Acoustics factsheet

Requirements for new homes and how NHBC can help

New homes are built to high standards; however, acoustics and noise control are important factors requiring careful consideration during design and specification, as well as pre-completion commissioning testing.

This document provides an overview of the regulations, challenges and typical requirements from project conception to completion, including technical advice for pre-completion testing.

The requirements for England and Wales are covered, as well as the variations for Scotland and Northern Ireland.

Stages in development

Planning

We can help with:

- environmental noise surveys
- noise mitigation measures
- layout advice for site/building/rooms.

Design

We can help with:

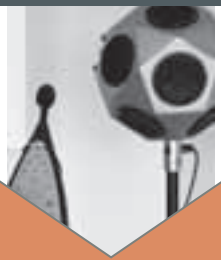
- performance appraisal
- design advice
- Building Regulations compliance.

Build

We can help with:

- construction noise monitoring
- design advice
- on-site inspection of detailing for acoustics.

Build pre-completion



We can help with:

- pre-completion testing for Part E compliance on sound insulation.

Occupancy

We can help with:

- sound insulation testing
- other acoustic measurements
- noise complaints
- expert help and advice.

Benefits of choosing NHBC Acoustic Services	
Fast response to fit your schedule	– Efficient liaison with NHBC surveyors to determine test programs. – Quick turnaround of results. – Swift information flow with NHBC Building Control to help clear outstanding technical conditions.
Cost-effective solution	– Competitive pricing. – UKAS accredited organisation with experienced consultants and technicians. – Some free remedial advice and discounted re-tests available.
Improved designs based on sound feedback	– Expert advice for specifying materials and constructions that comply. – Management reports that help you improve on future schemes. – Summary reporting of results across your sites are available – to help identify performance trends.

Why choose NHBC?

- ✔ NHBC provides a nationwide service.
- ✔ NHBC Acoustic Services provides a professional acoustic consultancy service to help developers tackle the key issues.
- ✔ NHBC Acoustic Services has carried out over 8,000 sound insulation tests since 2003. 96% achieved a pass. Of the remaining 4%, all who fully followed NHBC Acoustic Sevices remedial advice passed when re-tested.

For more information, call 0844 633 1000 and ask for 'Acoustics', email acoustics@nhbc.co.uk or visit www.nhbc.co.uk.

Planning

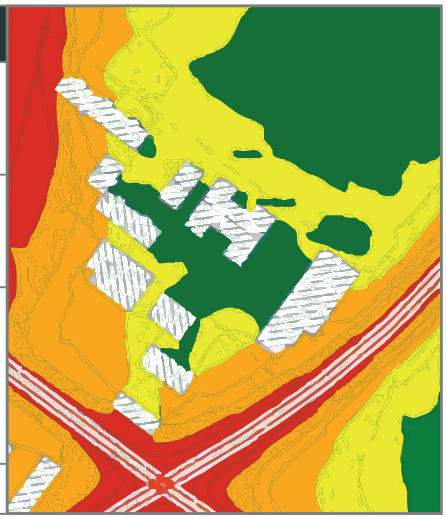
The planning process requires developers to consider the noise exposure of the site and how the homes may need to be insulated from noise due to road traffic, railways, aircraft and other sources.

'PPG24 guides local authorities in England on the use of their planning powers to minimise the adverse effects of noise. It outlines the considerations to be taken into account in determining planning applications for noise-sensitive developments and for those activities that generate noise.' From Planning Policy Guidance Note 24: Planning and noise – Scotland's PAN 1/2011 (formerly PAN 56) has similar requirements.

Noise categories and specification

PPG24 defines four noise exposure categories (NECs) which are used to classify a site proposed for residential development.

NEC	Description
A (Green)	Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as a desirable level.
B (Yellow)	Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise.
C (Orange)	Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.
D (Red)	Planning permission should normally be refused.



Design

Key considerations of acoustic design are:

- glazing (inc. curtain walling)
- doors
- ventilation
- building orientation and layout
- lightweight external walls and roofs
- separating wall and floor performance
- internal wall and floor performance
- reverberation control and room acoustics
- acoustic screening from external noise
- protection from plant rooms, communal areas etc.

