

Our ref: 8665gdr

Ground Gas Mitigation Design Report

For Land at

**Hareshill Road, South
Heywood, Rochdale**

,

**For: Northstone,
1 Old Park Lane,
Trafford City,
Manchester,
M41 7HA**

Date of Report: 16 March 2026

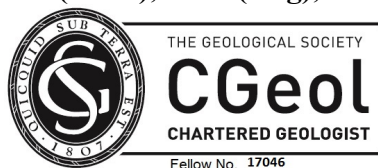
Ground Gas Mitigation Design Report for
Hareshill Road, South Heywood, Rochdale

Project Title	Hareshill Road, South Heywood, Rochdale
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Prepared by

Checked and Approved by



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Report Reference	Rev	Date	Description	Prepared	Checked and Approved
8665gdr	-	16 March 2026	Ground Gas Mitigation Design Report	B W Hill	P R Sykes

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Report Conditions

This report is an explanation and justification of the designs to protect human health associated with hazardous ground gas identified on a proposed residential development at Hareshill Road, South Heywood, Rochdale. This report was prepared on instructions received from our client, Northstone, 1 Old Park Lane, Trafford City, Manchester, M41 7HA.

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Where data supplied by others, including that from previous investigations has been used, it has been assumed that the information is correct. No responsibility can be accepted by Coopers for inaccuracies within the data supplied by others. We would advise that our clients make their own detailed enquiries to the Local Authority to determine any additional planning constraints which may be applied to this site, and which have not been identified within this report.

The design report is based upon the proposed construction of the buildings and established ground gas regime specific to this site and are not transferable for use on other developments. Any variations to the design of substructures, or future identification of potential undisclosed sources of hazardous ground gas must be reported to Coopers for further assessments or changes to the proposed mitigation measures.

This document should be provided to the Local Authority and warranty provider to justify the suitability of the proposed mitigation measures and no construction should commence until such time that the designs have been formally approved.

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Ground Gas Mitigation Design Report

Site Name/Address:	Hareshill Road, South Heywood, Rochdale
Developer:	Northstone
Floor Slab Construction:	- Precast Suspended Floor with Spantherm Floor System
Superstructure Build:	Standard Masonry
Design Criteria:	Characteristic Situation 2 (Plots 44 to 50) Basic Radon (Plots 150 to 174)
Coopers Drawing No.	- 8662-LRH-CS2-PC-PE-G-01 - 8662-LRH-CS2-RF-PE-G-01
Designer:	B. W. Hill, <i>BSc (Hons), CSci, MEnvSc, FGS</i> <i>Member of British Verification Council – Ground Gas Protection Systems.</i>

1.0 Design Summary/Overview

This design report follows the recommended approaches within BS8485:2015+A1:2019 and NHBC NF94 (2023). The appraisal of the ground conditions and engineering proposals have been undertaken by E3P on behalf of Northstone. The ground gas assessments and determination of the mitigation requirements by E3P, and final agreements from Rochdale Council should be provided, prior to construction.

This report is specific to the design and specification of the gas mitigation measures, as outlined in Figure 1. The proposals for verification of the gas mitigation measures are to be completed by a third party with demonstrated experience/qualifications in the verification process (to be appointed by Northstone, and independent of the installation contractor).

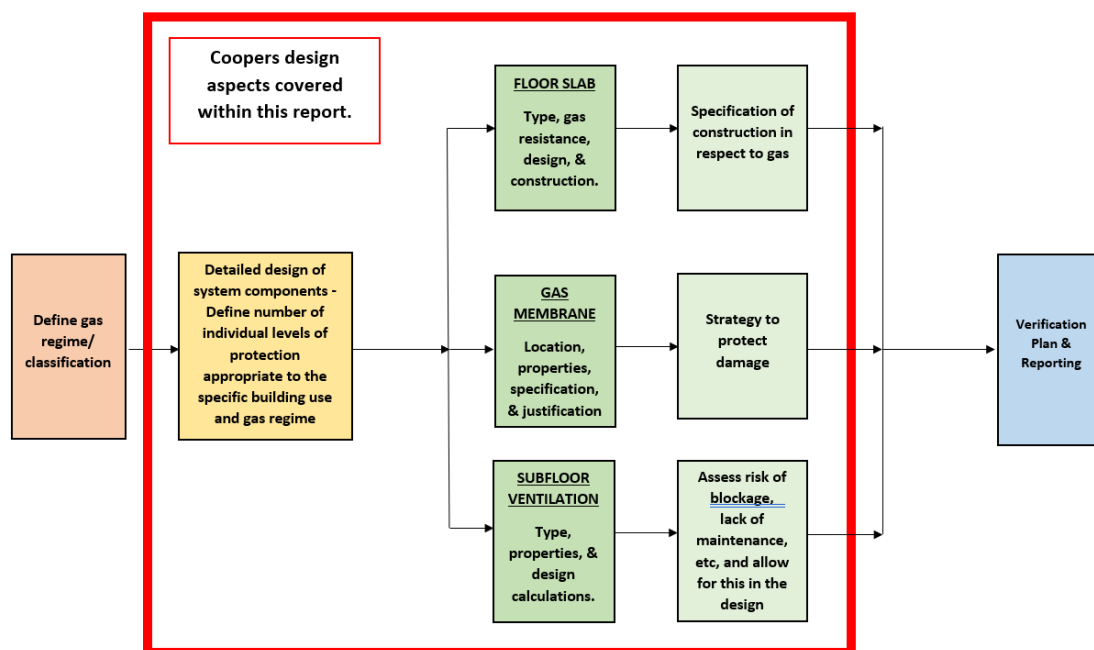


Figure 1: Gas design process

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2.0 Enclosed Documents

The following documents are enclosed with this design report:

- Coopers Drawing No. 8665-LRH-CS2-SP-AF-NS-01 Typical Gas Precaution Detail to a Spantherm Precast Slab and a Vented Void for Characteristic Situation 2.
- Coopers Drawing No. 8665-LRH-BR-SP-AF-NS-01 Typical Gas Precaution Detail to a Spantherm Precast Slab and a Vented Void for Basic Radon.
- Coopers Gas Mitigation Ventilation Calculation – Print sheets.
- Visqueen Product Specifications – NF400.
- Visqueen Product Specifications – Radon Blok400.

3.0 Site Context and Development Proposals

The site is proposed for development by Northstone, comprising of circa 186 No. residential dwellings, consisting of traditional detached and semi-detached houses of masonry construction. The development includes associated access roads, private gardens, parking/optional garages, and areas of proposed communal landscaping.

The site is located off Hareshill Road, Heywood, OL10 2TB, at National Grid Reference, SD 851 091. The site currently consists of open ground. The surrounding area consists of a combination of commercial/industrial units and agricultural land.

The historical Ordnance Survey maps identify the site to have been formerly agricultural land and farmyard with historically infilled ponds recorded.

4.0 Summary of Ground Gas Assessment

The site was subject to previous investigations and assessments by third parties, with the following provided to Coopers as the basis of the designs:

- E3P Report No. 18-435-R1-3 “*Phase I and II Geoenvironmental Site Assessment*”, dated 3 March 2026.

The ground gas assessment references the BGS dataset as defining the geological conditions within the western part of the site to have a 3-5% radon risk where basic radon precaution measures are required. The above report included an appended BGS Radon Report, dated 12 June 2025, based upon the latest BGS/UKHSA data. The dataset is represented in a raster format and the inferred zones of potential influence relative to the current layout has been inferred by E3P within their Drawing No. 18-435-033, Rev. A, appended to the above report. The defined plots requiring basic radon mitigation measures are Plots 150 to 174.

E3P referenced that following feedback from Rochdale Council, assessments have determined the presence of elevated concentrations/flow rates of methane, determined to extend to the areas of Plots 44 to 50, based upon the conceptual site model and monitoring data/assessment. These plots have been determined by E3P as requiring a precautionary design of Characteristic Situation 2 (BS8485) (CS2) gas mitigation measures to be included within the floor slab construction to prevent significant concentrations of hazardous ground gases entering through the floor slab construction to the proposed buildings. The designs require cognisance of the various potential pathways hazardous ground gas can take and the impacts on the preferential pathways which can be formed by the development construction works. Examples of common pathways for domestic properties is referenced in Figure 2.

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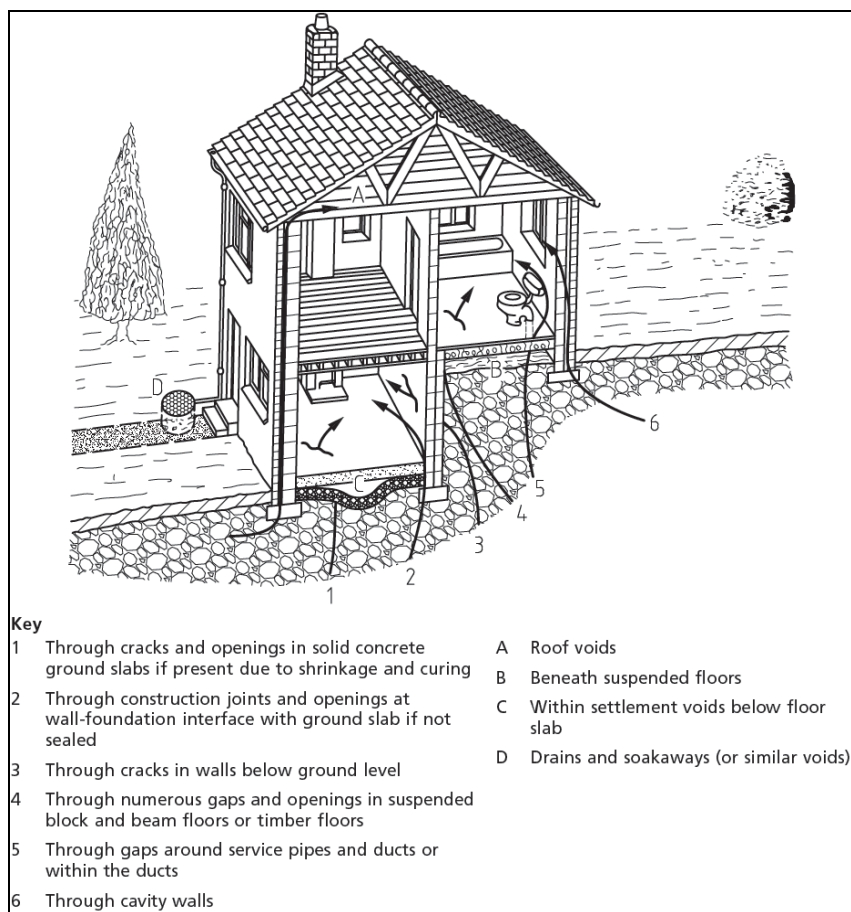


Figure 2: Potential pathways for hazardous ground gas to ingress into residential buildings (from BS8485)

5.0 Design Standards/Guidance

The general design for mitigation of ground gases are defined within British Standards BS8485:2015+A1:2019 (2019) “*Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Gases for New Buildings.*” Whilst limited to specified common static gases, the design approach cross-references other papers and standards associated with other vapours and radon (as the protection system design needs to consider all types of risks associated with radioactive isotopes/gases/vapours).

