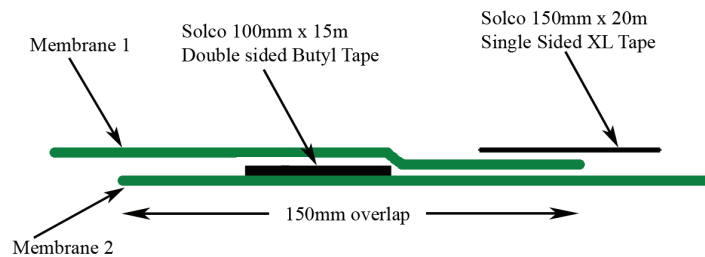
Typical Penetration Detail



Typical Column Detail

Note:

All service entry points must have airtight seals. Top hats and corner pre-forms must be sealed using double sided butyl tape.



Product	Description	Sizes	Application	Supply
Solco Double sided Butyl Jointing Tape	Butyl Adhesive Tape	50mm x 10m 100mm x 15m	Butyl based double sided tape for joints and laps	Rolls
Solco Top Hat Units	Polymeric	Various	For sealing around penetrations through gas membrane	Each
Solcourse Hydrocarbon DPC	A flexible Tri-polymer DPC	300mm - 1000mm	To prevent the transmission of Radon, CO ₂ , Methane Gas & Hydrocarbons	20m Rolls
Solco Radon Sump Units	Part of the Radon Protection System	430 x 430 x 220mm	Radon Sumps are used where sub floor depressurisation may be required.	Each
Solco XL Jointing Tape	Reinforcing Tape	100, 150 & 300mm wide	overband tape self-adhesive	20m Rolls
Solseal Bitumen Primer	Primer for SA Membrane	5L & 25L	Surface Primer	Drums
Solco Protection Boards	Bitumen / Polymeric	3mm thick	For heavy duty use	2m x 1m
Solco Corrugated Board	Plastic Corrugated	2mm thick	For light duty use	2m x 1m

ANNEX D
Installer Daily Log Sheet

Installer Daily Log



(Prepare one installer log sheet per day per plot)

Site Name: Herbert Road Phase 2B to 2D	Phase: 2B, 2C, 2D
Date:	Plot Number:
Weather:	Housing Style:
Installers:	
Progress (End of day) : In-progress, Completed	
Weather Condition:	

(Delete as appropriate)

No.	Item	Comments
1. Tasks		
	<i>Example (product type)</i>	<i>Example (Manufacturer, location, number of, serial number, reasons for repair etc.)</i>
1.1	Membrane	
1.2	Seals	
1.3	Penetrations	
1.4	Internal Corners	
1.5	External Corners	
1.6	Repairs	
1.7	Other	
Additional Notes:		