Noise exposure of outdoor spaces such as gardens, balconies and terraces should also be considered. Vibration exposure of the site/buildings may also need to be assessed and provisions made within the design.

Various standards and guidance exist to assist in specifying a suitable design to mitigate the effects of noise and vibration exposure. Ask NHBC about BS 8233, BS 4142, BS 6472, World Health Organisation guidelines etc.

Build

Tackling construction noise

The Control of Pollution Act 1974 (COPA) gives local authorities the power to control noise and vibration generated on construction sites.

Section 60 – a local authority may serve an abatement notice, requiring controls to be put in place to minimise the noise and vibration from a site. (Article 40 prohibition in Northern Ireland).

Section 61 – a formal agreement, requested before work commences, that allows the contractor and local authority to agree limits/controls such as noise levels and hours of work. (Article 41 consent in Northern Ireland).

NHBC Acoustic Services can assist developers with professional acoustic consultancy expertise and noise monitoring, to demonstrate Best Practicable Means (BPM) to address either Section 60 or 61.

Site inspections to improve performance

Workmanship or other site-based factors may have a detrimental impact upon the acoustic performance of the designed construction. We can undertake regular site inspections to check specifically for acoustic-related concerns. These reassure developers that potential problems have been minimised and that pre-completion testing for sound insulation will most likely achieve results that pass.

Build pre-completion

Sound insulation testing requirements

Approved Document E 2003 (ADE2003) in **England and Wales** requires that 1 in 10 dwellings within a group (defined by dwelling type, construction types etc.) be subjected to pre-completion testing (PCT), unless they are registered and fully compliant with the Robust Details Scheme.

The 2010 **Scottish Building Standards** came into effect on 1 October 2010. These increase performance standards and introduce a mandatory post-completion testing requirement for separating walls and floors between attached dwellings, from May 2011.
The sampling rate for PCT depends upon the type of dwelling and the form of construction adopted.

In **Northern Ireland**, Part G – Sound insulation of dwellings applies. Either use 'Acceptable constructions' or 'Acceptable upgrading' methods as detailed in Part G, or submit test evidence of construction performance in line with the 'Similar Construction Method' option. Requirements involve obtaining a sample 'set': the mean of the result set must achieve a specific level of performance and each individual result within the set must achieve a different specific level of performance.

Test bodies should preferably be UKAS accredited.

NHBC Acoustic Services is UKAS Laboratory No. 2688 and is accredited to carry out pre-completion testing.

Sound insulation performance standards

Dwelling-houses and flats – performance standards for separating walls, separating floors, and stairs that have a separating function

CRITERIA:	Airborne sound insulation – minimum values			Impact sound transmission – maximum values		
COUNTRY:	England/Wales	Scotland	N. Ireland	England/Wales	Scotland	N. Ireland
Purpose built dwelling-houses and flats						
- Walls	45 dB $D_{nT,w} + C_{tr}$ [1]	56 dB $D_{nT,w}$	Mean: 53 dB $D_{nT,w}$ Ind: 49 dB $D_{nT,w}$	-	-	-
- Floors and stairs	45 dB $D_{nT,w} + C_{tr}$	56 dB $D_{nT,w}$	Mean: 52 dB $D_{nT,w}$ Ind: 48 dB $D_{nT,w}$	62 dB $L'_{nT,w}$	56 dB $L'_{nT,w}$	Mean: 61 dB $L'_{nT,w}$ Ind: 65 dB $L'_{nT,w}$
Dwelling-houses and flats formed by material change of use (conversion)						
- Walls	43 dB $D_{nT,w} + C_{tr}$	56 dB $D_{nT,w}$ [2]	Ind: 49 dB $D_{nT,w}$ [4]	-	-	-
- Floors and stairs	43 dB $D_{nT,w} + C_{tr}$	56 dB $D_{nT,w}$ [2]	Ind: 48 dB $D_{nT,w}$ [4]	64 dB $L'_{nT,w}$	56 dB $L'_{nT,w}$ [3]	Ind: 65 dB $L'_{nT,w}$ [4]

[1] Purpose built rooms for residential purposes: walls must achieve a performance of 43 dB $D_{nT,w} + C_{tr}$ – otherwise the targets are the same as for purpose built flats.

