

Code of Practice

Protection of Structures from Ground Gases



September 2020



Code of Practice for the Protection of Structures from Ground Gases

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1. INTRODUCTION

The protection of buildings and structures from hazardous ground gases has its own unique considerations. Options for protection will be dependent on many factors including, previous land use, intended use of the type and size of the building, site conditions, type of gases present, and the hazards associated with them.

In recent years, the importance of ground gas protection on sites where hazards exist has become a critical element of the success of many projects. High profile failures have highlighted the real risk to life and health that inadequate, or ill-conceived ground gas protection measures have failed to eliminate.

Where a need for ground gas protection has been identified by the site investigation report, it is advised that a specialist in ground gas protection should be engaged at the earliest design stage of the building. Early involvement of a specialist will maximise the chances of a successful scheme while reducing costs and the likelihood of defects and failure.

This Code of Practice details the considerations and broadly defined steps that should be adhered to, in order to minimise the risk of failure when providing measures that protect buildings from hazardous ground gas.

This Code of Practice is issued by the Property Care Association hereinafter referred to as ‘the Association’. This Code of Practice is aimed at providing guidance for contractors, specifiers and other specialists involved in the planning and provision of buildings and structures that are at risk of hazardous ground gases ingress and is based on current best practice.

Information is also given on associated matters and, where appropriate, references made to other documents, legislation etc.

2. DEFINITIONS

For the purpose of this document and for reference, the following definitions are listed:

DETAIL DESIGN

The documents that show refined design plans, specifications and estimates that achieve the required performance needs. Detailed design will include outputs such as 2D and 3D models, drawings, and product specifications as well as information about sequencing and installation process.

GROUND GAS

Gases that emanate from the ground, soil, bed rock, natural deposits or buried materials that are hazardous to health or may poses risks of explosion or damage to the building.

GAS RESISTANT MEMBRANE

Membrane placed above or below or within the floor slab construction (and walls of a basement) to restrict, control or prevent the incursion of gas from the ground into a building

GAS RESISTANT DAMP PROOF COURSE

A barrier designed for use in applications where combined **damp proofing** and **gas** protection is required.

GAS VALIDATION PLAN

The section of the site investigation report or a report in its own right, that sets out the gas resistance measures required and the type and frequency of independent verification required to be compliant with regulation, and/or, local authority building control requirements.

GROUND GAS PROTECTION

Measures taken to control or eliminate the ingress of gases from the ground entering any spaces within buildings.

GROUND GASES REQUIRING ACTION

Methane

Carbon Dioxide

Carbon Monoxide

Volatile organic compounds (VOC)

Hydrogen Sulphide

Hydrogen

Radon

NOTE: The above is a list of the more commonly encountered ground gases that may require control measures. This list is not exhaustive.

HYDROSTATIC PRESSURE

Water pressure exerted as a result of hydrostatic head pressure created by water.

LIQUID APPLIED GAS RESISTANT MEMBRANE

A monolithic membrane that is applied as a liquid by brush, spray, or roller that when cured forms a barrier to the passage of ground gases.

PERIMETER & INFILL

Also known as perimeter install, this is where the membrane is installed to the external and sometimes internal wall footprint of the building to allow the walls to be built, the remaining membrane is then installed at a later point in the build process.

RENDER

The term 'render' refers to any applied coat which is made up of a sand:cement mix only and can be used for coatings applied internally or externally. It may incorporate water-resisting admixtures, accelerators, plasticisers, or other approved additives. Cement based renders are not considered to be a gas resistant measure in their own right.

STRESS

Stress is the pressure that builds up within the elements of a structure to resist applied loads and/or pressures.

TANKING

The term 'tanking' refers to a pressure resisting waterproofing system that is applied internally or externally to a structure, which will prevent any lateral penetration of liquid, either by capillary action or by hydrostatic pressure.

SITE INVESTIGATION REPORT

The report prepared by a suitably qualified and experienced geotechnical engineer that identifies the ground gas hazards present and quantifies the risk.

