

Ref. 24-116

Date: 23<sup>rd</sup> February 2024

Sam Buswell  
Countryside Partnerships  
1 Red Hall Avenue  
Paragon Business Village  
Wakefield  
WF1 2UL



Arc Environmental Ltd  
Solum House  
Unit 1 Elliott Court  
St John's Road  
Meadowfield  
Durham  
DH7 8PN

Dear Sam,

**Re: Land at Blue Hills Farm, Birkenshaw, BD11 2DU - Ground Gas Protection Measures Verification Plan**

**1.0 Introduction**

This letter report presents a Verification Plan for the installation and validation of ground gas protective measures which are required to be installed into low rise residential properties proposed for development at the above site by Countryside Partnerships at Blue Hills Farm, Birkenshaw.

This Verification Plan has been prepared in accordance with standards required in BS8485:2015+A1:2019, including proposals for validation and verification of the measures installed in accordance with CIRIA C735 and reiterated in Yorkshire and Lincolnshire Pollution Advisory Group (YALPAG) document "Verification Requirements for Gas Protection Systems (Version 1.1, December 2016).

The site has been the subject of third-party Phase 1 and Phase 2 assessments as follows:

- Ian Farmer Associates, 'Report on Preliminary Risk Assessment & Coal Mining Risk Assessment carried out at Blue Hills Farm, Birkenshaw, BD11 2DU' (Ref. 42251); prepared for Mr Carlton Ives, dated September 2018.
- Ian Farmer Associates, 'Ground Investigation Report carried out at Blue Hills Farm, Birkenshaw, BD11 2DU' (Ref. 4230244 Rev 01); prepared for Mr Carlton Ives, dated March 2021.

The results of the IFA hazardous ground gas monitoring showed that no levels of Methane (CH<sub>4</sub>) were recorded. However detectable levels of Carbon Dioxide (CO<sub>2</sub>) were recorded, up to 6.1%v/v with associated depleted oxygen concentrations down to 8.8%v/v. Negligible flow rates of <0.1l/hr were recorded. The slightly elevated concentrations of CO<sub>2</sub> and reduced Oxygen (O<sub>2</sub>) were encountered in windowless sampling boreholes refenced WS06, located towards the southwest side of the site adjacent to the edge of a previous car park.

T: 0191 378 6380  
E: admin@arc-environmental.com  
W: www.arc-environmental.com  
Registered in England No. 05539784



## **Re: Land at Blue Hills Farm, Birkenshaw, BD11 2DU - Ground Gas Protection Measures Verification Plan (Cont'd)**

### **1.0 Introduction (Cont'd)**

When considering these results, in accordance with CIRIA C665, the GSV for CO<sub>2</sub> does not exceed the assessment value of 0.78l/hr (Green Classification – NHBC Traffic light system), resulting in no gas protective measures being required for the proposed development. However, when considering the concentrations of CO<sub>2</sub> exceeds the action trigger level of 5%, the CIRIA 665 guidance recommends an increase in the characteristic situation by an order of 1 to consider the gas concentrations recorded resulting in an increase to 'Amber 1 Classification', therefore ground gas protection measures will be required.

Following completion of the Phase 3 Remediation Statement and Validation Proposal Sheets, Ref. 22-110 which recommended Amber 1 gas protection measures and was approved by Kirklees Council, this letter provides further details of the proposed gas protection measures to be installed into proposed residential properties and details how the installation of those gas protection measures will be verified, to ensure a sufficient level of protection is afforded against potential ingress of ground gases, commensurate with an Amber 1 setting.

### **2.0 Site Specific Requirements**

During the preparation of this letter, reference has been made where appropriate to BS8485 "Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings", CIRIA Document C735 "Good practice on the testing and verification of protection systems for buildings against hazardous ground gases" (2014) and YALPAG "Verification requirements for gas protection systems", Version 1.1 - December 2016.

In summary, the factors relevant to establishing an appropriate verification plan are as follows:

- The risk from hazardous ground gas at the site, based on IFA data is very low as described in BS8485 for sites classified as Amber 1. Protection measures commensurate with Amber 1 conditions are to be installed across the site.
- The proposed development by Countryside Partnerships comprises 77 No. residential dwellings, as shown Overview Site Layout Drawing 4035-20-AWSM-XX-XX-DR-A-1000, dated January 2023.
- Buildings will comprise conventional residential detached, semi-detached and linked properties (consistent with Type A development as described in BS8485 Table 3), with a suspended block and beam floor construction with ventilated subfloor void (consistent with Situation B as referenced in BS8485:2015 and YALPAG guidance).
- Where plots have attached garages the garage floor slab element will be ground bearing with an Amber 1 membrane lapped and sealed into the Amber 1 membrane of the plot (see construction drawings)
- Internal plot layouts will be simple.

## **Re: Land at Blue Hills Farm, Birkenshaw, BD11 2DU - Ground Gas Protection Measures Verification Plan (Cont'd)**

### **2.0 Site Specific Requirements (Cont'd)**

- Installation of membranes will be carried out by Countryside Partnerships appointed groundworks contractor. Whilst the contractor is expected to have experience of gas membrane installation, it is assumed at this stage that they will not hold the relevant NVQ qualification and must therefore be considered as non-specialist installers.

The proposed ground gas protection system for this site comprises a combination of a passively ventilated subfloor void of minimum 150mm clear height together with a sealed gas membrane spanning the entirety of the structure including integral garages.

The ventilated subfloor void is designed to meet at least 'good performance' as defined in Table 6 and Annex B of BS8485 and shall be ventilated via airbricks in external walls, in physical connection to the subfloor void via the use of periscopic vents.

The gas membrane will meet the requirements of BS8485 Table 7, and shall be sealed around service entries, thresholds and across wall cavities (including external walls and party walls between plots) using ancillary products compatible with the specific membrane chosen.

The annulus between service entry ducts and service supply pipes / cables shall be sealed using a proprietary system which has been approved for such use by the regulator and by the service supplier i.e. a closed cell foam (Filoform or Filoseal), inside the duct and / or appropriate gas resistant products (i.e. gastite tape) wrapped around the duct and service.

Drawings provided by Countryside Partnerships, indicating the typical floor construction including the position of the gas membrane, are appended. The details of the membrane to be installed are given below and on the appended data sheets.

Detail drawings confirm that the proposed ground gas protection measures include a subfloor void, which Countryside Partnerships have confirmed will include at least 150mm clear void space, connected via proprietary periscopic vents to airbricks on external walls, and provision of a low permeability membrane across the entire footprint of the properties and spanning internal and external wall cavities.

### **3.0 Membrane Selection**

Countryside Partnerships have confirmed that it is intended to install a Rhinoplast Super Gas Barrier membrane with associated Rhinoplast ancillary products including double sided tape and gas resistant tape which meet the requirements of NHBC Amber 1 combined with sub-floor passive ventilation. Data sheets pertaining to the Rhinoplast Super Gas Barrier membrane are appended to this report.

## **Re: Land at Blue Hills Farm, Birkenshaw, BD11 2DU - Ground Gas Protection Measures Verification Plan (Cont'd)**

### **4.0 Installation Details**

It is understood that Countryside Partnerships intend to use a non-specialist, although experienced, subcontract workforce for the construction of the substructure to the properties, including preparation of the subfloor void, installation of suspended modular (block and beam) floor slab, provision of periscopic subfloor void air vents, and ground gas membrane.

Notwithstanding the qualifications of the workforce, the subfloor void, gas membrane and system components shall be installed / sealed in accordance with the appended drawing and with the manufacturers guidance document.

Any repairs to damage caused to the membrane during or post installation shall also be carried out in accordance with this document.

Where membrane penetrations are created by ducts (typically used where domestic water supply enters the property), then additional sealing of the annulus between the duct and supply pipe must be carried out to ensure an airtight seal, using a pre-approved sealing system.

For the Amber 1 site characterisation and installation details, it is considered that the following verification strategy is appropriate for installation of the proposed gas protection measures:

- Details of proposed materials and construction method shall be submitted to and agreed with the independent verifier and the NHBC prior to construction (this document).
- A pre-construction briefing shall be given by the independent verifier to Countryside Partnerships and all their appointed contractors having any involvement in the construction of the gas protection measures (including subfloor ventilated void) detailing the requirements and purpose of the gas protection system and verification strategy. This shall include a confirmation that the contractor(s) are familiar with the gas membrane materials and the appropriate uses of the various products.
- All site personnel will be made aware by Countryside Partnerships of the presence of the membrane and the importance of preventing damage post installation. The independent verifier shall discuss strategies with Countryside Partnerships and the appointed installer to ensure prevention of damage after installation. Details will be communicated by Countryside Partnerships to any site personnel not present at the pre-construction briefing as a toolbox talk by the site manager as and when required during construction. This is to reduce the potential for accidental damage to the installed membrane by follow-on trades.
- Copies of delivery notes and packaging of the proposed materials shall be retained on site by the site manager for review by the independent verifier, and inclusion in the verification report where possible.

