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Ground Gas Risk – The Risk from Incorrect Characterisation

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Ground Gas Risk – The risk from incorrect characterisation

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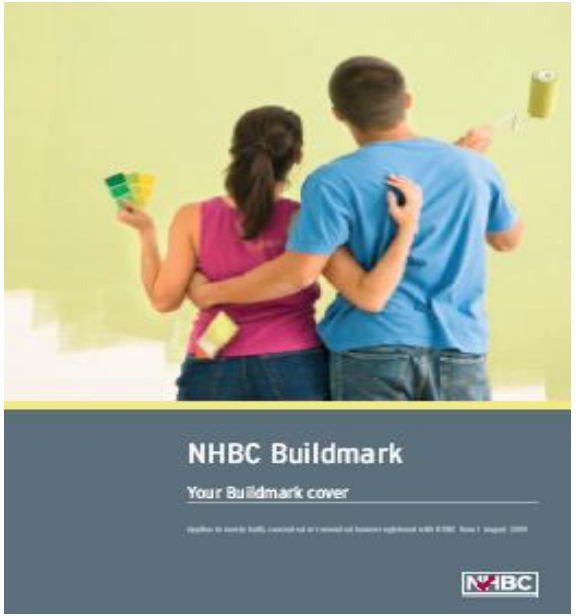
Who is NHBC?

- The National House-Building Council - established 1936.
- UK's leading independent standard-setting body.
- Non-profit distributing company.
- Unique “stakeholder” company structure.



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Who is NHBC?

- 10 year Warranty introduced in 1968
  - Insurance Company.
  - 1.6million homes under cover.
  - 80% market share.
- Building Control - Approved Inspector licence granted in 1985 (England and Wales).

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Assessing Gas risks

Lots of guidance and years of experience within the industry.

CIRIA 149

CIRIA 665 Ground Gas Handbook

NHBC traffic Light System RB17 TB16

BS8485:2015 BS8576

CIRIA 735

But still see inadequate gas risk assessments, design and installation……

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Assessing Gas risks

Current issues?

- We do gas monitoring, derive GSV & then compare against set values in a report(s).
- Set lines in the sand & > no risk and < then a risk…….
- But need to actually consider the wide picture – look at CSM – what is the risk? What is being built?
- Just because we have an exceedances does not mean a risk.

Assessing Gas risks

Get the CSM right.

- Is there any actual source or an ability to create a risk?
- Has there been sufficient monitoring/coverage to assess the risks adequately, can the site be zoned?
- Does the monitoring truly represent the site and risks?
- Is there a valid linkage?

Assessing Gas risks

Get the CSM right.

- Does the proposed mitigation measures take account of the actual construction details including floor and foundation types e.g. stepped walls (will wall ties penetrate the membrane) or Vibro Stone Columns create pathways?

- But still seeing poor risk assessments where gas monitoring done but not considered the CSM.

Assessing Gas risks

Incorrect characterisation results in:

Gas protection measures installed when not required

Or

Insufficient gas protection measures being installed??

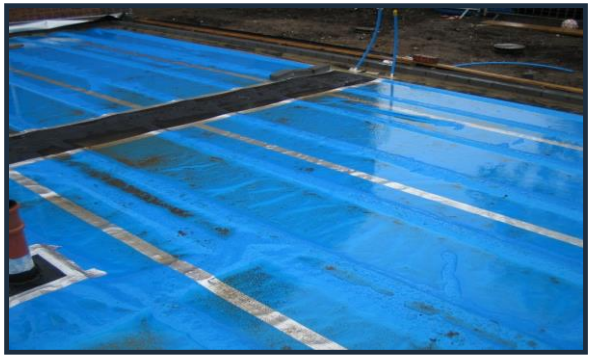
Assessing Gas risks.

Seeing gas protection measures being installed when a good gas risk assessment/CSM would confirm no risk.

- Agricultural land. 6 rounds and on 1 occasion = 1.1% methane, Co2 5.1%, no flows, and 150mm ventilated suspended void? Good standard of DPM/DPC (air leakage)
- Small brownfield site in London. MG to 2-3m and minor CO2 exceedance but…. Basement being installed and all MG being removed? Basement consists of waterproof RC concrete and end use is car parking with residential access.

Assessing Gas risks.

- BS8485 - 2pts for membrane = proprietary gas barrier installed and verified in line with CIRIA 735.
- Consequences of poor risk assessment? Membrane installed & Verified when not required?
    - Time? Financial costs?
    - Sustainable?
    - The next site?
- So have to jump through a number of hoops when good gas risk assessment and CSM would confirm no risk!!



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Assessing Gas risks.

- Important to characterise the gas risk before construction starts…..

And Not

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Case Study 1

- Gas risk not confirmed before builder starts construction.
- Former public house and builders yard.
- Our landmark showed landfill in close proximity and gas risk assessment requested.
- Builder commissions (reluctantly) desk study and gas monitoring.
- Gas detected – Elevated CO2 of 10.6% and flows of 1.6l/hr (consistent flows).
- Consultants concluded CS2 and possible amber 2 based on max conc.

Case Study 1

- Install gas membrane but construction started?
- Solutions – Monitor from sub floor void or retro fit gas membrane?
- Builder chose retro fit membrane & further RA.
- Could not easily be installed across the cavity
- So retro fit to the floor slab and lapped the membrane up the wall and tie into DPC
- Self adhesive also applied at wall junction
- Risk Assessment for ingress via cavity

Case Study 1

- Cost the builder a lot of money to resolve – retro fit of membranes and further risk assessment.
- Warranties – not released until gas risk mitigated = delay in sale of the properties.