BS8485 includes a series of tables to define the design system by the type of building (Type A to D), the gas risk of the ground (CS1 to CS6) and a points-based system for different types of protection to aid the design of the protection measures. It should be specifically noted that BS8485 recommends the production of a design report, which is not just adding up of points from tables, as discussed in Section 8.3.2 of the standards. The designs need to establish the assumptions/basis of the designs, the properties and performance of the mitigation measures and any associated calculations (e.g. venting performance). The NHBC have provided further clarification of their design requirements within their publication NHBC Foundations Report 94 (2023) “*Hazardous Ground Gas – an Essential Guide for Housebuilders.*” NF94 (2023) provides commentary that design of the gas protection system is not adding up points and requires a thorough consideration of the design requirements, as follows:

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“The design and detailing of gas protection measures requires more than just adding up points in the BS8485 screening system and providing standard details for membrane installations. The process should be systematic and commence with a general description of the gas protection system necessary to mitigate all of the potentially significant risks. The design of the gas protection system should include consideration of the protection inherently provided by the building construction and any conflict between the building design and gas protection measures. BS8485 advises that the gas protection design should be summarised in a design report and site specific design drawings should be provided. The report should: identify the key assumptions made in the design, justify the points assigned (if using the points system), justify the choice of products including gas membrane specification (not just gas transmission rate), provide ventilation calculations (site specific calculations to demonstrate performance), and include any other specific requirements.”

NHBC Foundations NF94 (2023) also discusses the level of detail required is dependent on the type of development, stating:

“For low rise housing on CS2 and CS3 sites the design report does not have to be an extensive document. Site specific details for the gas membrane installation, and locations of vent bricks can be provided on architects’ detail drawings that show the floor finishes, DPMs etc. Conversely a more detailed report and specific construction details are likely to be required for larger and complex multi storey developments.”

The subsequent sections of this report include the BS8485 points system, justification, and discussions of each component, following the recommendations of NF94. The proposed floor slab construction is uniform across the site, consisting of the following:

- Precast floor slab (Spantherm) with suspended subfloor void.

The superstructure designs have been confirmed as conventional masonry and not timber frame. Any changes to the superstructure type must be referred to Coopers to provide revised designs as the gas design system differs between the timber frame and masonry superstructures, where the position of the gas membrane beneath the timber frame is restricted due to the potential to create slip surfaces. The proposed warranty provider (NHBC) has released guidance (NF94) regarding the need to separate membranes on the external wall from the cavity tray to provide a pathway for moisture release and limit the risks of damage to the timber from moisture. The membrane position will also clash with the fixing points for the timber frame sole plate which requires specialist designs.

6.0 Gas Mitigation Design

6.1 Characteristic Situation 2 - Overview

The site-specific gas mitigation detail is provided on Coopers Drawing No.– 8665-LRH-CS2-SP-AF-NS-01- *Typical Gas Precaution Detail to a Spantherm Precast Slab and a Vented Void for Characteristic Situation 2.*

The NHBC NF94 guidance provides commentary in relation to BS8485, advocating that ground gas mitigation designs require consideration and justification of the whole design system, not just

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adding defined points from tables within BS8485. Whilst the below points are used each component is discussed in the following sections.

The gas mitigation measures classified as Characteristic Situation 2 (CS2) are following the BS8485 system. The buildings are of masonry construction, with no proposed internal/adjoining garages (based upon foundation plans). The proposed buildings are intended for domestic end use, and are classified as “Type A” buildings within BS8485, as follows:

Type A building: *private ownership with no building management controls on alterations to the internal structure, the use of rooms, the ventilation of rooms or the structural fabric of the building. Some small rooms present. Probably conventional building construction (rather than civil engineering). Examples include private housing and some retail premises.*

Under the BS8485 points system, for Type A buildings, a design score of 3.5 points is required for a CS2 regime, as per Section 7.1, Table 4, within the standards. The points achieved are via the following:

- Structural Barrier (Floor Slab Construction).
- Gas Resistant Membrane.
- Ventilation Protection Measures.

The points achieved for each component of the different floor slab construction are provided in Tables 1 (below), followed by a discussion of each component within the subsequent sections of this report.

Table 1: Summary of points allocations following BS8485 for Precast Floor Slabs (Block and beam)

Design Component	Type Proposed	Points Allocations
Structural Barrier (Floor Slab Construction)	Precast suspended floor (block and beam)	0 points
Gas Resistant Membrane	Proprietary Gas Membrane with Independent Validation	2 points
Ventilation Protection Measures	Passive sub floor dispersal with very good performance	2.5 points
TOTAL		4.5 points

Notes to Table 1:

The points allocation above are discussed in relation to each component within the subsequent sections, with an explanation. The points system has not been used to replace the design justification.

6.2 **Basic Radon - Overview**

The site-specific gas mitigation detail is provided on Coopers Drawing No. 8665-LRH-BR--SP-AF-NS-01- Typical Gas Precaution Detail to a Spantherm Precast Slab and a Vented Void for Basic Radon.

The primary guidance for design of radon protection measures for new buildings is provided within BRE BR211 (2023) “*Guidance on Protection Measures for New Buildings (Including Supplementary Advice for Extensions, Conversions and Refurbishment Projects)*”.

BR211 (2023), Section 5 “Technical Approach” provides information and illustrative examples of radon protection measures for basic and full radon mitigation through external wall transitions by different floor slab designs. The illustrative examples are accompanied by notes, referencing other aspects of the design system not recorded on the example. BR211 Section 6 “Detailed Protection

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Measures” includes discussions on the different components of radon mitigation to inform the designs.

NHBC NF94 (2023) references that elements of the advice within the document can be applied to radon, but reference to specific additional guidance is also required. The NHBC document was released a few months prior to latest revision BR211, where certain important changes to the design system were provided.

The subsequent sections of this report include the BS8485 points system, BR211 design appraisal, and justification, and discussions of each component, following the recommendations of NF94.

7.0 Gas Mitigation Design – Structural Barrier

7.1 Characteristic Situation 2

BS8485:2015+A1:2019, Annex A provides informative commentary on floor slab construction in relation to gas ingress and risk values. NHBC NF94 (2023) provides further useful commentary of the factors to consider in the allocation of gas resistance to the floor slab construction in the context of design points. With consideration of the following items:

- The maximum crack width(s) that have been assumed in the slab design. Structural designs should consider requirements to resist both flexural and shrinkage cracking.
- The type of joints in the slab and how wide are they likely to be.
- Thickness of the concrete.

The developer is proposing the construction of precast suspended floor slabs (Spantherm) with a non-structural, reinforced concrete screed finish. Precast suspended floor slabs provide significantly less resistance to gas ingress compared with cast in situ reinforced concrete floors slabs and integral floor slabs to raft foundations due to the gaps at the boundary between individual components allowing gas ingress. The reinforced concrete screed will offer some effectiveness to limit gas ingress, however this is relatively thin (subject to design, circa 75mm), non-structural concrete, where micro crack widths will allow more gas ingress in comparison to other floor slabs. BS8485 defines the overall very high risk for gas ingress to the proposed buildings through these types of floor slab construction.

Given the design system for the proposed floor slabs the structural barrier is determined as being insufficient to contribute towards the allocated points for gas mitigation.

7.2 Basic Radon

BR211 (2023) provides guidance on the radon mitigation measures for different radon risk designations on new buildings. The measures consist of forms of physical barriers and sumps/ventilation incorporating within proximity to the building ground floor slab. Specific information and options are provided for designers by different forms of ground floor slab construction type. Section BR211 – Section 5.1 includes a brief discussion of the design considerations and Section 5.1.1 provided reference to precast floor slabs. No reference is provided as to the floor slab type offering a structural barrier, with reliance on the inclusion of proprietary radon membrane to limit the amount of radon ingress.

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8.0 Gas Mitigation Design – Gas Resistant Membrane

8.1 Characteristic Situation 2

BS8485:2015+A1:2019, Annex C provides informative commentary on the choice and selection of gas resistant membranes on a site-specific basis, including the properties of the materials, the reliance on the membrane within the design system, the robustness of the materials to survive construction, the installation methods and the requirements for verification.

BS8485 and NHBC NF94 are clear that the gas mitigation designer is required to assess and determine appropriate membrane specifications for each site, rather than just confirm compliance with certain limiting values (for example methane permeability rates stated in both NF94 and BS8485).

“It is the responsibility of the designer to specify an appropriate gas membrane for a site, taking account of site specific factors. The guidance in BS8485 indicates that the designer must assess any membrane by all the criteria stated in the standard for the specific circumstances of each site. It is not appropriate to claim compliance just because it meets one, or a few, selected criteria for membrane properties.”

NHBC NF94 – Section 5.4.1 includes guidance on the design considerations for the gas membrane, with specific design considerations referencing back to BS8485. The authors highlight that the design criteria is not a methane permeability rate and other factors require consideration in relation to the designs. The guidance states the designer can select membranes on a site-specific basis which do not meet all of the design recommendations within BS8485, provided sufficient justification provided in the selection (e.g. methane performance may not be relevant if designing for VOCs). There are tables provided in the guidance on the membrane properties the NHBC consider suitable for different floor slab construction and location as a guide, discussed below.

The floor slab construction includes the insulation layer inherent with the precast floor slab, resulting in no potential protection offered by separate insulation above the gas membrane.

The site is designated as a Characteristic Situation 2 (lower gas regime) risk with membrane protection for elevated concentrations of methane. BS8485 advises that normally a methane permeability rate of $<40.0 \text{ ml/day/m}^2/\text{atm}$ is suitable to mitigate gas ingress and the Low Density Polyethylene (LDPE) component to have a minimum mass of 370g/m^2 and a minimum thickness of 0.4mm to survive construction.