## **Re: Land at Blue Hills Farm, Birkenshaw, BD11 2DU - Ground Gas Protection Measures Verification Plan (Cont'd)**

### **4.0 Installation Details (Cont'd)**

- Visual and 'pick test' inspection of gas protection measures, to be conducted by an independent and suitably experienced verifier on the first ten plots and on subsequent plots at a minimum frequency of one inspection per five plots (11 to 30) reducing to one inspection per ten plots (31 to 77). This frequency is to be increased at the discretion of the independent verifier if the verifier has any concern regarding the quality of installation or where there are consistent failures to meet the required standard of installation. In particular, where the verifier is not satisfied with the first or any subsequent installations, or is not confident that the installer fully understands the installation method, then verification will immediately revert to inspection of every plot until the verifier is satisfied with the installation methodology.
- The site manager is to be responsible for contacting the independent verifier to make arrangements for such inspections in good time. To this effect, a chain of communication between the site manager, installation contractor and independent verifier shall be agreed during the pre-construction briefing. Inspections are to be completed in two stages:
  - 1) Following completion of subfloor void and gas membrane installation and before placement of overlying materials and pouring of concrete.
  - 2) Following sealing of internal service penetrations whilst such penetrations are still accessible for inspection.
- The inspection by the independent verifier shall include confirmation of the use of the specified products; the integrity of joints between membranes, and between membranes and ancillary products such as top hats; verification that the membrane fully extends to all external faces of the structure; verification of seals to internal service ducts; and verification of the presence of unobstructed airbricks connected to the subfloor void by use of periscopic vents. Where possible, the inspection shall also confirm the presence of a minimum 150mm high subfloor void to the specific plot(s) inspected, although it is recognised this may not always be practical.
- In the event of non-compliance, the defect shall be immediately reported to the site manager and installer and all follow-on works shall be postponed enabling action to be taken to rectify the situation. The independent verifier will explain the reason for non-compliance and offer outline advice on how this could be rectified although it is ultimately the responsibility of the installer to achieve compliance.
- Where defects are such that they cannot be immediately rectified, then a further site visit for re-inspection shall be agreed between the site manager and the independent verifier. The re-inspection and subsequent actions shall take the same form as the initial inspection.
- Where plots include an internal, ducted service entry, then the installation of an airtight seal to the annulus between the duct and service pipe (with preference to the use of Filoform products) shall be inspected and verified by the independent verifier, during a return visit to the plot on completion of installation of the annulus sealant, or via plot specific photographic evidence provided by the installation contractor.

## **Re: Land at Blue Hills Farm, Birkenshaw, BD11 2DU - Ground Gas Protection Measures Verification Plan (Cont'd)**

### **4.0 Installation Details (Cont'd)**

- Where plots are not directly inspected by the independent verifier, then the installation contractor shall supply the verifier with completed copies of 'sign-off sheets, together with a series of photographs showing all joints and penetrations of the membrane, together with the installation of airbricks and periscopic vents, and subsequently the sealing of duct annuli, on each plot. These shall be supplied to the verifier within 24 hours of completion of the works. No follow-on work shall take place until the verifier has confirmed satisfaction with the installation based on a review of such documentation.
- If following review of the installation contractor's documentation, the independent verifier considers that an installation is non-compliant, then the site manager shall be contacted to instruct follow-on works to be postponed and the non-compliance rectified. Where this is the case, then the installation contractor shall resubmit documentation for approval before proceeding with follow-on work. This process shall be repeated, as necessary.
- In no circumstance shall any follow-on works take place until the independent verifier is satisfied that the installation is sufficiently robust and conforms to the requirements of this document and has confirmed their satisfaction to the site manager.
- Preparation of a Gas Verification Report, or series of reports, in accordance with YALPAG "Verification requirements for gas protection systems", 2016 Appendix 3, by the independent verifier.

It is anticipated that verification of installation of the ground gas protective measures will be carried out by Arc Environmental and all verification visits to be undertaken by a suitably trained and experienced Geo-Environmental Engineer.

**Table 1 - Summary of Ground Gas Verification Strategy**

<b>Action</b>	<b>To be completed by</b>	<b>Frequency</b>	<b>Completion Requirements</b>
Materials agreed with Countryside Partnerships, Independent verifier & NHBC	Countryside Partnerships, appointed installation contractor, Arc Environmental & NHBC	Once (submission of this document)	Prior to construction
Pre-construction briefing	Countryside Partnerships, installer and independent verifier	Once at start of project and repeated if necessary if change in personnel or similar	Prior to construction and subsequently as required
Visual inspection and pick test of gas protection installation by independent verifier	Independent verifier on instruction by Countryside Partnerships / Installer	First 10 plots then one in five plots (11 to 30) then one in ten plots thereafter (31 to 77)	Satisfactory independent verification required before further construction of gas protection measures proceed
Visual inspection and photographs of sealed internal service ducts	Independent verifier on instruction of Countryside Partnerships / Installer	First 10 plots then one in five plots (11 to 30) then one in ten plots thereafter (31 to 77)	Satisfactory independent verification required before further construction of gas protection measures proceed

**Re: Land at Blue Hills Farm, Birkenshaw, BD11 2DU - Ground Gas Protection Measures Verification Plan (Cont'd)**

**4.0 Installation Details (Cont'd)**

**Table 1 - Summary of Ground Gas Verification Strategy (Cont'd)**

<b>Action</b>	<b>To be completed by</b>	<b>Frequency</b>	<b>Completion Requirements</b>
Visual inspection, verification checklist and photographic record. Record to include any defects identified and confirmation of remedial measures	Installer	Every plot (other than those inspected by independent verifier)	Completed records to be submitted to Countryside Partnerships and independent verifier within 24 hours of inspection and approved prior to any follow-on work.
Visual inspection and photographic record of sealed internal service ducts	Installer	Every plot (other than those inspected by independent verifier)	Completed records to be submitted to Countryside Partnerships and independent verifier within 24 hours of inspection and approved prior to any follow-on work.
Preparation of Gas Verification Report	Independent Verifier	On complete installation and verification of all plots, batches of plots or for individual plots if timescale for discharge of conditions requires	Conforming to YALPAG guidance Appendix 3, submitted to and approved by regulators

We trust the above information is to your satisfaction, and if you require any further information or clarification, please do not hesitate to contact us.

Yours sincerely,

REDACTED

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For and on behalf of ARC Environmental Limited  
 John Ditchburn *BEng (Hons) CSci MIEEnvSc MCIEH FGS*  
 Director

Revisions:		
Rev P1	23.01.2022	DRP/JDK
First Issue		
Rev P2	23.02.2022	DRP/JDK
External paving updated and plots 61-62 along with garages serving plots 61 & 63 relocated.		
Rev P3	13.04.2022	DRP/JDK
Plots increased for 8no Goodridge house types.		
Rev P4	21.04.2023	JDK/DRP
Updates following comments from Countryside. Plot 42 moved East by 300mm. Plot 53 garage repositioned. Rear fence / retention of plots 46-54 adjusted. All retention shown as Adept latest levels drawings.		
Rev P5	25.04.2023	JDK/DRP
Sheet changed to 'overview' site layout.		
Rev P6	26.05.2023	JDK/DRP
RWP locations updated to suit contractor comments.		
Rev P7	29.06.2023	JDK/DRP
Plot 24 front entrance path adjusted to suit engineer levels.		
Rev P8	16.08.2023	JDK/DRP
Garage sizes adjusted in line with floor plans.		
Rev P9	24.08.2023	DRP/JDK
Redircor wall to front of site updated to suit engineers details.		
Rev P10	06.09.2023	MWC/JDK
Air source heat-pump omitted from layout and paths amended as per contractor instruction. Plot 77 moved across to achieve 1m clearance between adjacent plot. Steps added to front of plots 1-12. Highway updated to suit latest S38 layout.		
Rev P11	28.06.2023	JDK/DRP
Plots 1-12 moved back to accommodate footpath. Redircor wall & external steps. EVCP (fence / post mounted) colour changed to red. Plots 41 & 42 rear gardens adjusted.		
Rev P12	10.10.2023	JDK/DRP
Plots 1 & 2 moved towards plots 3 & 4, in order to increase distance to Redircor wall.		
Rev P13	30.10.2023	JDK/DRP
Gabion wall to rear of plots 50-53 updated.		
Rev P14	10.01.2024	JDK/DRP
Gabion retention & attenuation position updated inline with engineers drawings. Plot 24 moved 350mm South, to increase distance between plots 24 & 25.		



Gross site area phase 1	
Hectares	2.61 ha
Acres	6.45 acres

Net developable area phase 1	
Hectares	1.94 ha
Acres	4.79 acres

Phase 1:									
House Type	Type	Bedrooms	Persons	Amount	%	Sq.ft	Sq. m	Total sq. ft	Total sq. m
CARTWRIGHT	Terrace	2	3	7	9.1	768.80 ft²	71.43m²	5381.60 ft²	500.01m²
ELMSLE	Semi-det	3	4	26	33.7	933.90 ft²	86.77m²	24281.40 ft²	2256.02m²
MOUNTFORD	Detached	3	4	6	7.8	970.60 ft²	90.18m²	5823.60 ft²	541.08m²
BLOOMFIELD	Terrace	3	6	19	24.7	1170.46 ft²	108.75m²	22238.74 ft²	2066.25m²
GOODRIDGE	Detached	4	5	8	10.4	1111.76 ft²	103.30m²	8894.08 ft²	826.40m²
MYLNE	Detached	4	6	11	14.3	1136.00 ft²	105.58m²	12496.00 ft²	1161.38m²
<b>Total units:</b>		<b>77</b>	<b>100%</b>					<b>79115.42ft²</b>	<b>7351.14m²</b>