Case Study 2

- Former colliery including shafts - Colliery spoil to 5m.
- 6 rounds completed (7 week period in winter only). Sufficient?
- 2.7% CH_4, CO_2 10.3% (>5% in 4 rounds) low flow rates
- Gases present mainly in 1 area of site (21 plots affected).
- Elevated CO_2 with shallow groundwater (pumping?)
- Amber 1 mitigation proposed (ventilation critical).
- Suspended beam & block, proprietary gas membrane etc.
- Level access thresholds – limits subfloor ventilation rates

Case Study 2

- Gas measures installed but membrane cut off at cavity and not sealed around door thresholds. Membrane not lapped with cavity tray – ingress risk to cavity & to habitable spaces.
- Terraced properties, only ventilated at front & rear, 1 vent brick front and back (level access limited inclusion of crank vents). Unable to achieve 1 air change per 24hr as per NHBC Report 04 (March 2007).

Case Study 2

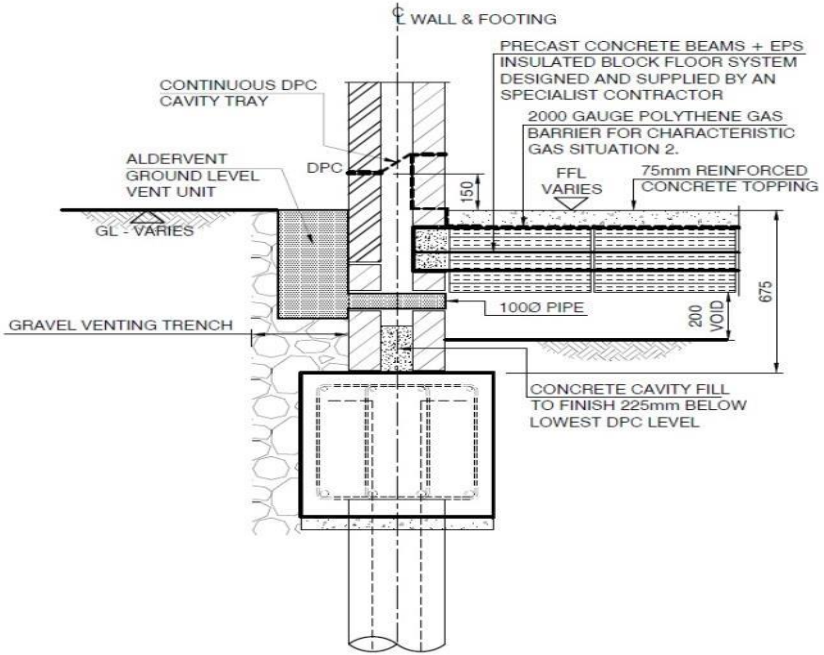
- Post construction in well & subfloor monitoring with Gasclam & spot monitoring found CH4 41.8%, CO2 21.5% with flow rates of 6.6l/hr in the wells, CH4 recorded 0.15% in the subfloor! Reassessed as CS3/Amber 2.
- Remedial mitigation required to remedy deficiencies in gas measures.
- As plots already constructed and 2000g membrane installed, only option was to increase ventilation and limit gas ingress rate to cavity.

Case Study 2 - Photos

Case Study 2

Remedial measures required:

- Excavate trench around perimeter
- Drill through to subfloor
- External vent boxes
- Preformed cavity closers at door thresholds
- Foam fill cavity below tray.



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Case Study 2 - Photos

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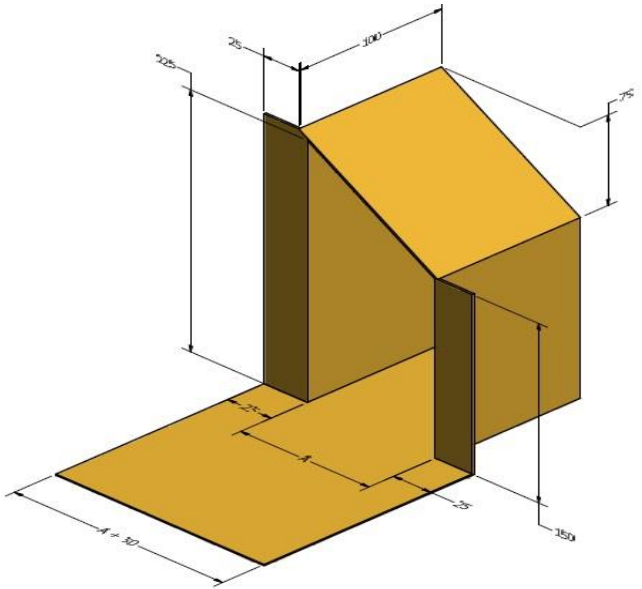

Case Study 2 - Photos

Case Study 2 - Photos

Case Study 2 - Photos

- Resulted in substantial remedial works being required.
- Cost the builder a lot of money and time.
- Delays in the release of our warranties – our warranties were not released until the remedial measures had been completed and verified.

Summary

- Get the CSM right.
- Carry out sufficient monitoring to characterise the risk Consider the actual risk potential, don’t just see exceedance as a risk?
- Does the design take into account the construction methods, earthworks proposals, construction details (floor, foundations etc). Do the foundations create a pathway?

Summary

- Many instances of inadequate or incorrect gas measures we see are due to either poor design or poor workmanship.
- The majority of these could be avoided with adequate monitoring/characterisation on low risk sites (i.e. mitigation is probably not required).
- If mitigation is recommended and poor installation occurs, builders have to choose to either carry out interim monitoring to assess if the risk is actually present (why not do that at the outset?) or opt for expensive remedial measures.

Summary

- Most opt for remedial measures due to concerns that monitoring may confirm there is a risk and the remedial work will be required anyway.

The End

Thank you for listening!

Any Questions?