NF94 – Table 5.1 references that for a block and beam floor slab a methane permeability rate of $<40 \text{ ml/day/m}^2/\text{atm}$ is also required and is classed as an above slab design approach where a minimum thickness of 0.4mm is required.

To achieve the methane permeability rates membranes suppliers have released hybrid polymer membranes (LDPE typically combined with Ethylene Vinyl Alcohol (EVOH) layers) which has a low methane permeability without needing to incorporate an aluminium foil layer which can pose contact corrosion risks with concrete.

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BS8485 outlines the importance of the installation in providing a sufficient barrier to limit gas ingress with independent verification required to verify the installation is sufficient. The independent verification proposals are to be provided by a third party (outside of the remit of this report).

The designs of gas membrane within the floor slab construction are commonly more complex than simple 2-dimension sections through buildings. The installer should consider the detailing through wall cavities, edges, joints, service penetrations and complex 3D shapes such as corners, door thresholds and level transitions. Coopers advocate that qualified gas membrane installers are appointed for the construction of the gas membrane component, and that a pre-construction toolbox talk is undertaken, between the designer, installer and verifier. Any variations to the designs must be approved by Coopers in advance of continuing construction and failure to do so should constitute a failure during the verification process.

The gas membrane is not the primary form of protection within the designs (which is the subfloor ventilation layer, discussed in Section 9), however should the ventilation layer become blocked in the future, the floor slab offers little resistance to gas ingress and the membrane would need to be sufficient to mitigate gas ingress to the enclosed spaces of the building.

The selected gas membrane for this site consists of a Visqueen NF400, which has a BBA agrément certificate, with a mass of $>370\text{g/m}^2$. The membrane has minimum thickness of 0.4mm, meeting the design requirements for this site, and following advice within BS8485 and NHBC NF94. The membrane can be taped or welded at the installation contractor's discretion. All ancillary products and tapes must be from the membrane manufacturer to ensure compatibility for adequate sealing. All sections of formed corners, returns, service entry pipes which are not preformed will require use of detailing tape to mitigate gas transmission.

The membrane is considered to be sufficiently robust to limit methane and carbon dioxide ingress, with methane permeability rate of $13.2\text{ml/m}^2/\text{day/atm}$, of sufficient mass for welding ($>370\text{g/m}^2$) and taped application. The position above the precast floor slab will not pose a high risk of stress from construction, with testing confirming tensile strength, elongation and nail tear resistance following BS EN 12311 and values provided stating these were considered to pass with no significant deterioration.

NHBC NF94 reference that a gas membrane within an above the floor slab construction does not require a membrane protection layer unless uncovered for a period of 1 day after the installation. Coopers have discussed the membrane performance with the manufacturer which state that whilst the membrane can become damaged by exposure to ultraviolet light, this is depending on the strength of sunlight and duration, with key requirement that the membrane should not become brittle at which point it ceases to provide the suitable mitigation performance.

To achieve the requirements for designation of 2 points within BS8485 independent verification is required in accordance with CIRIA C735, failure to verify gas mitigation measures would be deemed as 0 points. The verifier should be appropriately experienced to identify construction defects and be able to demonstrate their experience in this field. It is recommended that the company undertaking the works should be a Member of the British Verification Council (BVC).

The items to be verified and the methods used should be provided in the verifiers "Verification Plan" and this should be agreed with the Local Authority and NHBC. It is important that the verifier

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be permitted to determine the frequency of checks, cognisant of the gas risk, as the persons responsible for ensuring the mitigation measures were correctly constructed. These items should be agreed with the developer, warrantee provider and Local Authority, with cognisance of potential for plot specific completions.

Contractors record sheets and evidence of the installation demonstrates they have a good quality management system but does not constitute independent verification. This applies to affiliated companies (same directors, office, phone number, etc) which should not be considered as independent.

Coopers consider the membrane to achieve the 7-stage design criteria referenced within NHBC NF94 and BS8485.

8.2 **Basic Radon**

BR211 (2023), Section 6.2.1 discusses the physical properties and characteristics to be considered for protection to limit radon ingress. The design requirements include provision of a virgin polymer Low Density Polyethylene (LDPE) of 400µm (sufficiently thick to survive construction). BR211 references the physical properties of the membrane are less significant than the quality of the installation and the importance in the verification and Quality Management Record (QMR).

Example membrane positions in BR211 for basic radon have been adapted by Coopers upon request by the NHBC. The radon membrane is recorded by Coopers to be sealed to the cavity tray on the external wall with double sided tape to mitigate a potential slip surface, whilst not separated where driving rain can result in moisture ingress to the building.

The selected radon membrane for this site consists of a Visqueen RadonBlok 400 and meets the requirements outlined above.

To comply with BR211 the radon membrane should be independently verified, failure to verify radon mitigation measures would be deemed as posing a significant risk to the future occupants and invalidate Coopers mitigation designs. It is recommended that the company undertaking the verification works can demonstrate their competence in this field and Member of the British Verification Council (BVC).

The items to be verified and the methods used should be provided in the verifiers “Verification Plan” and this should be agreed with the Local Authority and NHBC. It is important that the verifier be permitted to determine the frequency of checks with cognisance of the gas risk, as the persons responsible for ensuring the mitigation measures were correctly constructed. These items should be agreed with the developer, warrantee provider and Local Authority, irrespective of conditions applied for legal completions.

Contractors record sheets and evidence of the installation demonstrates they have a good quality management system but does not constitute independent verification. This applies to affiliated companies (same directors, office, phone number, etc) which should not be considered as independent.

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9.0 Gas Mitigation Design – Ventilation Design

9.1 Characteristic Situation 2

BS8485:2015+A1:2019, Annex B provides informative commentary on the performance of different forms of subfloor ventilation, largely based upon the research by Department of the Environment, Transport and the Regions (DETR) Partners in Technology (PiT) (1997) “*Passive Venting of Soil Gases Beneath Buildings Research Report – Volume 1, Guide for Design*” and “*Volume 2, Computational Fluid Dynamics Modelling: Example Output*”. Models were based upon limited parameters for small (5m by 5m) and large buildings (30m width) with recommendations for designs based upon the results.

NHBC NF94 provides commentary in relation to the ventilation performance guidance within BS8485. Specific reference as to the importance of the verification of the ventilation proposals is required (where proposed as part of the mitigation designs). Whilst the ventilation layer is not highly susceptible to poor quality installation, there are several highlighted common problems, including incorrect external vents positioning, damage or blocking during construction, and insufficient ventilation through internal walls.

The Coopers referenced typical gas mitigation construction detail includes a minimum 150mm subfloor void, with side ventilation including standard cranked venting/air bricks at 2m centres, and internal walls containing connecting pipe work of 75mm at 1m centres. The subsequent sections detail the calculations and justification for the appropriate designs.

The ventilation performance is required on at least two opposite faces of the building, with the ventilation criteria variable depending on the span between the vents. For buildings with a span of <15m the designs are required to achieve a minimum ventilation of 1500mm²/m, and for spans of >15m a minimum ventilation of 2000mm²/m. The ventilation should not include spacing which results in areas which are liable to static conditions (typically maximum spacing between any vent of 2m).

The internal ventilation performance is required to be at least twice that required for the external ventilation. This equates to 3000mm²/m for buildings with a span between the vents on opposite sides of <15m and 4000mm²/m for >15m span.

Coopers Designs include:

- 150mm sub floor void (min.).
- Cranked external venting to air bricks at 2m spacing on at least 3 sides (frontages commonly not possible where level access is required).
- Internal wall venting pipes of 75mm diameter at 1m spacing.

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Venting Performance:

- Periscopic ventilation = 6000mm^2 (typical ventilation per periscopic vent, subject to product types)
- Internal cross ventilation connection = 4417.86mm^2 (75mm diameter pipe, area is πr^2)

Ventilation Designs and Calculations

The enclosed Coopers ventilation calculations provides further clarity of the design system, ventilation performance and the suitability of the ventilation proposals for the gas regime. The ventilation rates achieved are $3000\text{mm}^2/\text{m}$ for external vents and $4418\text{mm}^2/\text{m}$ for internal ventilation.

Validation of Ventilation Construction

The subfloor ventilation forms the primary mitigation measure for this floor slab construction. As such this item requires validation checks and reporting, including measurements of the ventilation height, dimensions and spacing of ventilation through internal and external walls. Whilst many of the construction items are not sensitive to incorrect application, it is common for contractors to deviate from any of the design proposals. It is recommended that the verifier holds a preconstruction site meeting with the contractors to highlight the design requirements and that deviations are not acceptable without designer approval.

Coopers consider that in the majority of the cases the architects construction details which include vent locations through walls will meet requirements for gas mitigation, these are typically designed for moisture mitigation in accordance with NHBC Standards Chapter 5.2.10.2. Whilst the external ventilation performance is the same for small buildings, the Standards includes no ventilation values for internal walls and can fail to meet the requirements for gas mitigation subject to the ventilation locations selected.

- 1) Coopers consider the design requirements for ventilation should follow the typical gas details provided in this report. Any variations to follow the architect's details would require review of each house type and design to confirm there is sufficient ventilation, with written confirmation from the gas designer.
- 2) The verifier should fail any deviations to the gas designs unless provided with written approval of the gas mitigation designer with associated calculations.
- 3) The verifier should be the person responsible for determining the frequency and stages of validation visits to deem themselves satisfied that the construction of the ventilation system has been followed. We consider that the site designation is low risk and the verifier can factor this within their proposals.

9.2 Basic Radon

The requirements for Basic Radon protection within Section 5.1 of BR211 define that the ventilation is inherent to protection against moisture, and whilst referenced on example details for Basic Radon mitigation this is not explicitly stated as design requirement (which is specified for Full Radon).

BR211, Section 6.8 references:

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“Where airbricks are recommended as the means of dispersing radon from beneath beam-and-block floors, they should be installed where possible on all sides of the building. Airbricks should be placed at intervals at least as frequent as would be normal for an ordinary suspended timber floor (ie openings should be large enough to give an actual opening of at least equivalent to 1500mm² for each metre run of wall on two opposite sides). Typically this means that vents should be positioned at 2m maximum centres along the external walls and not more than 450 mm from corners. It is also important to ensure that all airbricks are kept clear. Landscaping works such as paths and driveways must not compromise subfloor ventilation.

