

NHBC Risk Guide

Radon/Gas protection (Revised 01/24)

(Refer BRE Reports BR211, BR414 and GBG 47, CIRIA Reports C735 and C801, NHBC/RSK Group Plc 'Guidance on evaluation of development proposals on sites where methane and carbon dioxide are present' and NHBC Foundation NF94)

This NHBC Risk Guide covers the following key areas:

- Radon protection
- Other gas protection
- Gas protection measures
- General requirements and considerations for radon and other gas protection.

Site ref:..... Site manager:..... Inspector:.....
 Date:..... Signature:..... Signature:.....

Radon protection		
Is radon gas present?	Yes / No	
If unsure, check with NHBC Technical Operations for clarification		
Please specify floor design and level of protection required:	Ground bearing	Suspended
Basic:		
Full:		
<p>Note: In areas requiring basic radon protection, sufficient protection will be provided by a well-installed 0.4mm thick/1600 gauge damp proof membrane (DPM) modified and extended to form a radon barrier across the footprint of the building.</p> <p>Note: Buildings in areas of higher radon potential (applicable to approx. 10% of the UK) should include full radon protection. This requires a radon barrier across the footprint of the building supplemented by provision for subfloor depressurisation or ventilation via either a sump or a ventilated subfloor void.</p> <p>Note: Where the site is in an area of high or fluctuating water table, there is a risk radon sumps may become flooded or waterlogged. In such cases, waterproofing or tanking also suitable as a radon barrier should be used to prevent water ingress and provide radon protection.</p> <p>Note: Refer to BR211 Radon; Guidance on protective measures for new buildings (including supplementary advice for extensions, conversions and renovations) 2023 edition for further guidance on radon and radon protection measures.</p> <p>Note: UK radon maps may be viewed at www.ukradon.org/information/ukmaps.</p>		
Please specify the radon barrier to be installed:		
Note: Recycled products are not suitable for use as radon barriers.		






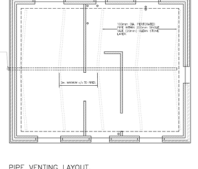






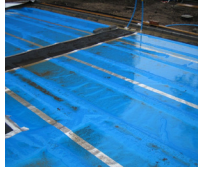


Other gas protection			
Is the site contaminated or potentially at risk of contamination migrating from an adjacent or nearby site?	Yes / No		
Is methane, carbon dioxide or other hazardous gas (eg hydrocarbons or other volatile organic compound) present?	Yes / No		
If unsure, check with NHBC Technical Operations for clarification			
Has the level of gas regime been defined?	Yes / No	Amber 1	Amber 2
		Moderate Risk ←→ High Risk	
		CS2	CS3
<p>Note: Amber 1 and Amber 2 relate to NHBC/RSK Group Plc 'Guidance on evaluation of development proposals on sites where methane and carbon dioxide are present' Report Edition No.: 04 March 2007. CS2 and CS3 are Characteristic Situations that relate to CIRIA C665 'Assessing risks posed by hazardous ground gases to buildings' 2007 edition.</p> <p>Note: Ensure the remediation method statement, risk assessment and verification plan have been accepted by NHBC Technical Operations in advance of the works. Copies of these documents should also be available on site.</p> <p>Note: Amber 2/CS3 gas regimes are considered high risk. In addition to the Note above, it is essential for plots so affected that construction details and material specifications are also agreed in advance of the works. This information should also be available on site.</p> <p>Note: Verification of the installation of gas protection for Amber 2/CS3 sites must be by an independent certifier. The verifier must not be the installer.</p> <p>Note: Prolonging presentation of verification of installation evidence post construction will be difficult, costly and disruptive, and may not necessarily be accepted.</p> <p>Note: Designs may be submitted referring to NHBC Foundation NF94. Check with NHBC Technical Operations on a site specific basis that these have been accepted prior to works commencing.</p>			