SLIP PLANE

A slip plain is a horizontal joint where there is a discontinuity of building materials that are not fully bonded to one another. This in certain circumstances, can allow the superstructure to move independently of the substructure acting about the slip plane that is created by the inclusion of a DPC or gas protection membrane.

VAPOUR CHECK

Any layer which reduces the passage of water vapour, resulting in a build-up of humidity immediately behind it.

VAPOUR CONTROL LAYER

A vapour control layer is a strategically placed vapour check, used where control of water vapour is required.

VAPOUR RESISTANCE

The ability to resist water vapour.

GEOCOMPOSITE VOID FORMER/ VENT MAT

A preformed engineered product usually laid below the base slab to create a ventilated void and direct ground gases away from the structures above.

WATERPROOF

A material or layer that is impervious to the passage of water.

WATERPROOFING

The application of a material that is impervious to water.

WATER VAPOUR

Water in its gaseous phase.

3. THE OBJECTIVES AND PRACTICE FOR GROUND GAS PROTECTION OF STRUCTURES

The objective of ground gas protection in buildings is to achieve effective control of hazardous ground gas, in order to preserve life and protect the health of occupants or users. Ground gas protection measures must also be delivered in a way that prevents damage or deterioration to the property or any of its elements.

Any ground gas protection system must first consider the site conditions and the hazards that are found to be present. The system must deliver a solution that can be installed successfully and will deliver the performance characteristics required to eliminate risk as far as is practicable and assure a built environment that is safe for occupation. To achieve this, the designer must consider the structure as well as the prevailing soil and ground conditions together with the gas hazards that have been identified in the site investigation report.

It is important that during all stages of the design process the designer, specialists and the operators installing the ground gas protection systems establish robust channels of communication.

Regular and clear communication coupled with good site supervision will allow variations and amendments to the design to be planned and executed without compromising the overall effectiveness of the ground gas protection system.

4. SITE INVESTIGATIONS FOR GROUND GASES / HAZARD AND RISK ASSESSMENT

The design requirements for any ground gas protection system will be dictated by a number of variable factors, including the use and design of the structure. However, the underlying ground conditions, the presence of harmful gas or contamination that has the potential to release harmful gases are primary considerations.

The processes of site evaluation and risk assessment for carbon dioxide and methane are set out in BS8485:2015+A1:2019. The process of conducting ground investigations and establishing the presence of and likely risks from harmful ground gas, is a task performed by a suitably trained and competent geotechnical engineer.

Section 5 of BS8485 describes the process of ground investigation and provides a flow chart that illustrates the process that must be followed when characterising and assessing a potentially contaminated site.



The designer of any ground gas protection measure should be able to recognise the adequacy of the site investigations.

Table 1 within section 5 of BS8485 provides useful guidance on this process.

Designers should be aware of any conceptual site model that has been prepared by the engineer(s) as part of the site investigation and site modelling. Any ground gas protection system must consider the content of the conceptual site model.

Section 6 of BS8485 describes the processes that must be observed to ensure the correct characterisation and risk assessment of the site.

A description of how the hazard classification is described by allocating an indicative characteristic gas situation (CS number), is set out. Information is given to illustrate how the gas screening value (GSV) is used to define the CS number appropriate to the site.

Table 2 of the BS8485 describes how the information collected from the site investigation is used to inform the allocation of the CS value.

Section 7 of BS8485 goes on to classify building types. In table 4 the standard sets out the gas protection score that must be attained by the gas protection system for any given building type that is to be constructed on a site with any derived CS number.

The designer of the gas protection system must rely on the information provided by the geotechnical engineers. The CS requirement in combination with the building type, will dictate the levels of protection that must be delivered in the design of the ground gas protection system.

Though the designer of the gas protection system is not usually responsible for the ground investigations or the allocation of the CS number, the designer must be able to recognise that the processes outlined in sections 5-7 of BS8485 have been undertaken appropriately by a suitably trained and qualified geotechnical engineer.