The guidance provides no commentary on requirements for ventilation through internal walls although continuity is required if future active extraction is proposed.

Whilst not stated as a requirement for Basic Radon protection Coopers designs include provision of internal and external ventilation to the equivalent of Characteristic Situation 2 would be adequate for the purposes of basic radon protection.

10.0 Conclusions and Further Actions

This design report is considered suitable to address the design requirements outlined for the development based upon the ground gas assessment.

The design report should be provided to the Local Authority and NHBC for approval.

The validation of the gas mitigation measures, including ventilation (where proposed) and gas membranes should be included within the verification plan and follow general guidance approaches within CIRIA C735.

Coopers recommend a pre-construction meeting between the verifier, installers and ground works contractors to highlight the pass/fail criteria and the stipulations in relation to the design proposals.

Validation reports should be commissioned to confirm construction of the radon and gas mitigation measures.

END OF REPORT

FOR GUIDANCE
PURPOSES ONLY

INSTALLATION, INSPECTION AND TESTING

1. A Ciria C735 compliant verification strategy is likely to be required, subject to approval by the Local Authority and NHBC.
2. Subject to inspection and verification it a membrane protection layer may be required to ensure membrane is not liable to future damage

NOTES

1. Coopers take no responsibility for the inappropriate use of this detail on a development. It is the responsibility of the Developer to commission a suitably qualified geo-environmental consultant to assess the relevant ground gas conditions at a development based upon the findings of in situ monitoring and/or qualitative risk assessment.
2. Coopers drawing is in accordance with current best practice with respect to design of measures and specification of membranes for the adequate protection of dwellings from the ingress of harmful ground gases. The details contained on this drawing are generic and for guidance purposes only. Any proposed amendments to the detail due to variations on specific house types should be referred back to Coopers for review and approval prior to implementation on site.
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4. Refer to Spantherm slab drawing for relevant house types.
5. Refer to insulation details on specific house type slab drawings.
6. For details of proposed foundations refer to site specific foundation plan and site investigation report.
7. The minimum clear void below the suspended Spantherm ground floor is to be 150mm (plus heave thickness, where applicable) and should be adequately ventilated in accordance with the Building Regulations. The base of the void is to be within 450mm of the outer ground level unless masonry is designed by a structural engineer. The backfill material should be effectively drained.
8. The gas resistant membrane should be a minimum 400µm proprietary gas membrane with min. Methane Transmission rate of <40 ml/m²/day/atm. This membrane must have a low permeability to carbon dioxide and methane and also acts as a damp proof membrane as well as a barrier to radon gas. **The specification of the gas membrane should be submitted to Coopers for approval prior to use.**
9. All gas membranes should be installed to the manufacturers guidelines and recommendations. Special care must be taken to ensure that the gas membrane is not snagged, torn, punctured, stretched or in any way damaged during construction. All damaged areas of the gas membrane must be replaced or repaired to manufacturers recommendations.
10. Joints between sheets of gas membrane should be well lapped (150mm min) and taped between sheets with a double sided butyl based tape in accordance with manufacturers recommendations. Depending on the manufacturer, an optional girth jointing strap can be provided, as shown below, for additional security.
11. All service entry points should be fitted with pre-formed gas resistant top hats. Tophats should be sealed to the pipe and gas membrane using butyl based double sided tape and fixed to the pipe with a jubilee clip.
12. Characteristic Situation is defined in BS8485:2015+A1:2019.

This typical detail is provided as a guide for construction. House type specific variations are required to account for slopes on garage floor slabs, stepped slab levels, full building level access, party wall temporary shuttering, corner unit construction, cloaking units around doors, piers, and other similar specific considerations. We would advocate the contractors hold pre-construction discussions with Coopers (and the verification consultants if another consultant) on the approaches and considerations for specific house type construction prior to commencing installation. Should variations be constructed without prior consent these will be deemed by Coopers as a defect and not suitable for construction or approval by us or third parties.

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CDM HIGH RISK ASSESSMENT

FOR ALL RISKS REFER TO DESIGN RISK ASSESSMENT



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Web: http://coopers.co.uk

Park House

Sandpiper Court

Chester Business Park

Chester

CH4 9QU

CLIENT

NORTHSTONE

PROJECT

Hareshill Road, South Heywood, Rochdale.

TITLE

Typical Gas Precaution Detail to a Spantherm Precast Slab and a Vented Void for Characteristic Situation 2

DRAWN BY

AH

DATE

13.03.26

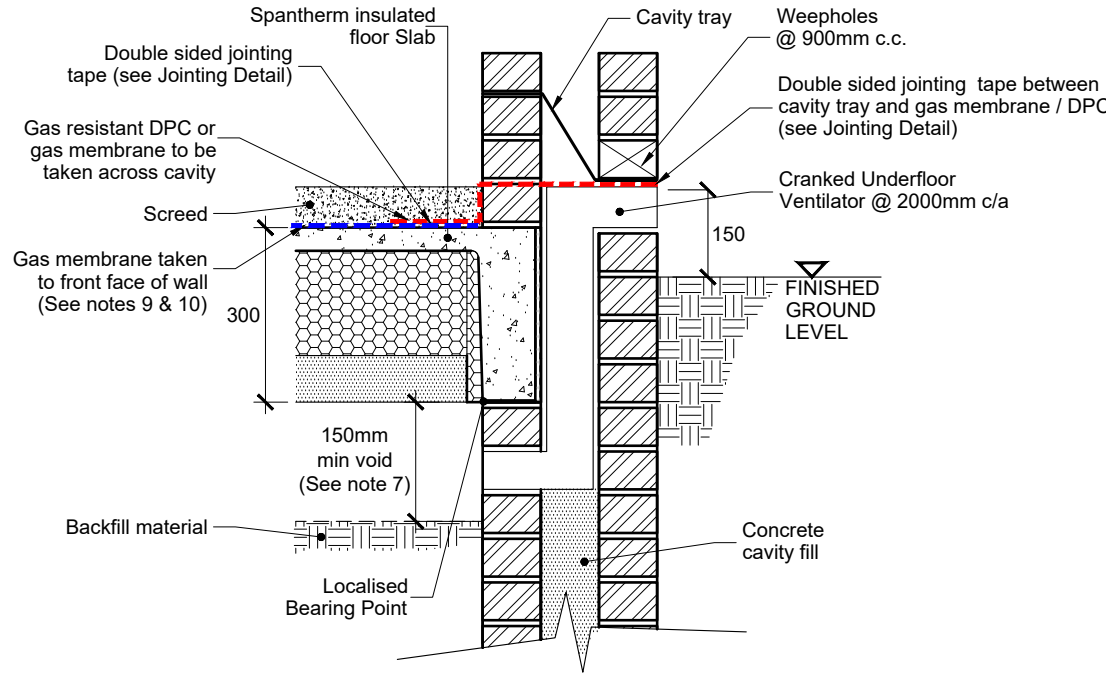
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NTS

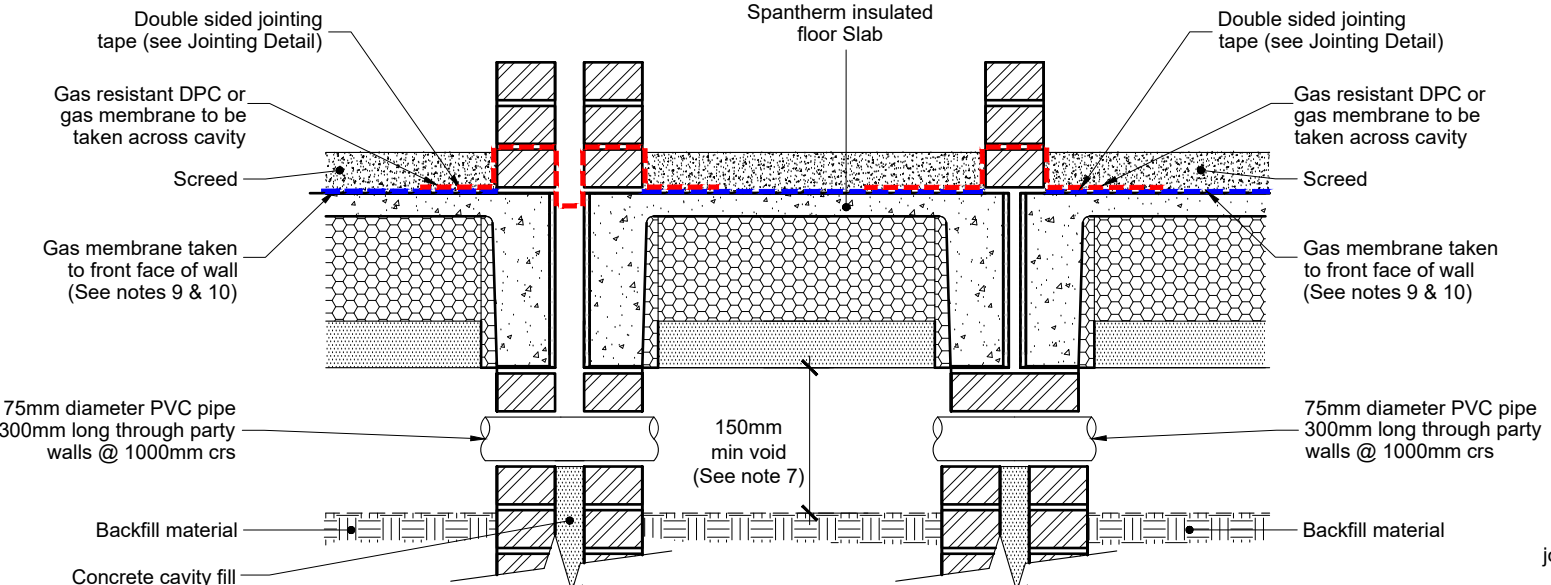
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8665-LRH-CS2-SP-AF-NS-01