<p><b>Key</b></p> <ul style="list-style-type: none"> <li>Private driveways &amp; Adopted highway-tarmac/finish. Concrete pin kerbs to drives.</li> <li>Adoptable roads- block paving</li> <li>Paving- Marshall or similar grey concrete flags. Size to be agreed.</li> <li>1.8m High timber fence with lockable timber gate</li> <li>1.5m High fence with 0.3m trellis</li> <li>1.5m High fence</li> <li>1.1m High galvanized steel railings fence powder coated finish (colour black)</li> <li>2.0m High acoustic fence specification subject to noise report recommendations.</li> <li>Concrete gravel boards to be used along fence line where required.</li> <li>0.45m Knee rail. Square timber posts with circular powder coated galvanized steel rails.</li> <li>1.5m High open boarded fence with 0.3m trellis</li> </ul>	<ul style="list-style-type: none"> <li>Tree to be retained - Category B</li> <li>Tree to be retained - Category C</li> <li>Tree to be retained - Category U</li> <li>Root Protection Area (RPA)</li> <li>Tree to be removed</li> <li>Proposed landscaped areas subject to landscape design</li> <li>Proposed POS areas</li> <li>Existing PROW SPE/14/10 to be retained</li> <li>Existing PROW SPE/14/10 to be diverted</li> <li>Proposed route of diverted PROW</li> <li>New 2m wide PROW route</li> <li>New PROW route-20mm dust aggregate with timber edging</li> </ul>	<ul style="list-style-type: none"> <li>Indicative location of gabion wall retaining structure</li> <li>Indicative location of the Contig retaining structure</li> <li>Indicative location of the Redi-Rock retaining structure</li> <li>Potential retaining structure TBC</li> <li>Proposed bin hard standing area.</li> <li>Bicycle store - timber lockable shed with ground anchor (Albany Sheds - Cottage) or within garage where applicable.</li> <li>Electric vehicle charging point exact type / model TBC - <ul style="list-style-type: none"> <li>Dwelling external wall mounted</li> <li>Post / Fence Mounted</li> </ul> </li> <li>Affordable unit</li> <li>Precast concrete or timber stair. Number of risers subject to confirmation of the height of adjacent banking. 1.1m high metal balustrade face fixed to steps where level changes are greater than 600mm in height.</li> </ul>
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**Notes**

Layout based on topographical survey by Survey Association drw no sss-8779-Blue Hill Farm

Any change in external levels greater than 0.6m to have edge protection. Level access to front and back of houses to be provided.

Existing services and street furniture to be identified by main contractor and capped off/grubbed up/diverted as required.



Based on Site Layout 4035.20.105X

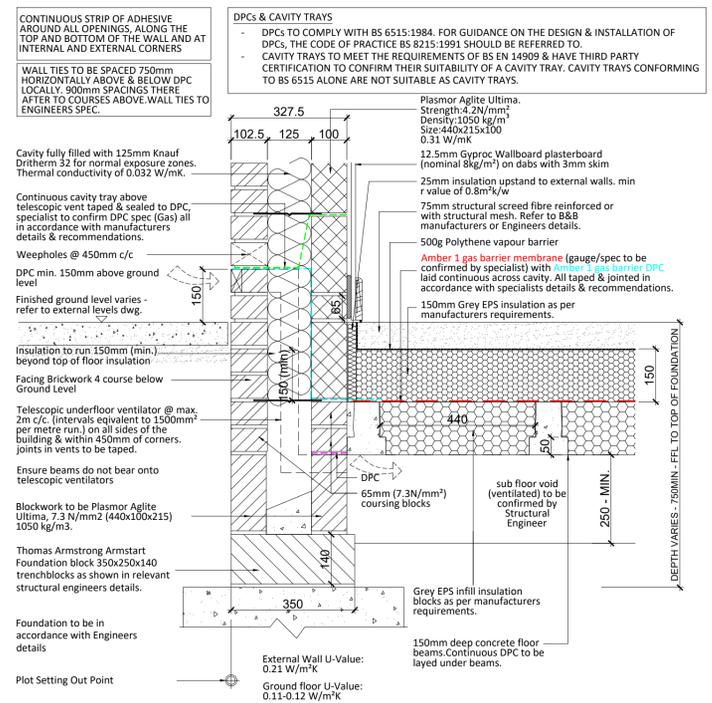
# Overview Site Layout

## Blue Hills Estate Farm, Birkenshaw

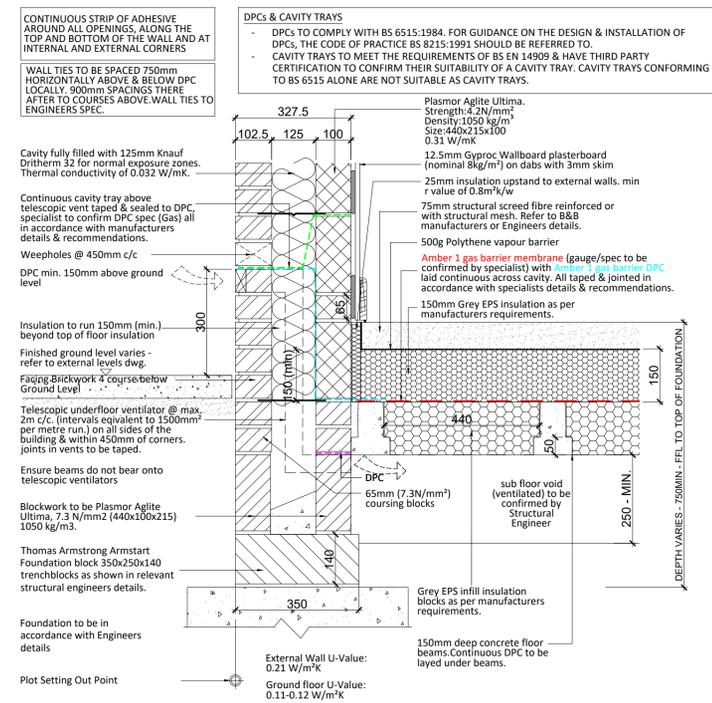
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4035-20-AWSM-XX-XX-DR-A-1000	
Status	SO Rev P14

Revisions:

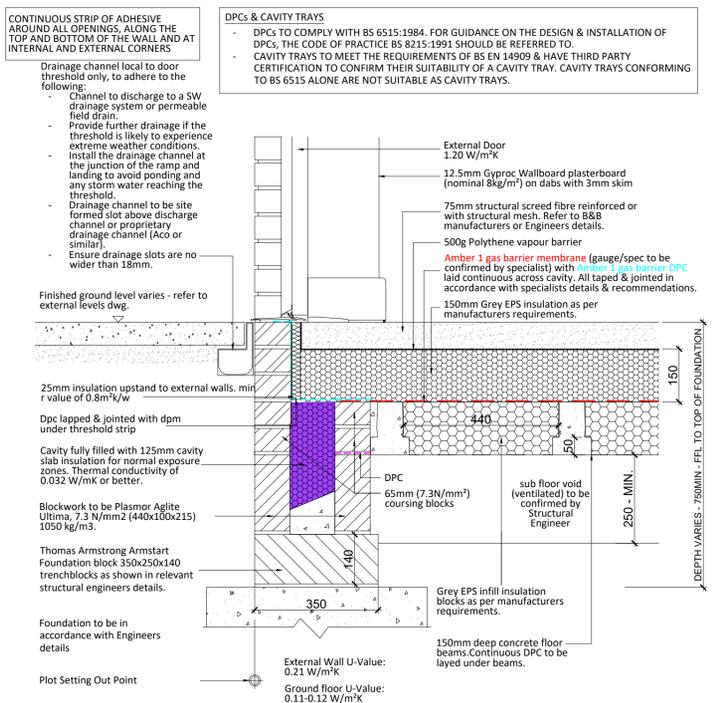
Rev P1	17.03.23	DP/JDK
Rev P2	20.03.23	DP/JDK
Details updated to include gas protection measures and comments from CSY.		
Rev P3	04.05.23	DP/JDK
Details updated following comments dated 28th April 23		
Rev P4	22.09.23	JKD/DP
Details updated to suit coursing section.		
Rev P5	13.10.23	JKD/DP
Details updated to suit SAP specification sheet.		
Rev P6	18.10.23	JKD/DP
Details updated to suit contractor comments.		