Designers of any ground gas protection system should be satisfied that the ground evaluation report and risk assessments are suitable and sufficient and that the authors of the report detailing the site risk and CS number are competent and qualified and their professional advice is protected by an appropriate level of indemnity insurance.

5. PRINCIPLES OF DESIGN

Once the site conditions and the proposed building is fully understood and objectives and instructions are defined, it is the role of the ground gas protection specialist to configure products and systems within that structure in order to afford the required levels of ground gas protection. The Designer must also consider the appropriate factors detailed within this Code of Practice so that the objectives of the proposed ground gas protection system are successfully met, and structures and occupants are protected from the risk of harmful ground gas in the long term.

The Designer must understand the risk classifications allocated to the site (CS number) as well as the nature of the physical characteristics of the gases that have been identified in the geotechnical reports and risk assessments. The building type, its intended use and the proposed structural characteristics of the building must also be known and must be considered by the designer.

The methods commonly adopted in order to deliver ground gas protection are set out in BS 8485:2015+ A1 2019 section 7.1. These are described as:

- Ventilation Measures
- Structural Barrier
- Gas Resistant Membrane

These measures may be used singly or in combination, where appropriate to the risk present, type of construction and property type to achieve the desired gas protection score.

To arrive at a logical design solution, the designer must balance these three mitigation methods against the Building Type (there are A,B,C,D, etc. categories for residential, commercial, industrial buildings etc.) and then balance these against the type of gases that have been found to present a risk at the site. A key factor in determining Building Type A, B or C is what form (if any) Building Management Controls will be implemented. It should also be noted that within a single building more than one building type may be present such as a Type D warehouse containing Type C offices.

This must then be set against the CS value set to determine the minimum ground gas protection score of 0 – 6 (the GSV screening and subsequent calculations determines the CS Value) that has been determined for the site by the geotechnical engineer.

In order to achieve effective protection, the British Standard attributes different gas mitigation methods with certain values. For example, a sealed and pressurised membrane system that combines both waterproofing and ground gas protection would attract the following points:

- Basement construction to Grade 3 standard – 2.5 points (only the Type B waterproofing is present)
- Integrity tested combined gas protection / waterproofing membranes – 2 points
- Active ventilation element – 2.5 points / or pressure relief element – up to 0.5 points

With a maximum of 7 points, such a solution could provide effective gas protection as required by BS8485 for most CS value classification and building type combinations.

NOTES: When considering the design of a ground gas protection system, it is essential that consideration be given to the means of construction as well as how the integrity of the system is maintained, as follows on trades interact with and build upon the installed system.

Section 7.2.1 of the British Standard states that “No more than one element of each type (i.e. from each table) should be combined to achieve the recommended gas protection score”.

6. DESIGNER

Many failures with ground gas protection are attributable to insufficient consideration of the relevant factors, leading to poor or inappropriate design. It is therefore essential in any situation where buildings are required to include protection against gases from the ground, that a competent specialist with experience commensurate to the challenges of the individual project and the site, are sought at the earliest possible opportunity.

The Association provides training for designers of ground gas protection systems: <https://www.property-care.org/training-qualifications/>

The designer should be able to demonstrate experience in the delivery of similar ground gas protection projects taking into account scale and complexity of the site, project and ground gas risk. The designer must ensure they are protected with levels of liability insurances commensurate with the needs of the client and the risk.

The geotechnical engineer must take liability for the evaluation of the site and the assessment and quantification of the risk associated with ground gas. The engineer may also be liable for advising the developer of the suitability of the site for its intended use.

The designer of the ground gas strategy will be responsible for the development of the design and specification of a suitable and sufficient ground gas protecting system that is based on the information contained in the site investigation report or gas validation plan. This must demonstrate that the designer has taken into consideration all the factors that are relevant to this function.

7. SURVEYING

It is not always possible or necessary for the specialist responsible for producing the design detail, to undertake a physical site visit to conduct a visual inspection. This is often impractical and without any value where a new building is still at the planning stage.