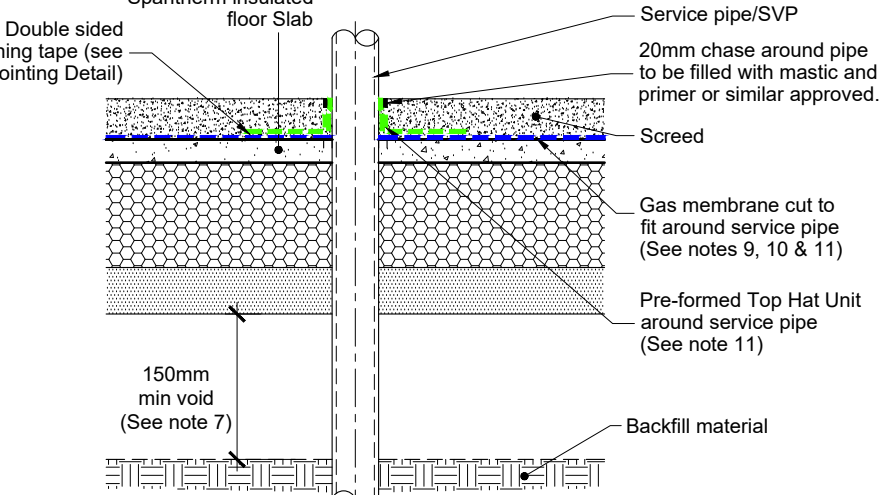
REVISION



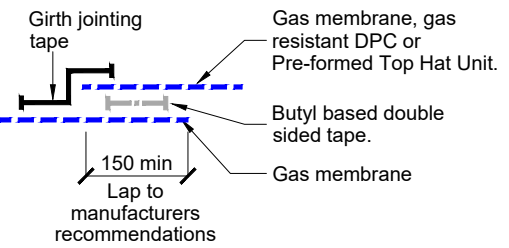
SLAB EDGE DETAIL AT EXTERNAL WALL



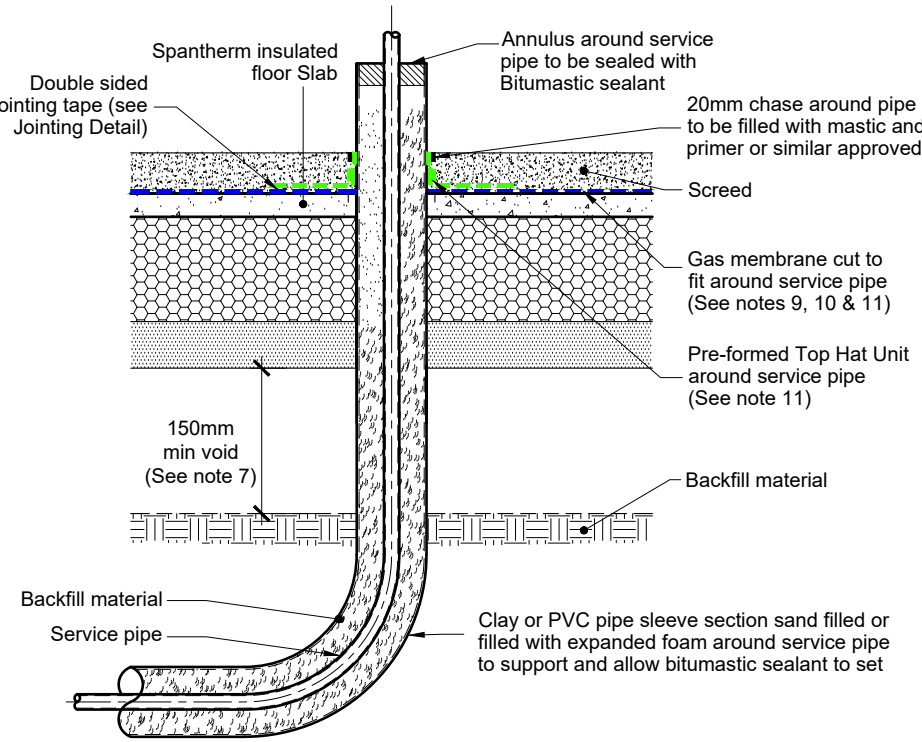
SLAB EDGE DETAIL AT PARTY WALL AND INTERNAL WALL DETAIL



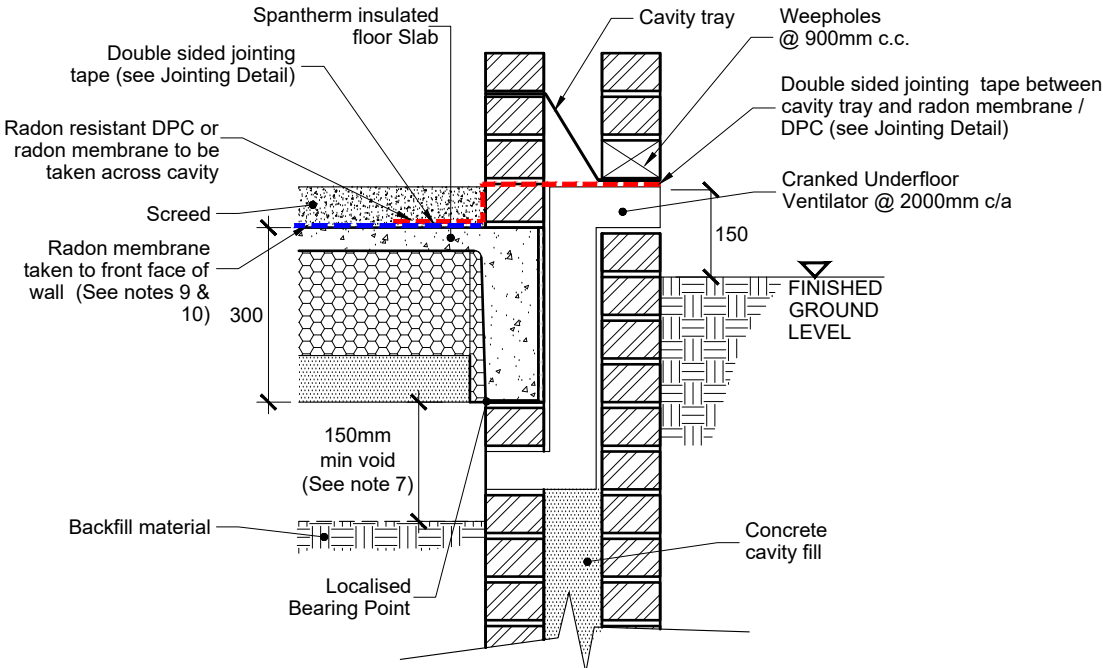
SERVICE ENTRY



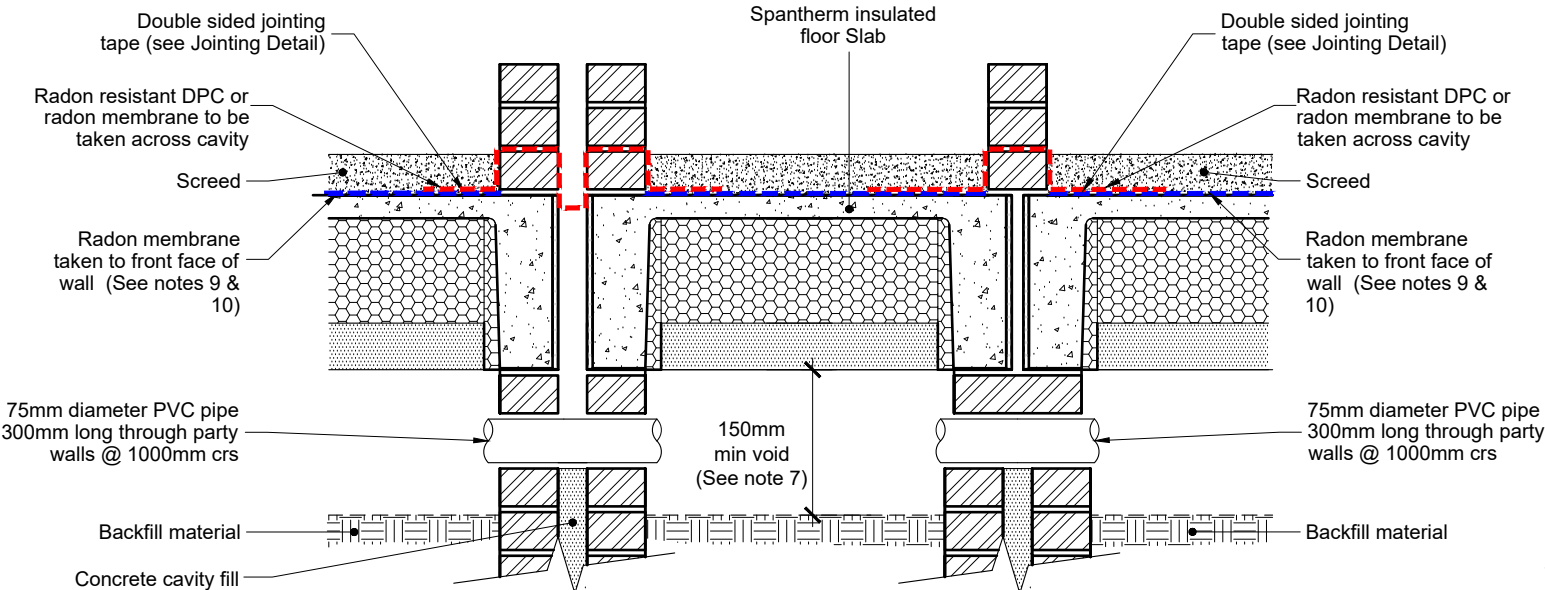
JOINTING DETAIL (See note 10)