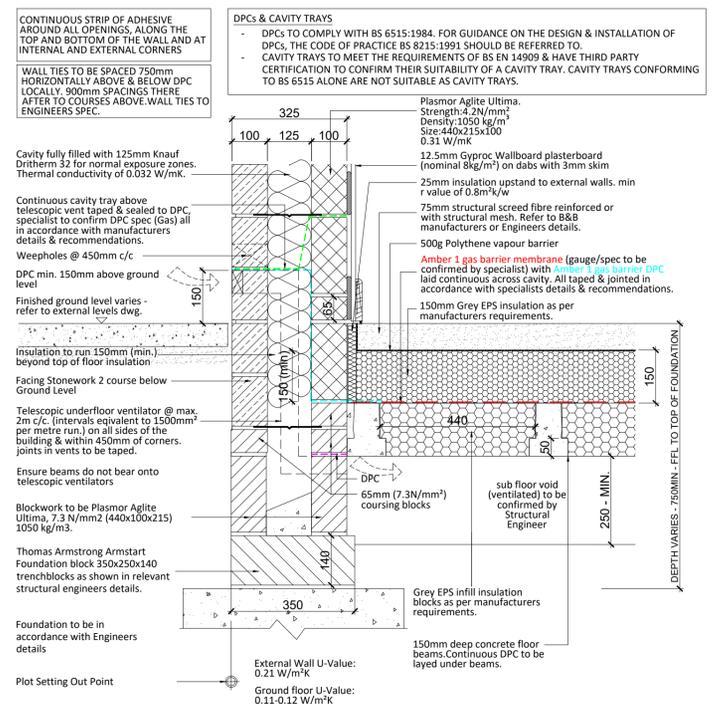
**150mm DEEP BEAM - DPC DETAIL - BRICKWORK (WITH AMBER 1 GAS PROTECTION)**



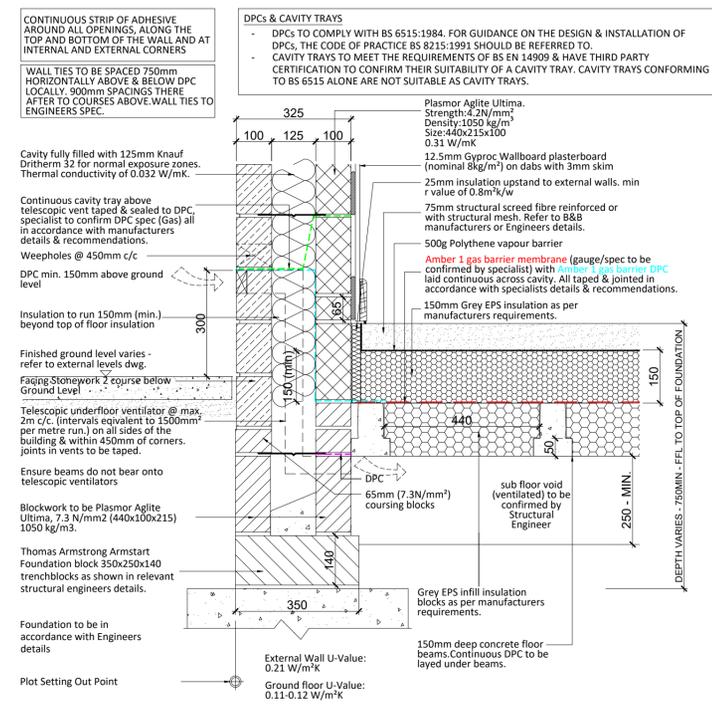
**150mm DEEP BEAM - DPC DETAIL - BRICKWORK (WITH AMBER 1 GAS PROTECTION)**



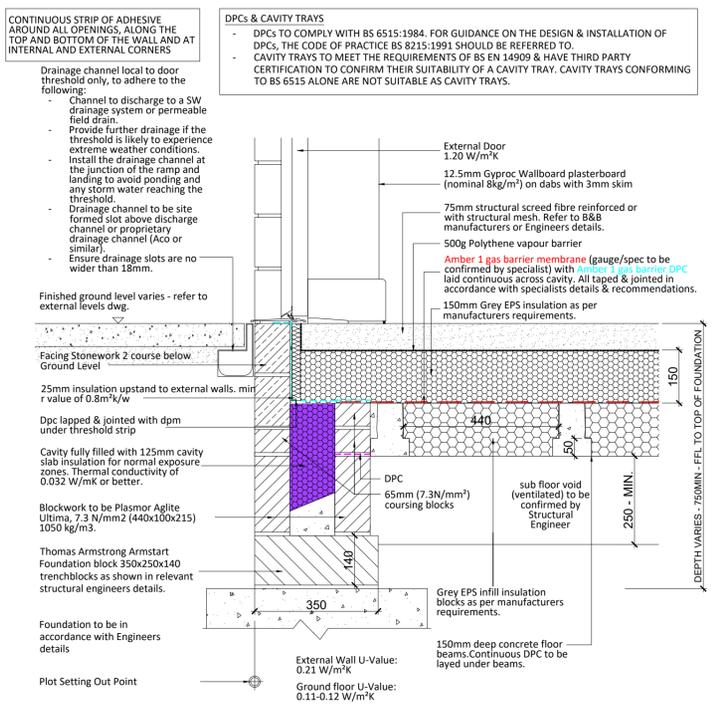
**150mm DEEP BEAM - LEVEL THRESHOLD DETAIL - BRICKWORK (WITH AMBER 1 GAS PROTECTION)**



**150mm DEEP BEAM - DPC DETAIL - STONework (WITH AMBER 1 GAS PROTECTION)**



**150mm DEEP BEAM - DPC DETAIL - STONework (WITH AMBER 1 GAS PROTECTION)**



**150mm DEEP BEAM - LEVEL THRESHOLD DETAIL - STONework (WITH AMBER 1 GAS PROTECTION)**

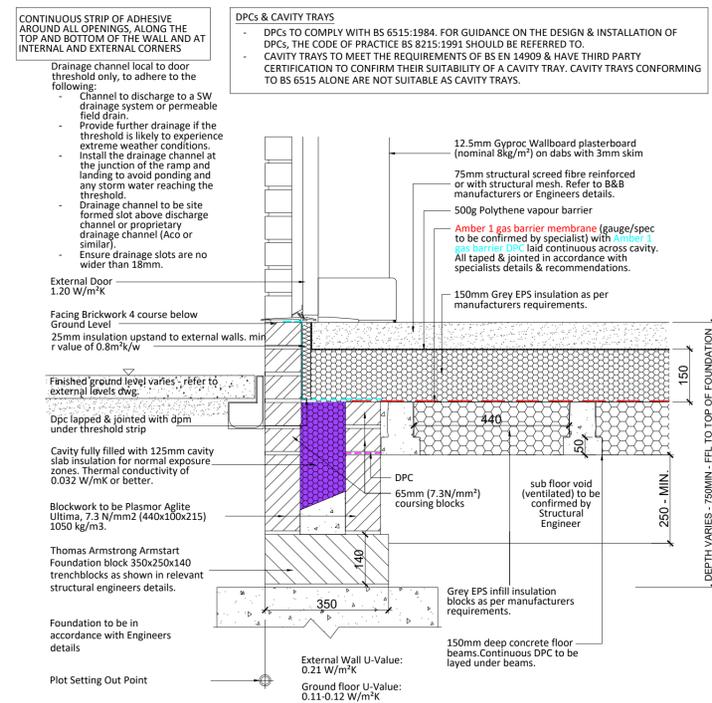
<b>Countryside Partnerships</b>	
Scale	1:10
Date	March 2023
Drawn/Checked	DRP/JDK
4035-20-AWSM-XX-XX-DR-A-3000	
Status	SO Rev P6

Assembly Details  
Sheet 1  
Blue Hills Farm  
Birkenshaw

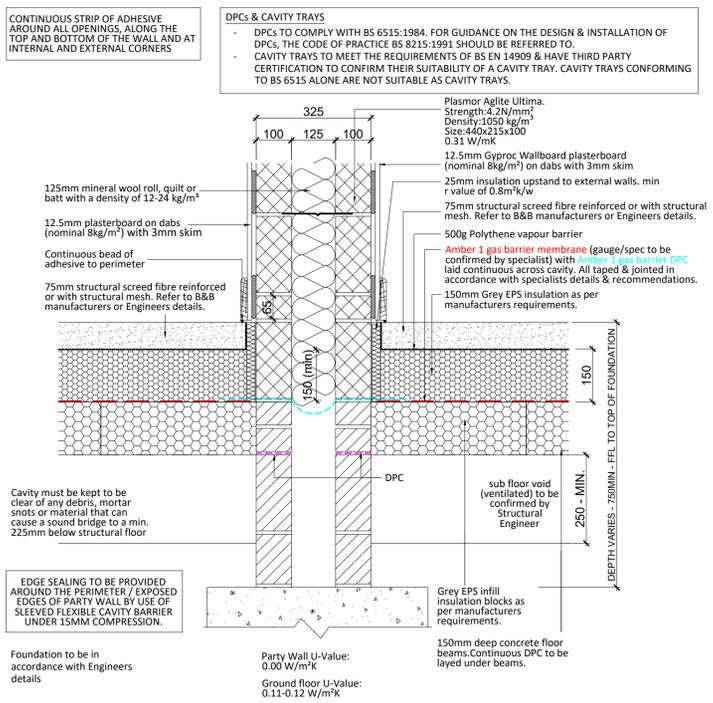


Revisions:

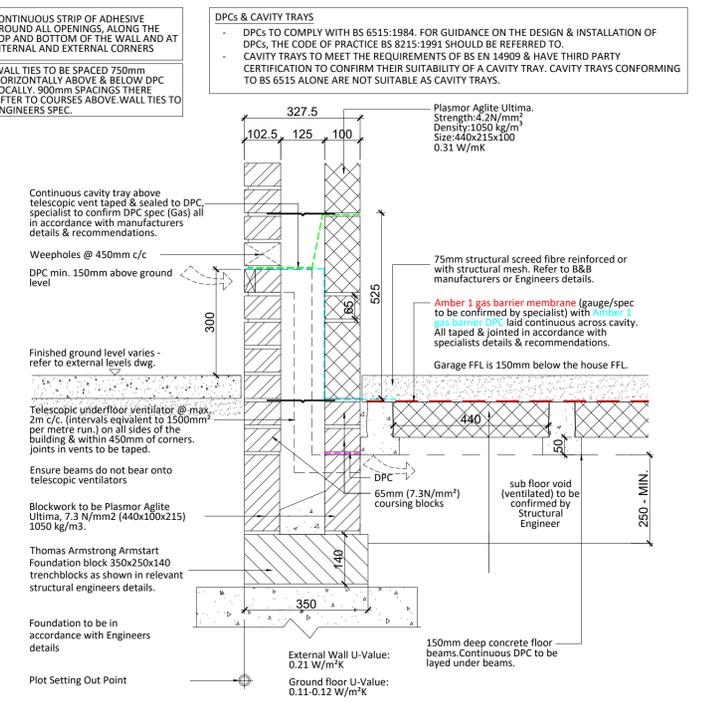
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Details updated following comments dated 28th April 23		
Rev P4	22.08.23	DP/JDK
Garage details changed to 'integral' garage.		
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Details updated to suit coursing section.		
Rev P6	13.10.23	JDK/DP
Details updated to suit SAP specification sheet.		
Rev P7	18.10.23	JDK/DP
Details updated to suit contractor comments.		
Rev P8	08.02.24	JDK/DP
Integral garage floor details updated to show block inlits.		