Where gas protection measures have been identified as a requirement in the renovation or refurbishment of an existing building, or part way through the construction of a new building, then a site survey may well be highly informative and enable greater accuracy in the creation of design detailing and work scheduling.

8. CONTENTS OF A GROUND GAS PROTECTION REPORT AND SPECIFICATION

In order that the designer can properly discharge their obligations to their client we recommend that any submission made should contain the following minimum levels of information.

The report should include reference to the following:

- Confirmation of clients' instructions.
- Identification of ground gas hazards on site that includes a reference to how this information has been obtained.
- CS classification, including a reference to how this information has been obtained.
- Sources of any ground gas including where, and how, this information has been obtained.
- Building type and use.
- Proposed method of providing gas protection commensurate with the identified hazards and risks (protection scores).
- Detailed specification that includes reference to the suitability of the products that are recommended.

In all situations where ground gas protection measures are recommended, the specialist should include the following advice:

- The extent of the ground gas protection measures must be clearly indicated. If a full ground gas protection system is not being specified, then the reasons for this should be stated and the risks arising from a partial system explained.
- Preparation works and who has the responsibility for completing these tasks.
- Implications of damage to membranes and ventilation layers by follow on trades and other site activity.
- Process for reporting and rectifying damage.
- Advice on fixing to/through the system to avoid puncturing the system in the future.
- Drawings showing areas to be protected and other relevant details.

Where ground gas membranes are specified, advice should include the following information:

The type of ground gas protection membrane that is being specified must be clearly indicated together with the number of points that are being gained through the adoption of the measure. Construction design details relevant to the site and the building being proposed, that include:

- Openings and apertures or obstacles
- The intended method of jointing and forming seams or welds
- Interfaces will be connected to moisture control layers such as moisture control layers
- Openings or apertures in the structure

Information about construction scheduling and advice to follow on trades should be set out along with information on what to do if membranes or joints or interfaces become damaged, perforated or otherwise compromised as a result of accidental damage, exposure to wind or other natural elements.

NOTE: Where a gas resistant membrane forms part of the proposed solution, the need for independent verification of the installed system in accordance with CIRIA C735 is explained. Without verification the protection points score cannot be assigned. Where a ventilated system is specified, advice should include the following information:

The type of ventilated system that is being specified must be clearly indicated together with the number of points that are being gained through the adoption of the measure.

Construction design details relevant to the site and the building being proposed.

Detailed plans for the openings and apertures including information on how the ventilation system will be connected to openings or apertures in the structure or to ductwork and connecting elements of the forced ventilation systems.

Information confirming that the specification and detail design for the ventilation system meets the design requirements set out by the geotechnical engineer, architect, and verification plan.

There are 3 main types of ventilation systems for a ground gas membrane installation.

- *A fully designed vent mat and ventilated void system (covering the full floor area that requires protection).*
- *A pressure relief system – this is where vent mat, granular blanket, gravel or pipework is installed at regular intervals and is connected to external ventilation, commonly at a maximum of 6m spacings and where possible always across the shortest section of the building (BS8485 states “all gas protection systems should include at least pressure relief)*
- *An active or powered ventilation system – this is where pipework or vent mat is installed and powered fans either input or extract air to create air changes that have been dictated by the geotechnical engineers’ calculation. Specialist fans are required for this form of ventilated system.*

NOTE: Powered fans require maintenance and periodic repair and replacement. A schedule of inspection, maintenance and renewal must be implemented where elements with moving parts are critical to the gas protection system.

The report should also detail the method used to calculate the required flow rates that are necessary when determining the profile of any ventilated voids.

NOTE: Where a Cementitious Multi Coat render system is recommended or liquid applied membrane, the report should include reference to:

The type of ground gas protection product being specified must be clearly indicated, together with the number of points that are being gained through the adoption of the measure.

Construction design details relevant to the site and the building being proposed, that include:

- Openings and apertures or obstacles.
- Interfaces will be connected to moisture control layers.
- Openings or apertures in the structure.
- The application process and information on set times and cure times if appropriate.