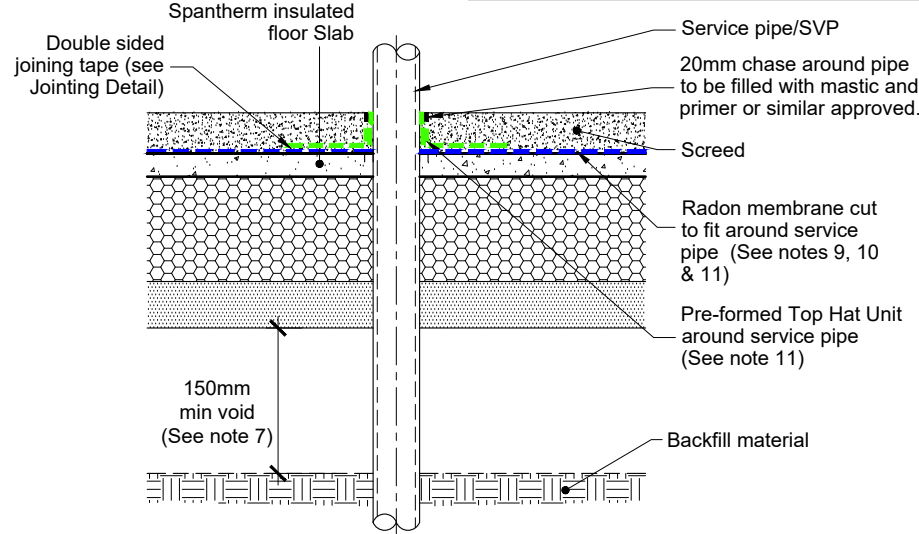
SLEEVED SERVICE ENTRY



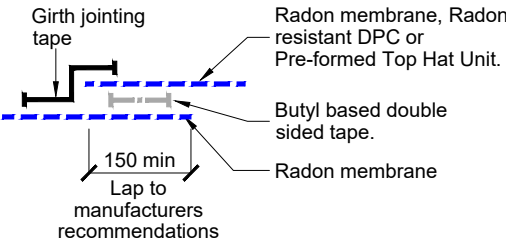
SLAB EDGE DETAIL AT EXTERNAL WALL



SLAB EDGE DETAIL AT PARTY WALL AND INTERNAL WALL DETAIL



SERVICE ENTRY



JOINTING DETAIL

FOR GUIDANCE PURPOSES ONLY

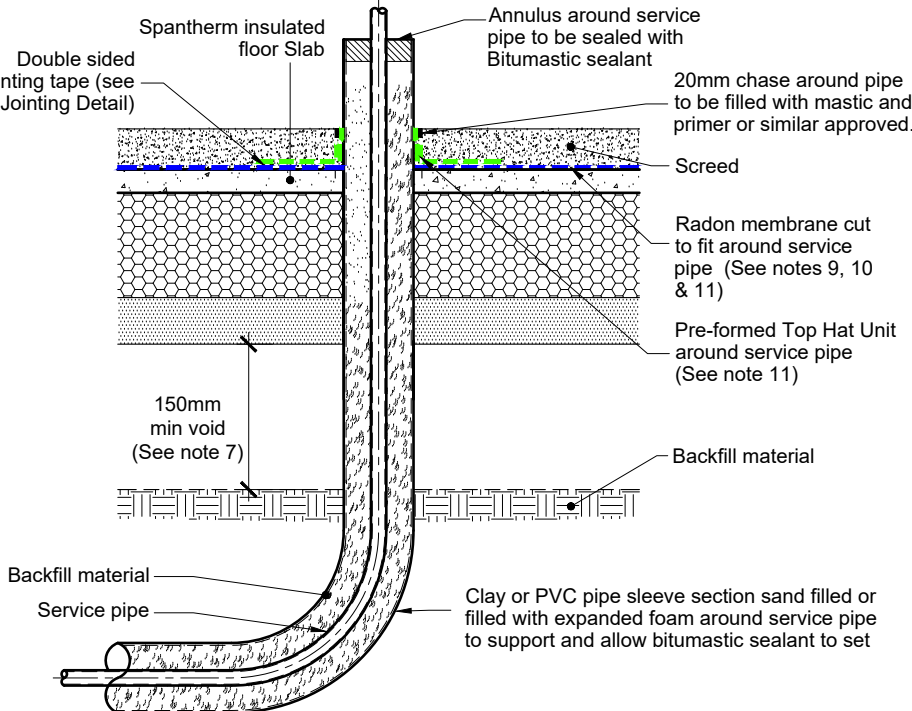
INSTALLATION, INSPECTION AND TESTING

1. A Ciria C735 compliant verification strategy is likely to be required, subject to approval by the Local Authority and NHBC.
2. Subject to inspection and verification it a membrane protection layer may be required to ensure membrane is not liable to future damage

NOTES

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2. Coopers drawing is in accordance with current best practice with respect to design of measures and specification of membranes for the adequate protection of dwellings from the ingress of harmful ground gases. The details contained on this drawing are generic and for guidance purposes only. Any proposed amendments to the detail due to variations on specific house types should be referred back to Coopers for review and approval prior to implementation on site.
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4. Refer to Spantherm slab drawing for relevant house types.
5. Refer to insulation details on specific house type slab drawings.
6. For details of proposed foundations refer to site specific foundation plan and site investigation report.
7. The minimum clear void below the suspended Spantherm ground floor is to be 150mm (plus heave thickness, where applicable) and should be adequately ventilated in accordance with the Building Regulations. The base of the void is to be within 450mm of the outer ground level unless masonry is designed by a structural engineer. The backfill material should be effectively drained.
8. The radon membrane should be a minimum 400µm, virgin polymer LDPE, certified to be suitable for mitigation of radon. **The specification of the gas membrane should be submitted to Coopers for approval prior to use.**
9. All gas membranes should be installed to the manufacturers guidelines and recommendations. Special care must be taken to ensure that the gas membrane is not snagged, torn, punctured, stretched or in any way damaged during construction. All damaged areas of the gas membrane must be replaced or repaired to manufacturers recommendations.
10. Joints between sheets of gas membrane should be well lapped (150mm min) and taped between sheets with a double sided butyl based tape in accordance with manufacturers recommendations. Depending on the manufacturer, an optional girth jointing strap can be provided, as shown below, for additional security.
11. All service entry points should be fitted with pre-formed gas resistant top hats. Tophats should be sealed to the pipe and gas membrane using butyl based double sided tape and fixed to the pipe with a jubilee clip.
12. Radon mitigation to comply with BR211:2023.

This typical detail is provided as a guide for construction. House type specific variations are required to account for slopes on garage floor slabs, stepped slab levels, full building level access, party wall temporary shuttering, corner unit construction, cloaking units around doors, piers, and other similar specific considerations. We would advocate the contractors hold pre-construction discussions with Coopers (and the verification consultants if another consultant) on the approaches and considerations for specific house type construction prior to commencing installation. Should variations be constructed without prior consent these will be deemed by Coopers as a defect and not suitable for construction or approval by us or third parties.



SLEEVED SERVICE ENTRY

CDM HIGH RISK ASSESSMENT
FOR ALL RISKS REFER TO DESIGN RISK ASSESSMENT

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Chester
CH4 9QU

CLIENT
NORTHSTONE
PROJECT
Hareshill Road, South
Heywood, Rochdale.

TITLE
Typical Gas Precaution Detail to
a Spantherm Precast Slab and a
Vented Void
for Basic Radon

DRAWN BY	AH
DATE	13.03.26
SCALE(S)	NTS
DRAWING NUMBER	REVISION

8665-LRH-BR-SP-AF-NS-01 -

Gas Mitigation Ventilation Designs

Key

Selection from Drop Down
Input values
Output Results/ Defaults
Calculation results
Formulas for reference

Site Name:	Hareshill Road, South Heywood, Rochdale
Project No.:	8665
Date:	16/03/2026
Run By:	BH
Template:	V.1.1 (BH-July 2024)

INPUTS			
Gas Characteristics		Output Results	
Gas Type:	Methane	1.0	C_e = equilibrium gas concentration in the void to achieve very good ventilation
Method:	Gas Regime		
Gas Screening Value (GSV):			GSV
or			
Gas Regime:	CS2	0.7	GSV
Site Characteristics			
Building Width (m):	10.000		
Building Length (m):	10.000		
Subfloor Void (m):	0.15		
Height of vents (m):	0.15		z
Mean wind speed:	4.5		
(BS5925 - Figure 5 - see look ups)			
Site Environment:	Urban	k 0.35	a 0.25 factors for wind speed in calculation
Wind Exposure:	Sheltered Inland	0.46	wind factor

STEP 1 Calculate fresh air flow required to dilute gas to design concentration	
$Q = q \{ (100 - C_e) / C_e \}$	
Where:	
q = surface emission rate of gas from the ground (total under whole building)	
C_e = equilibrium gas concentration in the void (in this case expressed as the % value not the mathematical value ie for 1% use 1 in the equation rather than 0.01).	
q = building width x length x gas emissions in $m^3/h/m^2$	
q calculation:	0.007
Q calculation	0.7

STEP 2 Air brick vent area and spacing for an open void	
The approach described in BS5925: 1991 is used to determine the necessary ventilation area and spacing of air bricks.	
STEP 2.1 Reference wind speed	
Hourly mean wind speed (BS5925 - Figure 5):	4.5 U_{50}
Correction ratio for site wind exposure:	0.46
Design wind speed (allow for 80% exceedance):	2.07 U_m
Therefore reference wind speed $U_r = U_m \times K \times z^a$ (Where z = height of vent)	
Reference wind speed (U_r):	0.45
STEP 2.1 Vent area	
Calculate required vent A_w area to give flow of fresh air, Q	
$A_w = \frac{Q}{U_r \times C_d \times \sqrt{\Delta C_p}} \times 10^6$ (note the factor 10^6 is to convert m^2 to mm^2)	
Q (Step 1) is in m^3/h and needs to be converted to $m^3/s = Q/3600$	0.0002 Q
U_r (Step 2.1):	0.45 U_r
Assume the discharge coefficient for a narrow opening, $C_d = 0.61$, which is a typical value for narrow openings from BS 5925: 1991. (This is a factor that correlates theoretical performance to actual performance)	0.61 C_d
Note for simple airbrick vents or similar there is usually some suction or pressure on the wall, regardless of wind direction. This is allowed for by using a very low value of Δ_p , typically 0.4 to 0.6	0.4 Δ_p
$A_w = \frac{0.0002}{0.45 \times 0.61 \times 0.63} \times 1000000$	
Area of ventilation required for whole building, A_w (mm^2)	
1107	
This is the total vent area along one long side of the building (the same area needs to be provided on two opposing sides).	
Venting required if opposite vents on building width in mm^2/m	1107 ÷ 10.0 = 111
Venting required if opposite vents on building length in mm^2/m	1107 ÷ 10.0 = 111
Note: The minimum venting area required in the Building Regulations of $1500mm^2/m$	

STEP 3 - Vent numbers/spacing

Step 3.1 - External Vents

The venting required on the opposite sides of the building is calculated by multiplying the distance (m) by the venting required (mm²/m):

Building Width:	10.0	m
Venting Required on Building Width:	1500	mm ² /m
Total Venting on Building Width	15000	mm ²
or		
Building Length:	10.0	m
Venting Required on Building Length:	1500	mm ² /m
Total Venting on Building Width	15000	mm ²
Ventilation achieved through air bricks (default is 6000mm ²)	6000	mm ²

The number of vents is determined by dividing the total venting required by the venting achieved per vent (round up):

Building Width Vents:	15000	÷	6000	=	2.5	=	3
Building Length Vents:	15000	÷	6000	=	2.5	=	3

Minimum ventilation required to provide an even flow of air across the building is 1 vent per 2m, the total vents required are therefore:

Building Width Vents:		
Minimum Vents (1 per 2m):	5	No.
Design Vents:	3	No.
Required Vents (max of above):	5	No.
Achieving ventilation	30000	mm ²
Building Length Vents:		
Minimum Vents (1 per 2m):	5	No.
Design Vents:	3	No.
Required Vents (max of above):	5	No.
Achieving ventilation	30000	mm ²

Step 3.1 - Internal Cross Ventilation

To allow cross-ventilation through internal walls, the ventilation should be a minimum of double the required vents

Vent Pipe diameter:	75	mm
No. of pipes per location (stacks)	1	
Achieves vent area:	4418	mm ² (can manual over ride vent area for other vent forms, such as spacers or air vents)

Building Width:	10.0	m																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												</
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STEP 4 - Time to fill void to explosive limits (methane)

Check the time taken to fill the void to 5% methane if there is no wind.