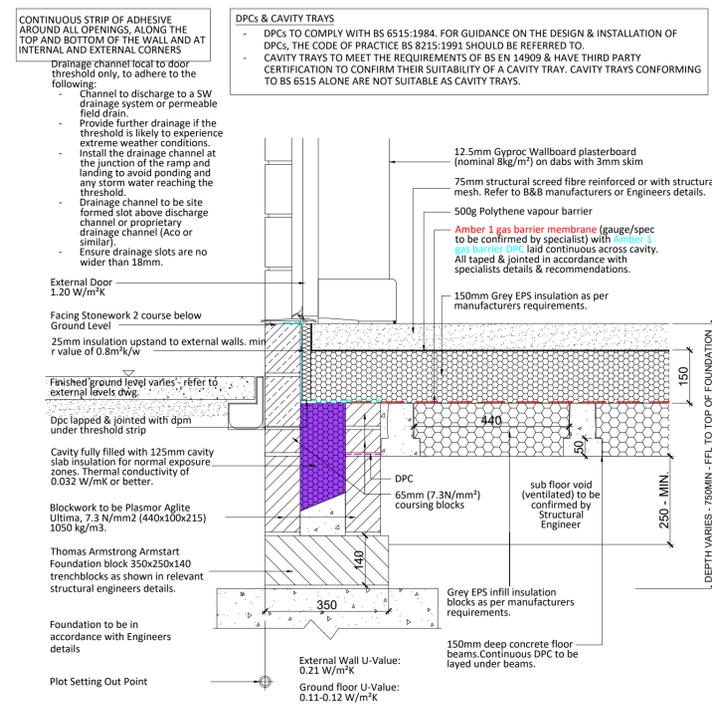
**150mm DEEP BEAM - STEPPED THRESHOLD DETAIL - BRICKWORK (WITH AMBER 1 GAS PROTECTION)**



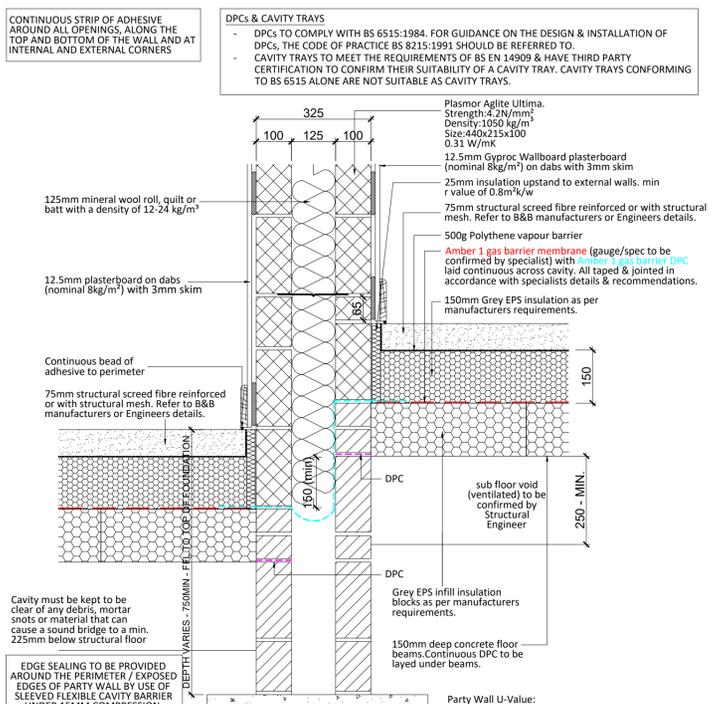
**PARTY WALL / GROUND FLOOR DETAIL (BASED ON E-WM-34) (WITH AMBER 1 GAS PROTECTION)**



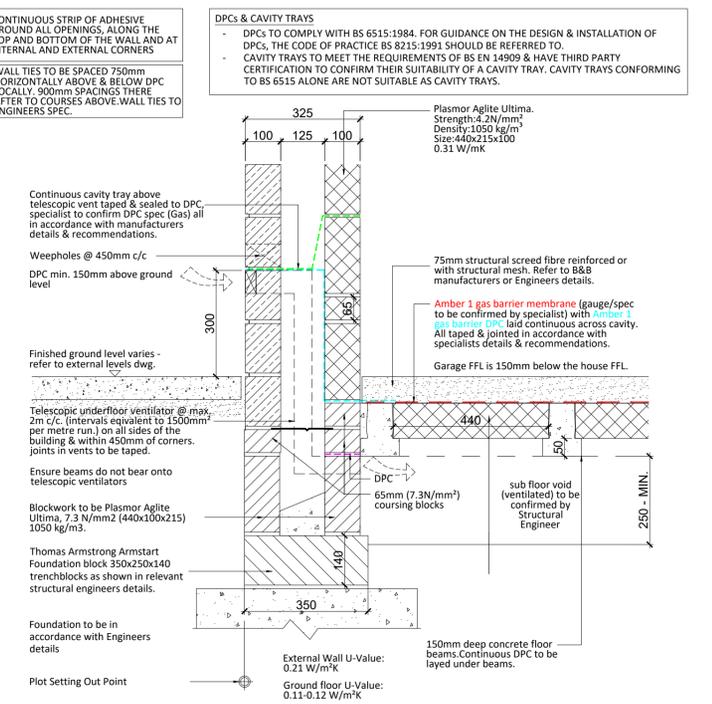
**150mm DEEP BEAM - INTEGRAL GARAGE DPC DETAIL BRICKWORK (WITH AMBER 1 GAS PROTECTION)**



**150mm DEEP BEAM - STEPPED THRESHOLD DETAIL - STONework (WITH AMBER 1 GAS PROTECTION)**



**STEPPED PARTY WALL / GROUND FLOOR DETAIL (BASED ON E-WM-34) CHANGE IN LEVEL VARIES (WITH AMBER 1 GAS PROTECTION)**



**150mm DEEP BEAM - INTEGRAL GARAGE DPC DETAIL STONework (WITH AMBER 1 GAS PROTECTION)**

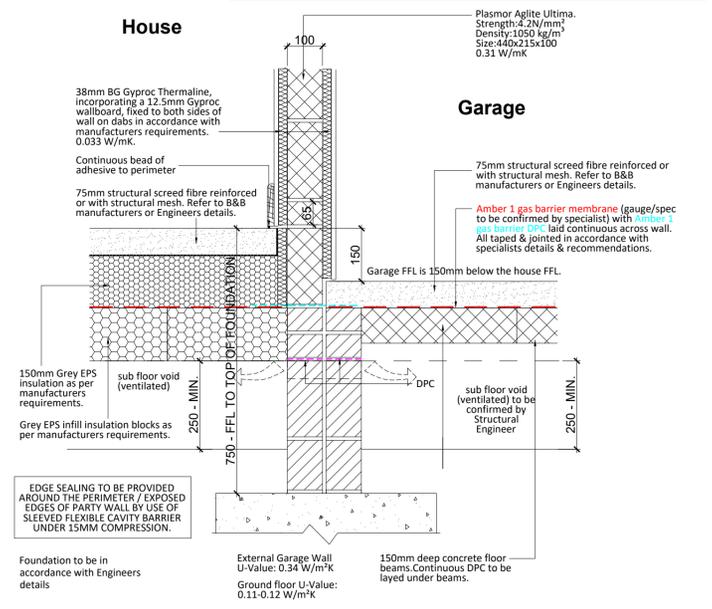
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Details updated following comments dated 28th April 23		
Rev P4	12.05.23	DP/JDK
Sub floor void dim updated		
Rev P5	22.08.23	DP/JDK
Details changed to concrete slab for attached garages.		
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Details updated to suit coursing section.		
Rev P7	13.10.23	JDK/DP
Details updated to suit SAP specification sheet		
Rev P8	18.10.23	JDK/DP
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Rev P9	08.02.24	JDK/DP
Integral garage floor details updated to show block inlets.		

**CONTINUOUS STRIP OF ADHESIVE AROUND ALL OPENINGS, ALONG THE TOP AND BOTTOM OF THE WALL AND AT INTERNAL AND EXTERNAL CORNERS**

**DPCs & CAVITY TRAYS**

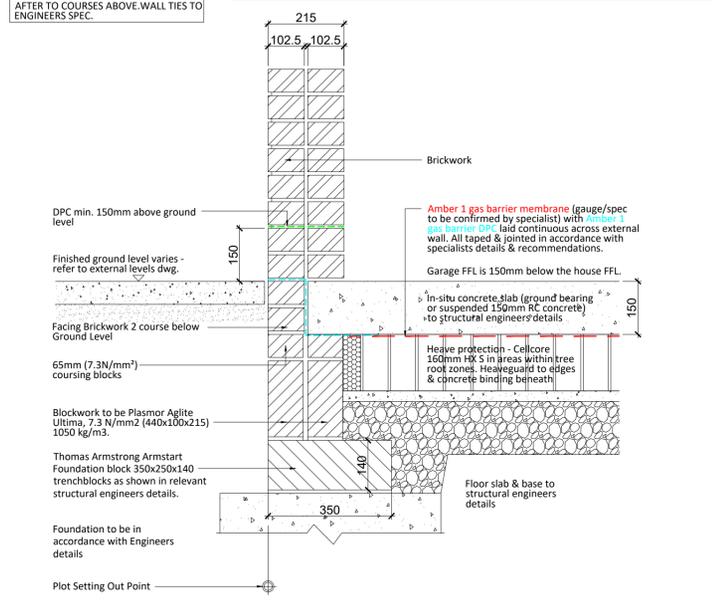
- DPCs TO COMPLY WITH BS 6515:1984. FOR GUIDANCE ON THE DESIGN & INSTALLATION OF DPCs, THE CODE OF PRACTICE BS 8215:1991 SHOULD BE REFERRED TO.
- CAVITY TRAYS TO MEET THE REQUIREMENTS OF BS EN 14909 & HAVE THIRD PARTY CERTIFICATION TO CONFIRM THEIR SUITABILITY OF A CAVITY TRAY. CAVITY TRAYS CONFORMING TO BS 6515 ALONE ARE NOT SUITABLE AS CAVITY TRAYS.