- Any protection from frost or excessive temperatures that may be required at different times of the year to prevent damage as products cure.

Information about construction scheduling and advice to follow on trades should be set out along with information on what to do if the multicoat system and its interfaces become damaged, perforated or otherwise compromised as a result of accidental damage, exposure to wind or other natural elements.

9. INSTALLATION AND APPLICATION OF GROUND GAS PROTECTION SYSTEMS

General

Ground gas protection systems should always be applied and installed by those who are properly trained and competent. Installers should be experienced in using the products and methods that are specified and must be fully aware of the implications of any defects or issues that lead to a lack of continuity.



Individual technicians should be skilled, knowledgeable, and experienced. Where appropriate and available they should have attained a relevant qualification.

Installers must ensure they are protected with levels of liability insurances that are commensurate with the needs of the client and the risk.

Technicians credentials may include the NVQ Level 2 in the Application of Ground Gas Protection Systems, evidence to demonstrate that they have received the appropriate training.

The installer should be able to demonstrate experience in the delivery of similar ground gas protection projects, taking into account scale and complexity. The installers should also be experienced in the application, jointing and handling of the product types that are specified for the project. In some circumstances it may be admissible for experienced technicians using unfamiliar products to be mentored and supervised by more experienced personnel. If this situation occurs the experienced

technician must take responsibility for the quality of the installation until such time as those being mentored are considered competent and proficient.

Before works commence on site it is imperative that the project is subject to a pre-start meeting. This may be called by the developer or site manager as a matter of good practice however, in every event where ground gas protection measures are to be delivered the contractor should insist on a meeting that includes the individuals who have control of the project planning and coordination of those working on or delivering to the site.

At the prestart meeting, processes to ensure the following should be agreed.

- Site preparation.
- Preventing disturbance and damage of the ground gas protection measures during works.
- How interfaces with other building elements will be constructed.
- Protection of ground gas protection systems before and during encapsulation.

- Reporting of damage to the ground gas protection system and the importance of competent repair.
- Implications of defects and failure.
- The process of inspection and verification.

Specifications and installation processes provided by manufacturers for products will inevitably vary. This is the case for products that may appear to be similar and that provide the same or similar levels of performance. It is important that all installers liaise closely with a manufacturer and make reference to product data sheets and material safety data sheets in order to establish exactly how their system should be applied. In all situations the manufacturer's instructions must be adhered to.

Site Preparation / Programming and Communication

In all situations where ground gas protection systems are to be installed the site should be suitably prepared in order to ensure efficient installations can be scheduled and executed to minimise the risk of damage and optimise its effectiveness.

Pre-start meetings and clear communications with site coordinators, ancillary trades and any third-party system verifier are advised in all situations. These open and clear lines of communication should be maintained throughout the full contract period.

The work area must be prepared and built out to the appropriate point before work to install or apply ground gas protection measures commence. This is important to ensure the intended system detailing can be delivered effectively and without compromise.



Completion and Protection

During the installation process and after the ground gas protection measures are installed, every effort must be made to ensure they are protected from damage. These may include:

- Site briefings.
- Warning and information notices.
- Temporary barriers and the establishment of exclusion areas.
- Temporary protection boards etc.

It is often desirable to schedule works in a way that ensures that the gas protection measures are covered by the subsequent building elements as soon as possible, to minimise the risk of accidental or weather induced damage.

Communication and responding to reports of damage

It is critical that any damage to the gas protection systems are identified and repaired before they are concealed by follow on works. The critical nature of defects and damage must be understood, and every effort must be taken to rectify defects or damage as soon as they become apparent.

Site co-ordinators, foremen and other site workers should be provided with information to allow any damage or apparent defect in the ground protection system to be reported to the specialist ground gas protection contractor.

This may include information that can be delivered as toolbox talks, site briefings, posters of signage that include information on what to do, and who to contact if damage is noticed.