Time to fill to 5% methane = (Volume of void x 5%)/Surface emission rate of gas below building.

The void volume is:	10.0	x	10.0	x	0.2	=	15.0
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Time to Fill the void is determined by:

$\frac{\text{void vol. x methane (as fraction)}}{\text{surface emission rate (in m}^3\text{ per hr per m) x building area}}$							
0.70	x	15.0	x	0.0001	x	0.05	
0.75							
0.007	=	107.1	Hrs to fill void to explosive levels with no wind				

Time for void to fill must be more than 10 hours:

Yes - No Changes Required

Visqueen Gas Barrier NF-400

Features & benefits

- BDA Agreement Certification - third party accreditation
- Complies with NHBC Foundation NF94 guidance for use in Type A membrane locations - non foil system
- Complies with the methane gas transmission rate, mass per unit area and thickness requirements of BS 8485:2015 + A1:2019 - industry standard for methane and carbon dioxide protection
- Transparent - allows a clear view of the substrate during and post installation
- Multi functional - also acts as a radon and damp proof membrane
- Dual jointing methods - depending upon specification, lap joints can be heat welded or taped

Product description

Visqueen Gas Barrier NF-400 is a co-extruded, multi-layer thermoplastic gas membrane, 0.4mm thick (400 micron). The membrane is transparent with a blue tint and supplied 2.4m x 43.5m in a single wound roll.

Approvals and standards

- Third party accreditation (BDA Agreement Certificate BAB-24-339-P-A-UK)
- Complies with the methane gas transmission rate, mass per unit area and thickness requirements of BS 8485:2015 + A1:2019
- Suitable for all Characteristic Gas Situation (CS) ground gas regimes
- Complies with NHBC Foundation NF94 guidance for use in Type A membrane locations (non foil system)
- Conforms to the specification requirements of NHBC Amber 1 and Amber 2 applications
- Conforms to the specification requirements of BR 211:2023
- UKCA UKNI CE to EN 13967:2012
- Visqueen certified with Quality Management System ISO 9001:2015
- Visqueen certified with Occupational Health and Safety System ISO 45001:2018
- Visqueen certified with Environmental Management System ISO 14001:2015

Usage

Visqueen Gas Barrier NF-400 is suitable for use in all types of buildings to prevent the ingress of harmful levels of methane, carbon dioxide and radon.

The barrier can be positioned above or below reinforced cast in situ concrete floor slabs e.g. ground bearing, suspended or raft, or above precast suspended segmental subfloors, e.g. beam and block floor.

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

NHBC NF94 guidance: Radon, carbon dioxide, and methane protection

Visqueen Gas Barrier NF-400 when installed with either welded or taped joints complies with NHBC Foundation NF94 publication, Hazardous ground gas - an essential guide for housebuilders, in Type A membrane locations in precast suspended segmental subfloors and reinforced cast in situ concrete floor slabs (ground bearing, suspended or raft).

For site or zone characteristic gas situations of CS4 and above, contact Visqueen Technical Office.

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

System components

- VisqueenPro Double Sided Jointing Tape, 50mm x 10m
- VisqueenPro Detailing Strip, 300mm x 10m
- Visqueen TreadGUARD 1500, 1m x 2m
- Visqueen TreadGUARD 300, 2m x 75m
- Visqueen NF-Detailing Strip, 300mm x 10m
- Visqueen NF-60 Lap Tape, 60mm x 45m
- Visqueen NF-150 Lap Tape, 150mm x 10m

Storage and handling

When storing Visqueen Gas Barrier NF-400 care should be taken to:

- store in its original packaging;
- avoid exposure to direct sunlight and high or low temperatures for prolonged periods of time;
- store in a well-ventilated covered area to protect from rain, frost, humidity and mechanical damage;
- store away from possible ignition sources;
- store rolls of the barrier horizontally on a flat surface and not stacked.

Care should be taken to avoid accidental damage to the product when handling on site.

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

Preparation

Visqueen Gas Barrier NF-400

Visqueen Gas Barrier NF-400 should be installed on a smooth continuous surface e.g. grouted beam and block floor, a compacted blinding layer e.g. 50mm thick sand blinding, or smooth concrete blinding. The substrate should be free from irregularities such as loose aggregates or other sharp protrusions, voids, projections or mortar deposits.

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

Hand rollers are required during lap joint formation and sealing membrane detailing. Typical hand rollers include 40mm silicone pressure roller and 6mm brass penny pressure roller.

Consult the project specification to ensure the correct method of lap joint formation for the project is followed (welded or taped).

Rolls of tape should be kept in a warm, dry location prior to use to ensure the tape is workable and can be more easily applied.

Installation

Installation of Visqueen Gas Barrier NF-400 should be carried out by a competent contractor experienced with this type of product e.g. hold an NVQ Level 2 Diploma in substructure work occupations (Installation of Gas Membranes - Construction).

The installation should be subjected to third-party validation in accordance with BS 8485:2015 +A1:2019 and CIRIA C735.

Visqueen Gas Barrier NF-400 should be loose laid on the substrate ensuring that the barrier sheet edges are aligned allowing adequate overlap for jointing between the sheets. The barrier can be laid either side facing upwards.

The barrier lap area should be clean and dry at the time of jointing. The barrier has been designed to exhibit superior welding properties using hot wedge and hot air welding, therefore onsite welding of all lap joints is recommended. When hot air hand welding the lap joints, the joint should be overlapped by approximately 100mm and an approximate 35mm weld is normally achieved. During hand welding, the lap joints should be firmly compressed using a hand roller to ensure an adequate bond is achieved.

When taping the lap joints, the joint should be overlapped by approximately 100mm and bonded with VisqueenPro Double Sided Jointing Tape (positioned approximately 25mm from the edge of the sheet) and sealed with Visqueen NF-60 Lap Tape or Visqueen NF-150 Lap Tape depending on the project specification. The lap joints should be firmly compressed using a hand roller during taping to ensure an adequate bond is achieved.

Creating an effective gas barrier often requires complex three-dimensional detailing, such as around internal and external walls, corners, doorway thresholds, service pipes, party walls, and structural columns. Visqueen Detailing Strip (Pro or NF depending on the project specification) is gas resistant and can be used in place of the gas barrier to maintain continuous protection. The detailing strip lap joints should be firmly compressed using a hand roller to ensure an adequate bond is achieved. Visqueen Ultimate Preformed Units are also available.

If the barrier is punctured or perforated a patch of the same material should be lapped at least 100mm beyond the limits of the puncture and either welded in position, or bonded with VisqueenPro Double Sided Jointing Tape (positioned approximately 25mm from the edge of the sheet) and sealed with Visqueen NF-60 Lap Tape or Visqueen NF-150 Lap Tape depending on the project specification. Alternatively a patch can be formed using Visqueen NF-Detailing Strip lapped at least 150mm beyond the extents of the puncture.

Long periods of exposure to ultraviolet light will reduce the effectiveness of the barrier. The barrier should be covered by a protective layer e.g. Visqueen TreadGuard protection or other approved protection material, immediately after installation to prevent damage from following trades, ultraviolet light, etc. Care should be taken to ensure that the barrier is not punctured, stretched or displaced during or post installation.

VisqueenPro Detailing Strip is also suitable for sealing detailing junctions and patch repairs, however when the gas protection measures are to conform with the requirements of NHBC NF94 guidance, please ensure acceptance by all stakeholders prior to use.

Usable temperature range

When Visqueen Gas Barrier NF-400 is installed with taped lap joints, the air temperature should not be below 5°C or falling to prevent the risk of surface condensation affecting the tape adhesion.

When ambient temperatures are above 25°C or rising, the barrier should be covered immediately after installation.

Additional information

When used in accordance BS8485:2015 + A1:2019 a subfloor ventilation system or pressure relief may also be required.

To assist build sequencing, Visqueen Ultimate Gas DPC is available for gas protection through the wall construction.

Visqueen Gas Barrier NF-400

For further information contact Visqueen Technical Office on 0333 202 6800.