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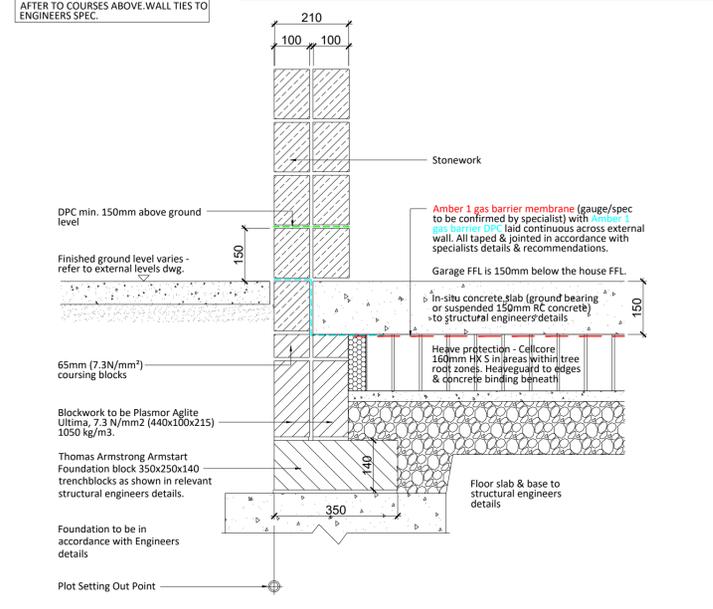
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**150mm DEEP BEAM INTEGRAL GARAGE / GROUND FLOOR DETAIL (WITH AMBER 1 GAS PROTECTION)**

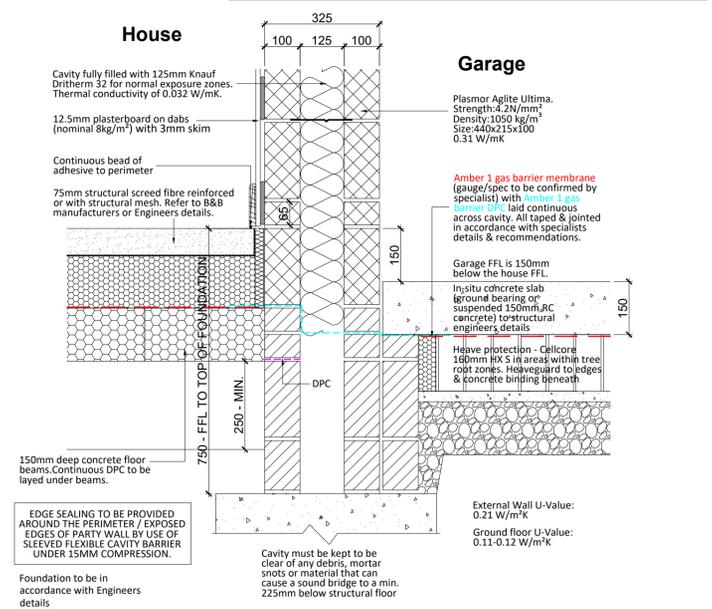
**150mm DEEP BEAM - ATTACHED GARAGE DPC DETAIL - BRICKWORK (WITH AMBER 1 GAS PROTECTION)**

**150mm DEEP BEAM - ATTACHED GARAGE DPC DETAIL - STONEMWORK (WITH AMBER 1 GAS PROTECTION)**

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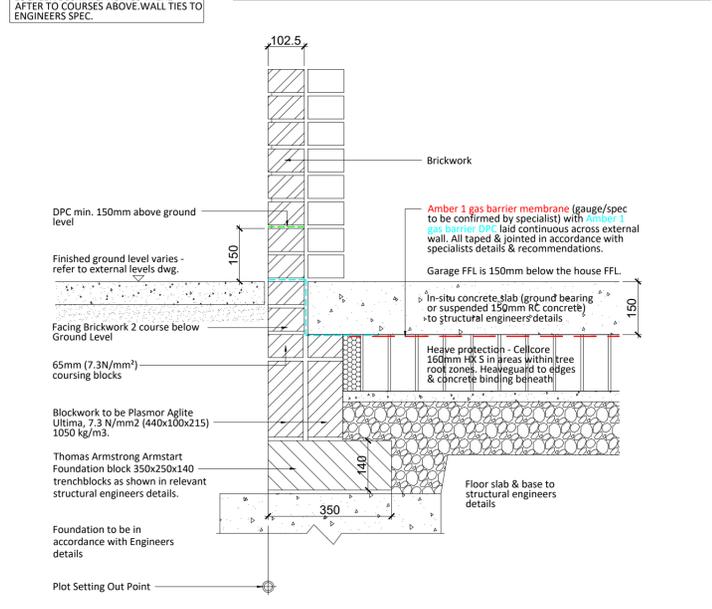
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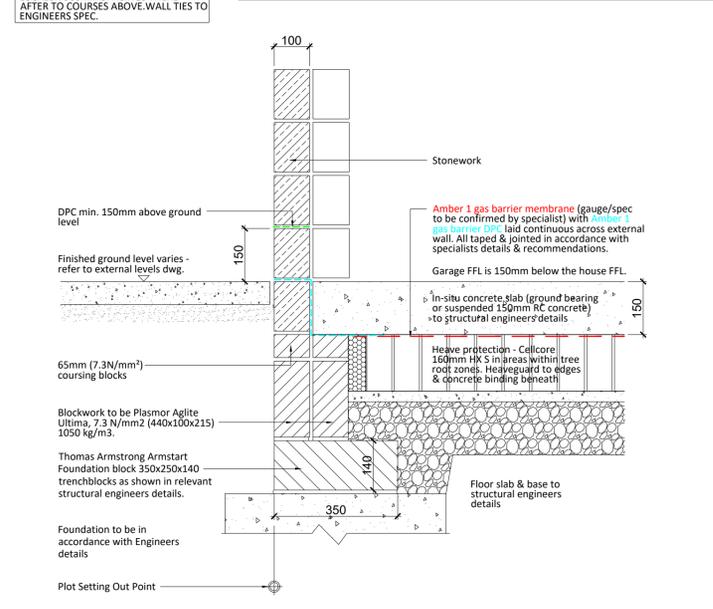
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**150mm DEEP BEAM ATTACHED GARAGE / GROUND FLOOR DETAIL (WITH AMBER 1 GAS PROTECTION)**

**150mm DEEP BEAM - ATTACHED GARAGE DPC DETAIL - BRICKWORK (WITH AMBER 1 GAS PROTECTION)**

**150mm DEEP BEAM - ATTACHED GARAGE DPC DETAIL - STONEMWORK (WITH AMBER 1 GAS PROTECTION)**

<b>Countryside Partnerships</b>	
Scale	1:10
Date	March 2023
Drawn/Checked	DRP/JDK
Status	S0 Rev P9



Assembly Details  
Sheet 3  
Blue Hills Farm  
Birkenshaw



## Rhinoplast Super Gas Barrier

### Data Sheet

#### Product Description

A monolithic hybrid co-polymer barrier giving excellent performance. Fully tested for Radon, Methane and CO<sub>2</sub>. Approved by NSAI (IAB) Exceeds the requirements of BRE211. Primarily designed to comply with specific details for gas resistant membranes as outlined in BRE414 to meet the requirements of NHBC Amber 1, but could be used as Amber 2 in situations where no further improvement in the reduction of gas permeability is required from aluminium foil or EVOH layered products, and to be combined with sub floor void passive ventilation. Rhinoplast Super Gas Barrier is not recommended for use when meeting BS8485:2015 +A1:2019 CS2 or above and for dwellings that require high levels of gas resistance from the membrane alone.



Roll size: 4m x 20m

The Rhinoplast range of Gas Barrier Systems has been designed to provide a complete solution to the problems associated with construction on land associated with a range of hazardous gasses, when installed in accordance with the relevant codes of practise. The primary method of protection to the structure is by way of a complete “footprint” membrane system combined with underfloor passive venting. The key to a successful outcome is installation. The best membranes poorly installed are likely to fail. The Rhinoplast range includes pre-formed details and tapes to facilitate this. Where necessary we will provide on-site advice and training to ensure a successful outcome. We even offer a “pre pour” inspection service to ensure correct installations and detailing. These barriers are designed to protect structures and inhabitants from the effects of these gasses. They will also act as damp-proof membranes where applicable and are intended to last the life time of the building. All of our membranes can be welded. With the increase in awareness of such gasses, along with more and more stringent requirements, it is becoming more and more important for contractors to use “fit for purpose materials” in the secure knowledge that they will perform satisfactorily. As pressure mounts on the construction industry to build on “Brown Field Sites” the demand for these products is increasing daily. All Rhinoplast membranes will also function as damp-proof membranes and are CE marked to BS EN 13967 for this purpose.

#### Colour:

Yellow

#### Technical Data:

Property	Test Method	Data
Weight		370g/m <sup>2</sup>
Thickness		400µm
Tensile Strength	MD	21.5MPa
	CD	29.4MPa
Elongation	MD & CD	>800%
Dart Impact Strength		1.012kg
Tear Resistance	MD	248N/mm
	CD	303N/mm
Low Temperature Flexibility		-25°C
Radon Permeability		4x10 <sup>-12</sup> m <sup>2</sup> /s
CO <sub>2</sub> Transmittance		26.53cc/m <sup>2</sup> hr
Methane Transmittance		6.43cc/m <sup>2</sup> hr
MVTR		0.16g/m <sup>2</sup> /day
Standard Roll Width		4m
Standard Roll Length		20m
Standard Roll Weight		28.48kg

## Ancillary Components

### Rhinoplast Joint Strip

A butyl modified reinforced double sided bitumen tape, 1.5mm thick, designed to form a gas tight gasket. Excellent adhesion and tolerance to damp conditions.