Repair and Variations

In the event that ground gas protection systems are damaged or compromised and require repair, or where detailed design is found to require alteration or amendment, these should be recorded and reported in detail.

Design variation can take many forms and are common at the early stages of a build. It is important to understand that changes in design by others may have an impact of the design, efficiency, or execution of the intended ground gas protection system.

Where any significant changes to the planned building or the construction programme are made, the design details for the ground gas protection system and the implications to the performance of the ground gas measures must be evaluated. If necessary, the detailed design of the ground gas protection measures should be amended or changed to prevent compromise.

The client, project designer and the third-party verifier should all be informed of any damage repairs, significant specification changes or amendments to the proposed design details.

10. INSPECTION AND VERIFICATION

Third party verification of the ground gas protection system is often a condition of the planning process and requirement of local authority building control. It is also needed to be compliant with table 7 within BS8485 in order to allocate the protection score.

System verification is therefore a requirement that is set out by the developer, architect, or main contractor.

Verification is an essential part of gas protection. Gas protection measures may consist of a number of design features including ventilation, structural barriers and membrane barriers, all of which are required to be considered within the verification process. The existing standard that describes the role and responsibilities of the verification specialist is **CIRIA: Good practice on the testing and verification of protection systems for buildings against hazardous ground gases (C735)** and **BRE211, Radon: Guidance on protective measures for new buildings**.

The role of the verifier is to assess the suitability and viability of the gas protection system that has been proposed for any given site and to ensure the system is installed without defects that will compromise the safety of the buildings occupants.

The verifier should be involved at the early stages of building design to ensure the suitability of the ground gas protection measures that are being proposed. The verifier will prepare a verification plan that will set out the requirements for gathering data to demonstrate the gas protection system meets its intended aims and objectives.

The verifier will later inspect and where appropriate, test the ground gas protection systems during the construction phase.

The verifier must identify and report on the installation of the ground gas protection measures before they are concealed or covered by sequential building elements. The findings of these inspections are reported to the main contractor and the contractor undertaking the installation of the ground gas protection measures.

The purpose of these verification inspections are to identify any defects or design shortfalls that may negatively affect the efficacy of the ground gas protection measures, and to reduce the likelihood of failures in the ground gas protection system that could result in harm to the occupants of the building.

To achieve this the process of verification requires that sufficient and suitable evidence be obtained to demonstrate that the gas protection measures have been installed as required and that they conform to the design, specification, and installation methodology. Steps may also be required to provide evidence that the installed measures are working and effective.

When the verifier is satisfied that the design and installation of the ground gas protection measures are adequate and have been installed correctly to achieve the required level of protection, a certificate of verification will be issued by the verifier. Copies of this may be made available to the installing contractors.

Qualification and Competence

The individuals responsible for verifying the ground gas protection system must be properly trained and competent. Verifiers must possess the appropriate levels of skill, expertise, and experience appropriate to the gas risk, scale, and complexity of the proposed construction.

Verifiers who provide professional advice, guidance or opinion must ensure they are protected with levels of professional liability insurances that are commensurate with the needs of the client and the risk.

Verifiers should have achieved or be working towards Level 4 NVQ Diploma in Verification of Ground Gas Protection Systems.

Conflicts of interest

Verifiers must operate independently and free of external influence. They should have no commercial links to the company or individuals that supply or install the gas protection measures that they are asked to verify and must avoid any conflicts of interest.

Issuing combined installation and verification contracts may risk increasing the likelihood of conflicts of interest, so should be avoided. Verification companies or individual verifiers must consider and make known any potential conflict of interests to all interested parties, if they are involved in any activity other than verification with the system installer, product supplier, developer or installing contractors.

The amount of verification required for a particular project is highly variable and is dependent on the gas regime, overall risk, complexity of the design and installation methodology and qualifications of the installing technicians.

Independent verification should be applied to all aspects of the gas protection system including structure, membrane, and ventilation. It is normally the decision of the Verification Specialist on how much is required and this should be set out in the verification plan.