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Property	Test method	Units	Compliance criteria	Result
Dimensions	BS EN 1848-2	m	-	2.4 x 43.5
Nominal thickness	BS EN 1849-2	mm	+/-10%	0.4
Mass	BS EN 1849-2	g/m ²	>370	>370
Tensile strength - machine direction	BS EN 12311-2 method B	N/mm ²	MDV	26.3
Tensile strength - cross direction	BS EN 12311-2 method B	N/mm ²	MDV	29.4
Elongation at break - machine direction	BS EN 12311-2 method B	%	MDV	607
Elongation at break - cross direction	BS EN 12311-2 method B	%	MDV	921
Joint strength - taped joint	BS EN 12317-2	N/50mm	MDV	217
Joint strength - welded joint	BS EN 12317-2	N/50mm	MDV	405
Watertightness at 2kPa for 24 hours	BS EN 1928 method A	-	Pass/Fail	Pass
Watertightness at 2kPa for 24 hours after ageing	BS EN 1296 (12 weeks) + BS EN 1928 method A	-	Pass/Fail	Pass
Watertightness at 2kPa for 24 hours after alkali environment	BS EN 1847 (28 days) + BS EN 1928 method A	-	Pass/Fail	Pass
Resistance to impact	BS EN 12691 method A	mm	MLV	200
Low temperature flexibility	BS EN 495-5	°C	MDV	-20
Resistance to tearing (nail shank) - machine direction	BS EN 12310-1	N	MDV	265
Resistance to tearing (nail shank) - cross direction	BS EN 12310-1	N	MDV	240
Water vapour resistance	BS EN 1931 method B	MNs/g	MDV	2,296
Water vapour permeability	BS EN 1931 method B	g/m ² /d	MDV	0.08
Water vapour resistance factor	BS EN 1931 method B	μ	MDV	1,140,000
Water vapour diffusion equivalent air layer thickness	BS EN 1931 method B	SD in m	MDV	459
Methane gas transmission rate - membrane	BS ISO 15105-1	ml/m ² /day/atm	MDV	13.2
Methane gas transmission rate - welded membrane joint	BS ISO 15105-1	ml/m ² /day/atm	MDV	15
Carbon dioxide gas transmission rate	BS ISO 15105-1	ml/m ² /day/atm	MDV	22
Radon gas transmission rate - membrane	SP method	m/s	MDV	<3.0 x 10 ⁻⁹
Puncture CBR	BS EN 12236	N	MDV	1620
Tensile yield strength - machine direction	ASTM D4885-01	kN/m	MDV	8
Tensile yield strength - cross direction	ASTM D4885-02	kN/m	MDV	7.3

Visqueen Gas Barrier NF-400

Resistance to static loading	BS EN 12730 method C	kg	MDV	15
Elongation yield - machine direction	ASTM D4885-01	%	MDV	405.3
Elongation yield - cross direction	ASTM D4885-01	%	MDV	400.2
Tear resistance - trouser method A - machine direction	BS ISO 34-1	kN/m	MDV	128
Tear resistance - trouser method A - cross direction	BS ISO 34-1	kN/m	MDV	109.7
Tear resistance - angle method B - machine direction	BS ISO 34-1	N	MDV	137
Tear resistance - angle method B - cross direction	BS ISO 34-1	N	MDV	139.6

Health and safety information

Refer to the Visqueen Gas Barrier NF-400 safety datasheet (SDS).

About Visqueen

Visqueen is a leading provider of construction membrane technologies and design-based solutions for ground gas, structural waterproofing, damp proofing and fire protection.

We offer complete support at every stage of the specification, including the supply chain process. As the UK's principal technical authority, we are best placed to ensure that the principal designer and contractor specify the most technically suited, durable, and competitive solution to guarantee their project is protected for the lifetime of the building.

Visqueen is at the forefront of advanced membrane technology and innovation in the construction industry, earning the trust and loyalty of specifiers throughout the UK and Europe.

For more information, visit visqueen.com or contact our sales office at +44 (0) 333 202 6800 or enquiries@visqueen.com

Complete Range, Complete Solution



Passive Fire Protection



Gas Protection



Damp Proof Membrane



Air and Vapour Control



Stormwater



Damp Proof Course



Temporary Protection

Visqueen Technical Support

Visqueen offer a comprehensive full nationwide technical support. Our team of CSSW qualified technical support managers provide on site design-based solutions for specifiers, contractors and builders merchants, and will ensure that from design stage to installation the project is fully risk assessed and the specification is approved by all stakeholders.

Our Technical Office, can design, prepare and manage CAD detailing, together with assisting in quantity take offs, while offering advice on technical installations and product selection.

Competency & Design

Visqueen promotes competency in building design by ensuring that its technical team possesses the necessary skills, knowledge, experience, and ethical practices. The company adopts the "golden thread of information," ensuring all project data is digitally secure and accessible throughout a building's lifecycle. This approach aligns with the Building Safety Act and aims to foster accountability and compliance with evolving regulations, providing clients with confidence in the safety and reliability of their projects.

Visqueen CPD Seminars

Visqueen's CPD Seminars offer insights into Building Regulations, Standards, and industry guidance related to damp proofing, hazardous ground gas protection, and structural waterproofing. These one-hour seminars are tailored for construction design professionals and delivered by our Technical Support Managers. Visit our website



Visqueen Gas Barrier NF-400

to book a free CPD.

Visqueen Contract Design Services

Visqueen Contract Design Services offers a bespoke design service led by our team of Certified Surveyors in Structural Waterproofing (CSSW), providing experienced and specialised waterproofing design expertise for complex projects. We provide comprehensive support throughout the entire project, ensuring that all work meets the requirements of warranty providers and adheres to the highest standards of quality, reliability and current legislation.

Visqueen Training Academy

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

Visqueen RadonBlok 400

Features & benefits

- Agreement certified - third party accreditation
- Conforms to BR 211:2023 - industry guidance for radon protection
- Also provides damp proof membrane protection
- Dual jointing methods - lap joints can be taped or heat welded

Product description

Visqueen RadonBlok 400 is a flexible 0.4mm thick thermoplastic membrane. The product is purple in colour and supplied 4m x 25m in a centre folded roll. Other sizes and formats are available on request including single wound i.e. no folds.

The membrane is manufactured from virgin polymer.

Approvals and standards

- Third party accreditation (IAB certificate 05/0214)
- Conforms to the specification requirements of BR 211:2023
- UKCA UKNI CE to EN 13967:2017
- Visqueen certified with Quality Management System ISO 9001:2015
- Visqueen certified with Occupational Health and Safety System ISO 45001:2018
- Visqueen certified with Environmental Management System ISO 14001:2015

Usage

Visqueen RadonBlok 400 is used to prevent the ingress of radon in both basic and full radon protection areas. The membrane can be positioned within the ground floor construction either above or below the structural floor.

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

System components

- VisqueenPro Detailing Strip, 300mm x 10m
- VisqueenPro Single Sided Tape, 75mm x 25m
- Visqueen Top Hat Units
- Visqueen RadonBlok Double Sided Tape, 30mm x 30m
- Visqueen Radon Sump
- Visqueen NF-Detailing Strip, 300mm x 10m
- Visqueen NF-150 Lap Tape, 150mm x 10m

Storage and handling

Visqueen RadonBlok 400 should be stored horizontally, under cover in its original packaging.

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

Preparation

Visqueen RadonBlok 400 should be installed on a smooth continuous surface e.g. grouted beam and block floor, a compacted blinding layer e.g. 50mm thick sand blinding, or smooth concrete blinding. The substrate should be free from irregularities such as voids or protrusions.

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

When installing the membrane in demanding site conditions, use Visqueen NF-150 Lap Tape in place of Visqueen Pro Single Sided Tape.

Installation

Visqueen RadonBlok 400 should be loose laid on the substrate. The membrane should be clean and dry at the time of jointing. It should be overlapped by at least 150mm, bonded with Visqueen RadonBlok Double Sided Tape and sealed with Visqueen Pro Single Sided Tape.

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

Airtight seals should be formed around all service entry points. Visqueen Preformed Top Hat Units should be used for sealing service entry pipes. The base of the top hat and the upstand should be bonded using Visqueen RadonBlok Double Sided Tape and sealed with Visqueen Pro Single Sided Tape. The upstand should be secured with the supplied jubilee clip. Alternatively VisqueenPro Detailing Strip or Visqueen NF-Detailing Strip can be used to seal service entry points. The upstand should be secured with a jubilee clip.

Visqueen RadonBlok 400

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

If the membrane is punctured or perforated a patch of the same material should be lapped at least 150mm beyond the limits of the puncture and bonded with Visqueen RadonBlok Double Sided Tape and sealed with Visqueen Pro Single Sided Tape. Alternatively a patch can be formed using Visqueen Pro Detailing Strip or Visqueen NF-Detailing Strip and lapped at least 150mm beyond the extents of the puncture.

Long periods of exposure to ultraviolet light will reduce the effectiveness of the membrane. The membrane should be covered by a protective layer immediately after installation to prevent damage from following trades, ultraviolet light, etc. Care should be taken to ensure that the membrane is not punctured, stretched or displaced when applying a screed or final floor covering. A minimum thickness of 50mm screed is recommended.

When reinforced concrete is to be laid over the membrane the wire reinforcements and spacers must be prevented from puncturing the membrane. Where there is a high risk of potential damage, the membrane should be covered with Visqueen TreadGUARD protection, screed, or other approved protection material before positioning the reinforcement.

When used in full radon protection areas, a Visqueen Radon Sump or subfloor ventilation system maybe required.

Usable temperature range

When taping joints, it is recommended that Visqueen RadonBlok 400 and all associated system components should not be installed below 5°C.

Additional information

Where ground gas protection is required to BS 8485:2015 + A1:2019, use Visqueen Gas Barrier or Visqueen Gas Barrier NF-400 systems.

To assist build sequencing, Visqueen Zedex CPT DPC is available for radon protection through the wall constructions.

For additional detailing information, contact Visqueen Technical Services +44 (0) 333 202 6800.

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Property	Test method	Units	Compliance criteria	Result
Length	BS EN 1848-2	m	-1	25
Width	BS EN 1848-2	m	-1	4
Thickness	BS EN 1849-2	mm	-1	0.4
Tensile Strength - MD	BS EN 12311	N/mm ²	MLV	15
Tensile Strength - CD	BS EN 12311	N/mm ²	MLV	15
Tensile Elongation - MD	BS EN 12311	%	MLV	400
Tensile Elongation - CD	BS EN 12311	%	MLV	400
Joint Strength	BS EN 12317-2	N	MLV	250
Watertightness to 2kPa for 24 hours	BS EN 1928	-	Pass/Fail	Pass
Resistance to impact	BS EN 12691	mm	MDV	>200
Durability (artificial ageing)	BS EN 1296 and BS EN 1928	-	Pass/Fail	Pass
Durability Chemical Resistance	BS EN 1847	-	Pass/Fail	Pass
Resistance to tearing (nail shank) MD	BS EN 12310-1	N	MDV	225
Resistance to tearing (nail shank) CD	BS EN 12310-1	N	MDV	230
Water vapour transmission - resistance	BS EN 1931	MNs/g	MDV	1193
Water vapour transmission - permeability	BS EN 1931	g/m ² /d	MDV	0.12
Diffusion equivalent air layer thickness	BS EN 1931	m	MDV	160

Visqueen RadonBlok 400

Low temperature flexibility	BS EN 495-5	°C	Pass/Fail	-25 °C
Radon Permeability	SP Test Method	m ² /s	MDV	7.5x10 ⁻¹²
Visible defects	BS EN 1850 -2	-	Pass/Fail	Pass
Reaction to Fire	BS EN 13501-1	Class	MDV	F

Health and safety information

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Visqueen RadonBlok 400

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