**Colour:** black.

Available in: 50mm x 15m rolls,  
100mm x 15m rolls

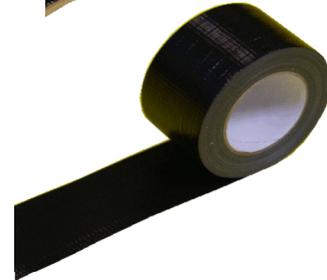


### Girth Tape

A single sided girth tape used to secure and protect linear joints. Excellent adhesion, dimensionally stable and water resistant.

**Colour:** black.

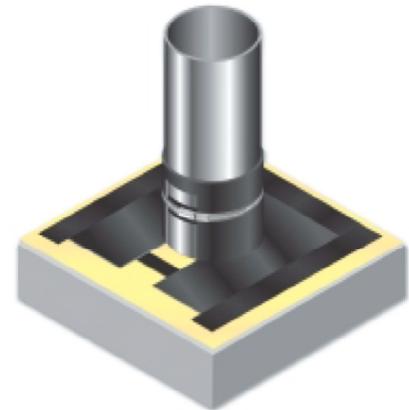
Available in: 72mm x 50m rolls.



### Top Hats

A pre-formed pipe seal complete with stainless steel jubilee clip. Easily fixed and sealed on site.

Size range from 50mm to 200mm.



### Radon Sump Units

The Radoncare Sump and Cavity Gas Vent System is manufactured by a rotational moulding process from heavy duty polyethylene. The sump is constructed with a solid roof and base and is provided with 40mm diameter holes in the walls. Spigots for 100mm pipe connections are provided at each end of the sump, but are blanked off with knock outs to allow choice of direction for extract pipe. The cavity gas vent comes with a detachable polyethylene cap, which can be easily removed if an extraction system has to be attached.



### Useful References

The Building Regulations Approved Document Part C, CP 102: 1973 code of practice for the protection of buildings against water from the ground.

**BR211** "Radon - Guidance on protective measures for new buildings"

**BRE414** "Protective measures for housing on gas-contaminated land"

**CIRIA 665** Ground gas handbook 2009

**BS8485:2015 + A1:2019** Code of Practice for the Characterization and Remediation from Ground Gas in Affected

Developments **NHBC** "Guidance on methane and carbon dioxide" and technical extra April 2016, issue 20.



# Guidance for Construction on Gas Contaminated Land and Installation Guidelines for Gas Barrier Systems



## Guidance for construction of new dwellings on gas contaminated land.

### Assessing the risk:

It is a requirement of National Planning Policy Framework and Building Regulations Approved Document C, that where the proposed structure is at risk from gas contaminated land the developer must carry out a risk assessment for submission to the local planning authority. The types of ground gasses commonly encountered are:

**Radon Gas** – A colourless, odourless naturally occurring radioactive gas.

This gas is prevalent in granite areas but can occur almost anywhere. Granite is naturally rich in uranium. It is widely held that exposure to Radon Gas is a major cause of lung cancer.



**Methane Gas** – A colourless gas formed by the decomposition of organic material.

The gas is flammable and potentially explosive even in relatively low concentrations.

This gas is common on or near landfill sites, mining areas etc. This gas becomes explosive at concentrations of 5% subject to an ignition source.



**Carbon Dioxide** – A colourless gas which in sufficient concentrations can cause asphyxiation.

Often associated with landfill areas it is formed by the oxidation of carbon.



**Hydrocarbons** – A range of hazardous substances often associated with the

petrochemical industry. Typically found in disused petrol stations and industrial sites.



### System solutions:

The Rhinoplast range of Gas Barrier Systems has been designed to provide a complete solution to the problems associated with construction on land associated with a range of hazardous gasses, when installed in accordance with the relevant codes of practise. The primary method of protection to the structure is by way of a complete “ footprint “ membrane system combined with underfloor passive venting. The key to a successful outcome is installation. The best membranes poorly installed are likely to fail. The Rhinoplast range includes pre-formed details and tapes to facilitate this. Where necessary we will provide on-site advice and training to ensure a successful outcome.

We even offer a “ pre pour “ inspection service to ensure correct installations and detailing.

These barriers are designed to protect structures and inhabitants from the effects of these gasses. They will also act as damp-proof membranes where applicable and are intended to last the life time of the building. All of our membranes can be welded.

With the increase in awareness of such gasses, along with more and more stringent requirements, it is becoming more and more important for contractors to use “ fit for purpose materials “ in the secure knowledge that they will perform satisfactorily.

As pressure mounts on the construction industry to build on “ Brown Field Sites “ the demand for these products is increasing daily.

## Gas Barrier Installation Method:

### General:

The Rhinoplast range of gas barrier systems has been carefully designed to provide everything required to complete a safe and successful installation. Our membranes are technically advanced and the components rigorously tested to ensure the system will perform correctly and keep the structure safe from harmful ground gasses, however poor installation can and will compromise the outcome. Good workmanship and attention to detail are therefore of paramount importance.

Our system components are matched to the barriers and should not be substituted as doing so could compromise the installation.

It is vital for the system to work correctly, that a gas tight footprint is created for the structure, and detailed through the walls to the outside. Particular care should be taken when jointing and detailing. Ensure the area which the membrane is going to cover is swept free of all debris likely to cause puncture such as brick or block fragments or dried mortar. Where this is not possible the area under the membrane should be protected by sand blinding to a depth of 50mm. The area should be dry and the temperature 5°C or above. Between 5°C and 10°C it may be necessary to apply heat to the tape for good adhesion. Take care not to expose the area to excessive foot traffic and avoid accidental damage during installation and before the concrete is poured. Where this is impractical protection boards should be used. Lay the membrane over the footprint of the building, taking care to allow for a minimum of 150mm overlaps. Ensure the membrane is as flat as possible to the ground, and tucked neatly into the floor to wall angle to avoid excess voiding.

Where the Rhinoplast LT Jointstrip joins at 90 degrees, it is vital that a neat “butt” joint is achieved. All joints should be over-taped to protect the seal from the ingress of concrete during the pour.

### Jointing and Detailing – In Line Joints



Overlap the Gas Barrier to a minimum of 150mm. Place a strip of Rhinoplast LT Jointstrip on the lower layer, having removed the plastic release film from the tape and press down firmly.



Remove the release paper and apply pressure to effect a seal. Expel any air trapped in the gasket. A roller is useful for this purpose

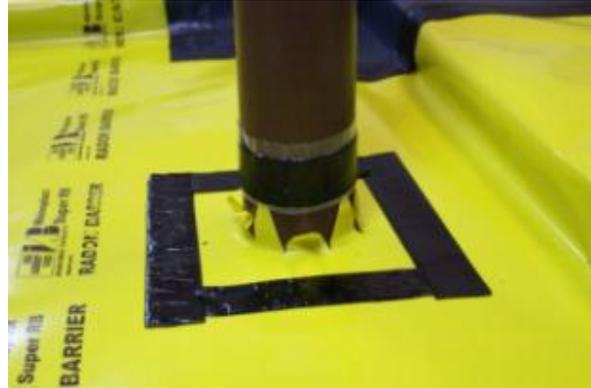


Secure the flap down with Rhinoplast High Tack single sided girth tape to secure the joint and protect it from the concrete pour.

## Jointing and Detailing – Service Pipe Penetrations



Cut around service pipe penetrations. Ensure this is positioned away from other laps or joints.



Place a strip of Rhinoplast LT Jointstrip around the pipe to line up with the top of the cloak, leaving the plastic release membrane to the outside in place. Place four strips of the tape to match the footprint of the top hat detail ensuring the tape is neatly butt jointed. Remove the release tape from the four base pieces.



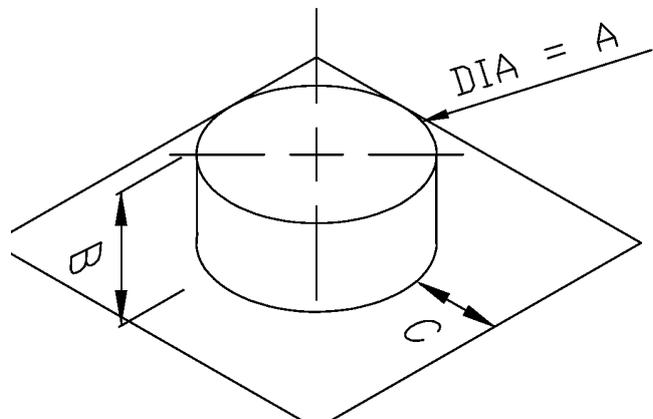
Slide the top hat into position and push down on the flat section to effect a seal on to the tape. Carefully remove the plastic release membrane from the tape around the pipe by pulling it out.



Seal the outside of the bottom plate with four strips of Rhinoplast reinforced detail strip. Push down to expel air and effect a good bond.



Secure the top hat to the pipe with a stainless steel jubilee clip ensuring the clamp is located over the tape inside. Tighten to ensure a good seal.



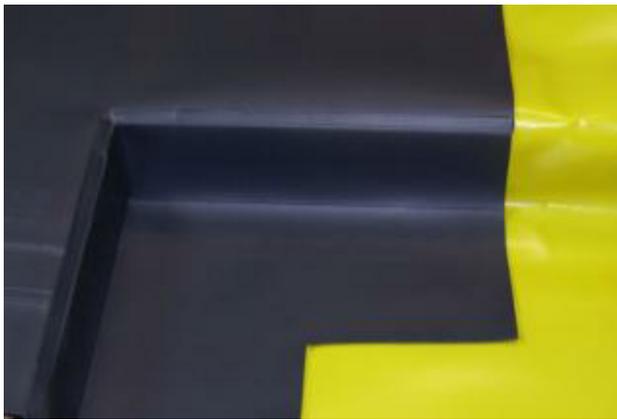
## Jointing and Detailing – Internal Corners



It is possible to complete internal corners by using a “hospital fold” method. Ensure voiding behind membrane is minimal



Secure corners to hold in place with Rhinoplast Reinforced Detail Strip to ensure the detail remains stable.