[2] Traditional buildings = 53 dB $D_{nT,w}$

[3] Traditional buildings = 58 dB $L'_{nT,w}$

[4] An alternative laboratory test method may also be used to demonstrate performance – see Part G.

Ind: Individual

Are you ready for Pre-completion Testing (PCT)?

✔ Pre-completion Testing for sound insulation usually takes place after second fix but before floor finishes (carpets, ceramics, timber/laminate) are fitted.

✔ Call us for details on whether you are ready – mains power must be available.

Common reasons for failing a sound insulation test

Reasons for failing a sound insulation test between dwellings usually fall into three categories:

- Incorrect design (materials specification and/or detailing).
- Incorrect material supply or inadvertent site substitution.
- Poor workmanship and/or appreciation of factors important to sound insulation.

Floors	Walls
– Floating isolated screeds bridged (gaps in resilient layer). – Underweight flanking walls (external/internal). – Continuous slabs, planks, screeds beneath cavity masonry walls. – Shallow, underweight or poorly isolated ceilings. – Shallow joists and/or insufficient stiffness. – Room in roof – poor detailing. – Underweight SVP enclosures. – Penetrations to ceiling – poor detailing of downlighters, speakers etc. – Dry-lining dabs bridging to isolated screed. – Skirting boards bridging to isolated screed.	– Flanking over walls via profiled floor slab gaps. – Poor head detailing to non-loadbearing walls. – Narrow cavities. – Bridged cavities (mortar droppings or other debris). – Incorrect wall ties or mortar accumulation. – Underweight coursing blocks.

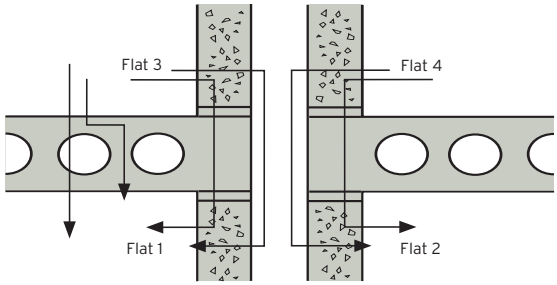
Floors and walls
– Bridged resilient bars (incorrect screw length or positioning). – False assumptions (e.g. using systems/treatments from previous projects without fully checking the suitability for the current project). – Insufficient validation of material properties/performance. – Curtain walling – poor detailing (e.g. at mullion and transom interfaces). – Build sequencing interfering with best practice/detailing.

Flanking sound transmission

Flanking sound transmission occurs via indirect paths. The diagram shows the principal sound transmission paths (direct and indirect) in a typical floor arrangement.

Careful design and good workmanship are key to overcome this complex issue.

Diagram: Separating floor/wall junction



Occupancy

Even with good design, problems can occur after occupancy, and NHBC Acoustic Services can help if they do.

Sound insulation testing and investigative/diagnostic work can help identify problems, especially if the specific properties of concern were not tested as part of a programme of PCT. Expert advice is available to help the builder deal with problems and, as far as practically possible, address homeowners' concerns (perhaps before it gets to claim stage).

Building Regulations for acoustics

England and Wales: Part E has four requirements pertaining to sound

Further details are provided in Approved Document E to The Building Regulations (2003 edition incorporating 2004 amendments).

Site testing requirements*	**Requirement E1** Protection against sound from other parts of the building and adjoining buildings. A performance-based requirement which can be satisfied by either (a) carrying out a programme of PCT on a certain sample of separating walls/floors on a site, or (b) by registering all attached dwellings on the Robust Details Scheme.	
Design requirements	**Requirement E2** Protection against sound within a dwelling-house etc.	**Requirement E3** Reverberation in common internal parts of buildings containing flats or rooms for residential purposes.

*** Requirement E4:** Acoustic conditions in schools also require acoustic PCT.

Scotland: Section 5 has two standards pertaining to noise
The standards cover separating walls and floors (Standard 5.1) and internal walls and floors (Standard 5.2). Reverberation control in common spaces is not covered.