Verification Plan

It is a requirement of C735 that a Verification Plan is produced ahead of works commencing. This document collates the available information and the Verification Specialist decides how much verification and by what methods are to be implemented at the project.

The Verification Specialist will require documentation to complete their work, including:

- Ground Gas Assessment
- Health & Safety Requirements and Warnings
- Development Plans
- Detailed Ground Gas Protection Design (remember ventilation, structural and membrane)
- Materials specifications (those relevant to gas protection)
- Installation Methodology including defect repair
- Installers qualifications
- Build Schedule
- Contact details for key persons

Verification Inspections

Inspections will be carried out by the Verification Specialist at key points of the gas protection installation.

Note: It is essential that the verifier is given has good channels of communication to ensure they can attend site at the appropriate times with the correct equipment and to ensure the installation operatives are present to effect repairs as necessary during the verification visit.

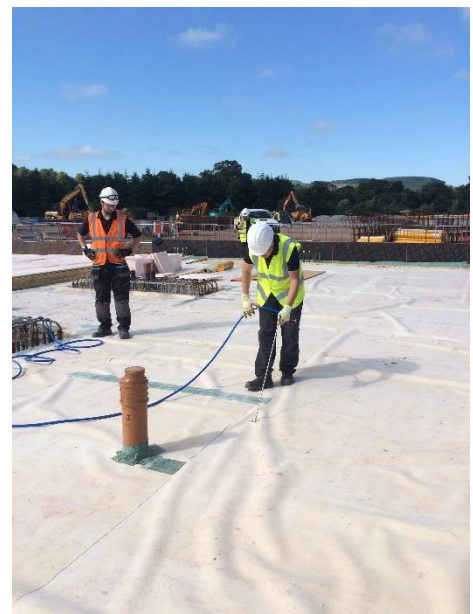
Most documentary information is collected on site using visual inspections and taking measurements. This is typically supplemented using one or more non-destructive integrity test methods, such as air lancing, dielectric, tracer gas testing and continuous gas monitoring or radon gas monitoring.

Destructive tests may also be requested. This requirement and the implications of such testing should be detailed within the verification plan. Where destructive testing is carried out this should be detailed and documented, and an allowance should be made for subsequent repairs to the gas protection system.

Where the verifier identifies serious defects or deficiencies that have been repeated several times, then they should request immediate action is taken to address the issues raised. They are at liberty to increase the amount of inspection required.

Accidental Damage

Damage can occur after the gas protection system is installed and the verification process has been completed. The verifier can and will revoke previous certifications where evidence of damage is reported.



Verification Reporting

Following completion of verification, a report and certificate is typically issued to the client detailing the works and documentary evidence and comprehensive illustrative photographs to support written observations.

Note: The Verification Specialist may also request evidence from the installing contractor for work they have not seen, or for confirmation of specifications of materials used or qualifications of the installing operatives. Delays, additional costs, and the possibility that the works cannot be fully verified, will result if this information is not forthcoming.

11. OTHER SOURCES OF INFORMATION

This Code of Practice should be read in conjunction with:

British Standards

From: BSI Publications, Linford Wood, Milton Keynes MK14 6LE

- BS 8485:2015 A1 2019 – Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings
- CIRIA Guidance 735 – Good Practice on the Testing and Verification of Protection Systems for Buildings Against Hazardous Ground Gases
- BS8102: 2009 – Code of Practice for Protection of Below Ground Structures Against Water from the Ground

BRE

From: BRE Bookshop, BRE, Garston, Watford WD2 7JR

- BRE Digest 211 – Radon: Guidance on Protective Measures for New Buildings

Property Care Association

- Downloadable from www.property-care.org

For further information, contact:

Property Care Association

11 Ramsay Court

Kingfisher Way

Hinchingbrooke Business Park

Huntingdon

Cambs.

PE29 6FY

Tel: 01480 400000

Email: pca@property-care.org

Web: www.property-care.org

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