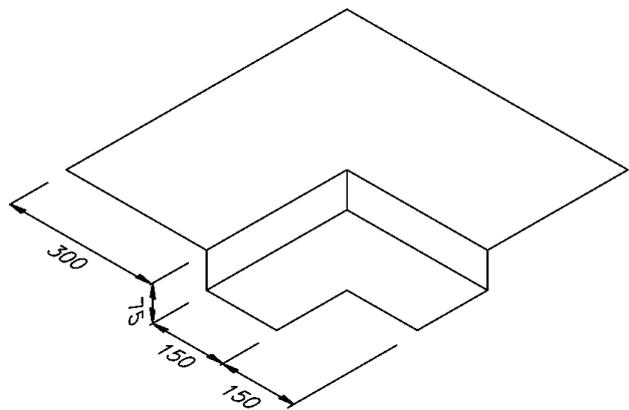
For ease of installation, internal corner cloaks are available



All preformed cloaks should be sealed with Rhinoplast LT Jointstrip ensuring butt joints are neat and accurate.



Over tape all cloaks with Rhinoplast Reinforced Detail Strip to stabilise the detail and prevent ingress of concrete during the pour.



## Jointing and Detailing – External Corners



A preformed cloak is required for external corners. Cut the membrane at 45 degrees away from the corner to release tension and achieve a neat fit.



Tuck the membrane neatly into the floor/wall angle to prevent excess voiding behind.



Place strips of Rhinoplast LT Jointstrip under the footprint of the cloak ensuring corners are butt jointed.

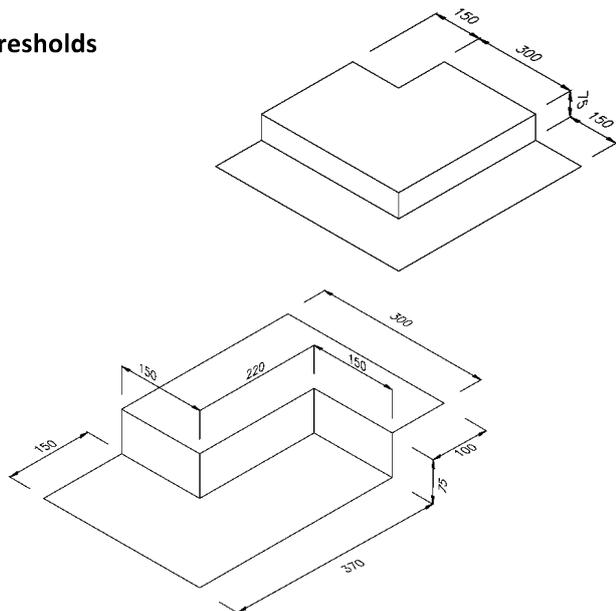


Remove the brown release paper on the Jointstrip and push the cloak onto the tape to effect a seal. Over-tape with Rhinoplast Reinforced Detail Strip.

## Jointing and Detailing – Door Thresholds



Where door thresholds are necessary, a preformed cloak pair is available which should be installed using the sealing and detailing method described for the corners.



A final inspection should be made to ensure no damage has occurred. If damage is apparent, the area should be patched with gas membrane with a minimum of 150mm laps and sealed with Rhinoplast LT Jointstrip, then over-taped with Rhinoplast High Tack single sided girth tape.

		<b>BRE211 RADON</b>	<b>NHBC AMBER 1 CS2*</b>	<b>NHBC AMBER 2 CS2 &amp; CS3</b>	<b>CO2</b>	<b>HYDROCARBONS</b>
<b>IAB</b>	<b>Rhinoplast Ultra Radon</b>	✓	✗	✗	✗	✗
<b>BBA</b>	<b>Rhinoplast 400 Extra Radon Barrier</b>	✓	✗	✗	✗	✗
<b>IAB</b>	<b>Rhinoplast Super</b>	✓	✓*	✗	✓	✗
	<b>Rhinoplast Amber 2000</b>	✓	✓*	✗	✓	✗
	<b>Rhinoplast Total Gas Barrier Complies with the requirement of BS 8485:2015</b>	✓	✓	✓	✓	✓*
	<b>Rhinoplast Evolution Hydrocarbon Gas Barrier</b>	✓	✓	✓	✓	✓*
	<b>Rhinoplast Hydrocarbon Barrier</b>	✓	✓	✗	✓	✓

\* Vapours only

\* CS2 Suitability depends on construction type. Please check for details

**Note:** All membranes must be installed in accordance with BRE211 (radon) or BRE 414 (Ground Gas) NHBC traffic light risk assessment designated Red would not normally be suitable for low rise housing development, without further remedial action and assessments.

#### Useful references:

**The Building Regulations Approved Document Part C 2004, CP 102: 1973** Code of practice for the protection of buildings against water from the ground.  
**BR211** “ Radon – Guidance on protective measures for new buildings “  
**BRE414** “Protective measures for housing on gas---contaminated land “  
**CIRIA 665** Ground gas handbook 2009  
**CIRIA C748** Guidance on the use of plastic membranes as VOC vapour barriers  
**BS8485:2015** Code of Practice for the Characterization and Remediation from Ground Gas in Affected Developments  
**NHBC** “ Guidance on methane and carbon dioxide “ and technical extra April 2016, issue 20.



## System Membranes & Components

### Rhinoplast Ultra:

A monolithic LDPE barrier designed primarily for use with Radon gas. Fully Radon gas tested and approved by NSAI (IAB) Meets the requirements of BRE211.  
Standard roll size 4 x 20m.  
Colours: red or grey.  
Thickness 300mu (1200 gge)



### Rhinoplast 400 Extra Radon

400mu Heavy Duty monolithic LDPE barrier designed primarily for use with Radon gas. Meets the requirements of BR211 :2015  
Standard roll size 4 x 20m.  
Colour: Green  
Thickness 400mu (1600 gge)



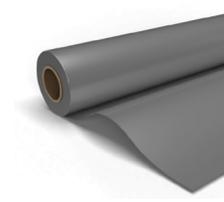
### Rhinoplast Super:

A monolithic hybrid co-polymer barrier giving excellent performance. Fully tested for Radon, methane and CO2.  
Approved by NSAI (IAB) Exceeds the requirements of BRE211. Complies with NHBC Amber 1 applications. CS2 dependant on construction type. Standard roll Standard roll size 4 x 20m  
Colour: Yellow  
Thickness: 375mu (1500 gge)



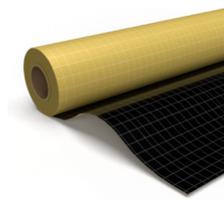
### Rhinoplast Amber 2000:

A monolithic LDPE barrier. Excellent strength and puncture resistance. Exceeds the requirements of BRE211. Complies with NHBC Amber 1 applications. CS2 dependant on construction type.  
Standard Roll Size: 4 x 12.5m  
Colour: light grey  
Thickness: 500mu (2000 gge)



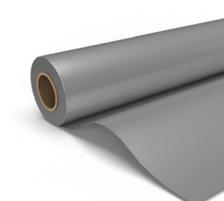
### Rhinoplast TGB:

Excellent gas resistant properties due to the integral aluminium foil. Laminated construction includes reinforcing mesh to improve tear propagation properties. Designed as a high performance barrier for all applications except hydrocarbon liquids.  
Standard Roll size: 2 x 50m  
Colour: Black & Gold  
Complies with the requirements of BS 8585: 2015



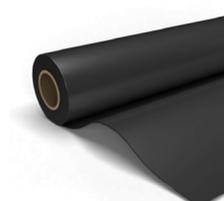
### Rhinoplast Evolution Hydrocarbon Gas Barrier:

Rhinoplast Evolution is a high specification co-extruded multi-layer barrier specifically developed for use on construction sites contaminated by Volatile Organic Compounds, Hydrocarbons and other ground gasses such as Methane, Radon and CO2. The product is 14 layers and contains 2 layers of gas barrier polymer (EVOH) to offer exceptional performance and prevent the ingress of dangerous gasses into buildings. It is manufactured using the latest co-extrusion technology and cannot de-laminate. The product will also act as a damp-proof membrane. The membrane is manufactured using high performance engineering polymers to give exceptional strength and does not require reinforcement. It can be installed by the use of sealing tapes or can easily be welded.  
Colour: Silver  
Roll size: 1.65 x 61m  
Thickness: 400mu  
Complies with the requirements of BS 8585: 2015



### Rhinoplast Hydrocarbon:

Rhinoplast hydrocarbon is a HDPE membrane designed to withstand the effects of fluid hydrocarbons.  
Colour: Black  
Thickness: 1mm and 1.5mm



### Rhinoplast LT Joint-strip:

A butyl modified reinforced single sided bitumen tape, designed to reinforce details such as difficult folds and pre formed cloaks.  
Acts as a secondary gas seal. Excellent adhesion and dimensionally stable.  
Colour: black. Available in 75mm x 15 metre rolls.

### Rhinoplast Reinforced detail strip:

A butyl modified reinforced single sided bitumen tape, designed to reinforce details such as difficult folds and pre formed cloaks.  
Acts as a secondary gas seal. Excellent adhesion and dimensionally stable.  
Colour: black. Available in 75mm x 15 metre rolls.



### Rhinoplast High tack girth tape:

A single sided girth tape used to secure and protect linear joints. Excellent adhesion, dimensionally stable and water resistant. Colour: black.  
Available in 72mm x 50 metre rolls.



### Preformed cloaks and details:

A range of cloaks manufactured from gas resistant DPC and designed to ease the installation of the system. Standard cloaks available from stock. Bespoke service available from our in house design team.



### Rhinoplast gas resistant CoC polymer DPC:

A co-polymer gas resistant high performance DPC. Fully tested for methane gas. Available in usual widths up to 1000mm. 20 metre rolls.