Northern Ireland: Part G has three requirements pertaining to sound
The requirements cover separating walls and floors (requirements G1, G2 & G3). Performance of internal walls and floors and control of reverberation in common spaces is not covered.

Early acoustic advice is crucial

Developers can benefit significantly from seeking expert acoustic advice early in a project, to ensure compliance with Building Regulations/Standards, to minimise failures and to reduce potentially costly and disruptive remedial measures later on.

Did you know?

The requirements and standards apply to the following areas:

Dwellings adjoining commercial or other non-residential spaces must comply with the relevant performance requirements. Specific pre-completion testing may be needed. This is because:

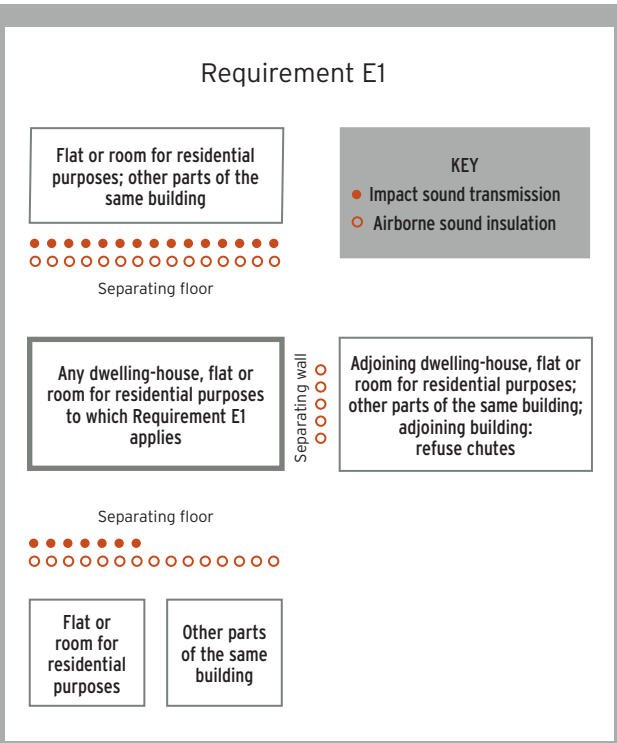
- the separating wall/floor construction may differ from the same elements throughout the rest of the building where there is a dwelling/dwelling arrangement
- if a noise generating space is adjacent to the dwelling (e.g. lift, plant room, commercial premises), it is recommended that developers seek specialist advice and aim to exceed the minimum performance standards.

Terraces above dwellings that do not belong exclusively to the dwelling

- Because the roof/ceiling construction is performing a separating role, it needs to resist airborne and impact sound transmission.

Conversions/material change of use

- Complex acoustic issues depending on the building's properties – specialist advice is recommended.



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Acoustic considerations elsewhere in the building regulations

England and Wales: Part F – ventilation

Other acoustic considerations across the building.

Recommended measures for builders and designers

- Consider the number, size and acoustic performance of penetrating ventilation elements – they may undermine the acoustic performance of the façade which is insulating the occupants from external noise sources.
- Careful design and specification is necessary to mitigate the noise generated by mechanical ventilation systems that could potentially disturb occupants or neighbours. ADF 2010 gives guideline noise levels.

Undertaking on-site measurements of noise levels can confirm the actual noise in a dwelling is designed to minimise disturbance – contact NHBC for details.

England and Wales: Part L – conservation of fuel and power

Tough new requirements

Approved Document L 2010 edition introduces tough new requirements. The design needs careful consideration to ensure that selection of materials and detailing (e.g. for improved thermal performance) do not represent possible weaknesses from a sound insulation perspective. For example, for a cavity masonry wall:

- edge sealing
- insulated cavities.

Noise facts:

- Around half the UK population say that noise affects their quality of life. (Ipsos MORI).
- In a recent survey, 22% of people cited noise as the most common cause of problems between neighbours. Neighbours From Hell in Britain (NFHiB).
- One in seven people are woken by neighbours, whilst one in ten are kept awake. (Ipsos MORI).

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