Gas protection measures

Have gas protection measures been agreed with NHBC Technical Operations?		Yes / No	
Please confirm floor design, membrane specification, sub slab ventilation and ventilator requirements:			
		Ground bearing	Suspended
Membrane specification	Straight Polymeric, eg polyethylene		
	Reinforced product		
	Multi-layer with aluminium insert		
	Hydrocarbon		
	Specialist membrane		
<p>Note: Membranes to be minimum 0.3mm thick/1200 gauge (0.4mm thick/1600 gauge for radon). Product/material datasheets, or preferably Agrément Certification, should provide permeation data for gases</p> <p>Note: Recycled products are not suitable for use as radon and/or gas membranes.</p> <p>Note: Gas membranes should be suitable for the level of gas risk, nature of construction and durable.</p> <p>Note: Provide temporary protection. Gas membranes should not be left exposed for prolonged durations to avoid damage by follow-on trades, weather conditions (eg wind, frost, rain or sunlight) or other potential hazards. If unsure, check with the membrane manufacturer.</p> <p>Note: Aluminium insert gas membranes should not be located where in direct contact with concrete as either part of a floor or screed. Minor damage such as tears or puncturing of the membrane can instigate aluminium corrosion.</p> <p>Note: Specialist gas membranes may be required on heavily contaminated sites where multiple gases may be present.</p> <p>Note: Designs may be submitted referring to NHBC Foundation NF94. Check with NHBC Technical Operations on a site specific basis that these have been accepted prior to works commencing.</p>			
Sub slab ventilation	Clear void		
	Void former/geocomposite layer		
	Granular venting blanket		
	Venting pipes		
Ventilators	Air bricks		
	Telescopic vent connectors		
	Vent boxes		
	Other		
<p>Note: Sub-slab ventilation (for pressure relief) is required where gas protection is needed.</p> <p>Note: Details of the approach, be it for a ground bearing or suspended floor, shall be designed and identified on construction layout drawings and details.</p> <p>Note: Solutions for ground bearing floors require specialist design.</p> <p>Note: Venting pipes should be interleaved to prevent short circuiting and have more than one inlet and outlet point.</p> <p>Note: Where the site is in an area of high or fluctuating water table, there is a risk sub slab ventilation may become waterlogged or flooded. Specialist advice is required.</p> <p>Note: Designs may be submitted referring to NHBC Foundation NF94. Check with NHBC Technical Operations on a site specific basis that these have been accepted prior to works commencing.</p>			
Has a specialist installer been employed to install the barrier system?		Yes / No	
<p>Note: In all instances the installer should be competent, familiar and appropriately experienced in gas membrane installation.</p> <p>Note: For all Amber 2/CS3 sites, installers should be suitably qualified. A NVQ Level 2 is one example of a suitable qualification.</p> <p>Note: Verification of the installation of gas protection for Amber 2/CS3 sites must be by an independent certifier. The verifier must not be the installer.</p> <p>Note: Designs may be submitted referring to NHBC Foundation NF94. Check with NHBC Technical Operations on a site specific basis that these have been accepted prior to works commencing.</p>			

General requirements and considerations for radon and other gas protection

<p>The barrier should be continuous across the whole footprint of the building, including:</p> <ul style="list-style-type: none"> taking it through or under internal wall and external walls, continuing across party or separating walls, provide an air tight seal around any penetrations through the barrier, tapes, lapping and jointing should be specified in the design. <p>Where the barrier crosses the cavity, a cavity tray should be formed to prevent the ingress of water. Correct installation of the cavity tray is of equivalent importance in this respect.</p>	<p>Ensure the following where subfloor ventilation is provided:</p> <ul style="list-style-type: none"> air bricks are not restricted eg by raised external ground levels, meter boxes etc they are positioned at 2m maximum centres, not more than 450mm from corners and installed on two opposite sides if periscope subfloor ventilators are located entirely below the barrier, they do not need to be gas tight. Where vents are located above or penetrate the barrier, any joints (telescopic or otherwise) or sliders require gas tight seals.
<p>Note: Designs may be submitted referring to NHBC Foundation NF94. Check with NHBC Technical Operations on a site specific basis that these have been accepted prior to works commencing. Cavities may not require sealing.</p>	

Membranes		
		
Ensure product is sufficiently durable to withstand the construction process.	Specialist installers may be required to joint thicker products.	Specialist membranes may be required. Taped seams may not be appropriate.
Ventilation		
		
Specialist venting solution required for ground bearing slabs.	Sub slab voids should be clear of debris.	Venting pipes should be interleaved to prevent short circuiting and have more than one inlet and outlet point.
Ventilators		
		
Ensure telescopic ventilators are adequate. Photo shows ventilator too short and disconnected.	Vents should not be susceptible to clogging. Refer to Technical Guidance 6.1/27.	Planting proposals must consider air brick positions and not hinder air flow.
Installation		
		
Solutions for vertical walls and/or at steps require specialist products and knowledge/skills to install.	The product needs sufficient strength, detailing and adherence across steps.	Preformed /specialist proprietary components offer solutions for difficult detailing.
		
Thicker membranes advisable under position of sleeper walls.	Timber frame sole plate (as shown here) or light steel frame base plates must not damage membrane integrity.	Weld temperatures are critical. Example shows burning of membrane.