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Review of sound insulation standards and proposed new performance levels in Scotland

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1. INTRODUCTION

For the first time in over 20 years the Building Standards Division (BSD) of Scottish Government has undertaken a major review of Section 5: noise of the Technical Handbooks. This applies to new, altered, extended or converted buildings. The proposals include raising the sound insulation performance levels of the separating walls and floors between attached dwellings, introducing sound insulation testing and provisions for non-domestic buildings. This paper provides an overview of the research undertaken to establish the increase in sound insulation performance levels and the relevance of sound insulation testing.

2. BACKGROUND

There has been little change to the Noise standards since 1987. During this time complaints have increased and expectations of higher levels of sound performance by occupants have risen.

BSD held a workshop in December 2005 to gather industry opinion and inform the review of section 5: Noise of the Technical Handbooks. The workshop highlighted the need to raise sound insulation levels and the variation in performance testing regimes within Scottish local authorities. It was also suggested that in some authorities there was less sound testing undertaken than in previous years and that the quality of dwellings was suffering as a result. There was concern raised on the reliance on post construction checks rather than on pre-construction specification and detailing. It was considered that it may be possible to improve the quality of sound insulation of dwellings in Scotland and raise awareness through increased take up of performance testing.

3. BUILDING STANDARDS SYSTEM IN SCOTLAND

The building standards system in Scotland is a pre-emptive approval system. The system is designed to check that the proposed building work meets the building standards. Inspections during construction and on completion are limited to the minimum necessary to discourage avoidance of the legislation. The inspections do not provide a system to control work on site, that is a matter for the contracts and arrangements put in place between the client and builder. The responsibility to meet the standards ultimately rests with the building owner, and enforcement powers in the Building (Scotland) Act 2003 can be used where necessary to ensure compliance.

3A. Current Noise Standard

Building standards and guidance are laid out in Section 5: Noise of the Technical Handbooks. Standard 5.1 applies to separating walls and floors; between attached dwellings, between a dwelling from another building or part of the same building. Two separate compliance approaches are presented in guidance:

- the specified constructions; which are separating wall and floor designs, that when built correctly, will meet the performance levels; or
- the performance levels and test procedures.

The performance levels:

- for a separating wall, airborne noise ($D_{nT,w}$) is a mean of 53 dB and individual value of 49 dB;
- for a separating floor, airborne noise ($D_{nT,w}$) is a mean of 52 dB and individual value of 48 dB, and impact noise ($L'_{nT,w}$) is a mean of 61 dB and individual value value of 65 dB.

All tested in accordance with BS EN ISO 140-1:1198 and BS EN ISO 140-2:1991.

4. RAISING THE SOUND INSULATION PERFORMANCE LEVELS

The research findings indicated the expectations of occupants are not being met, and that sound insulation levels for separating walls and floors should achieve a higher level. BSD considered how much higher the level could be raised, and how this could be reached. Research carried out by Napier University for the publication 'Housing and Sound Insulation: Improving existing attached dwellings for conversions[1]' indicated there very few noise complaints occurred above a level of 56 dB.

BSD considered whether it was feasible to raise the performance level to a minimum value of 56 dB or higher. Before reaching a decision, BSD considered the system already in place in England and Wales, where many of the separating wall and floor constructions can already achieve a level of 56 dB, following the Robust Details Ltd (RDL) approach. The key benefit of adopting this level in Scotland is that house builders are already familiar with designing and building types of construction achieving this level.

4A. Research

Before reaching a decision on whether the performance level would be raised, BSD undertook research on the effect achieving different levels would have on existing separating wall and floor constructions.

The research project 'To design separating constructions that are resistant to the transmission of noise: Jan 2008', provided information on the improvements needed to the existing constructions. It also provided new design details for separating wall and floor constructions (termed Example Constructions) for a range of raised performance levels.

The Example Constructions have been developed from test results taken from actual 'field sound tests'.

The current performance levels are based around a 'mean' approach, whereas the proposed performance levels are intended to be a minimum (airborne) and maximum (impact) criteria. They are designed to achieve the recommended performance levels, of a minimum airborne sound insulation performance of 56 dB $D_{nT,w}$ for walls and floors, and a maximum 56 dB $L'_{nT,w}$ impact for floors.

5. PERFORMANCE TESTING

As concerns were raised on the variation of approach to performance testing carried out by local authorities, BSD commissioned 2 research projects to obtain information and views on current practice on the levels of performance testing and separating wall and floor designs.

The first research project was 'Noise: Performance testing regimes in Scottish Local Authorities: October 2006'. As it was considered possible to improve the quality of sound insulation of dwellings in Scotland by raising awareness through measures such as increasing the rate of performance testing, views on current practice were sought.

The survey did not substantiate the earlier views that there was less testing carried out than in previous years. However, it found variations in the level of testing required by Scottish local authorities. A number of responses noted that a sound test was not being carried out on:

- non-specified constructions; including those that rely on the manufacturer's literature, usually tested in laboratory conditions. This is being used as evidence the construction will achieve the performance standards.
- constructions which have previously been accepted and performance tested on another site even although the tested building is not the same as the later building; and

This raised some concerns. By not carrying out a field test, the construction could fail the minimum performance standards as the effects of flanking transmission would not be taken into account in laboratory conditions.

This research also found that there are variations in the level of testing required by Scottish local authorities. This highlighted two main issues:

- the decision made at the assessment stage on whether testing is required to specified and non-specified constructions; and
- the benefits of post construction testing.

From these initial findings a second research project was commissioned 'Noise: Constructions used in separating walls and separating floors: New dwellings: May 2007'. The evidence gathered from this research showed wide variations in practice adopted by Scottish local authorities. The results indicated some differences in constructions which were being submitted for building warrant approval and those eventually built on site.

This pointed to a lack of consistency in reference to the current guidance within the technical handbooks; and on how performance testing was applied in respect of the number of tests carried out on site during a sound test. In many of the reported cases,

despite the fact that the criteria could have been met, in practice it was not always followed.

7. SUMMARY

As this was the first time in over twenty years BSD carried out a review of the noise standards it was important to identify both the strengths and weaknesses of the current standard and guidance. From the workshop and the research, BSD identified several areas needing to be addressed. Two of these were substantiated by the research outlined in this paper. They are:

- the decision made at the assessment stage on whether testing is required to specified and non-specified constructions; and
- the use of post construction testing.

There are wide variations in specified constructions currently being accepted. Current practice uses specified constructions with limited checks through performance testing. The emphasis for the future will now be placed on a performance testing regime, with robust information on types of separating wall and floor constructions that can be used. The Example Constructions will not preclude the use of other types of construction that undergo a satisfactory field test.

As there is a lack of consistency in how performance testing is carried out, all types of construction will be required to be tested on site. To address the issues where non-specified constructions are used, including those that rely on the manufacturer's literature being used as evidence and, constructions which have previously been accepted and performance tested on another site. BSD propose to introduce sound performance testing to overcome these issues.

The revised section 5: Noise will come into force in October 2010.

REFERENCES

1. S. Smith, J. Wood and R. Mackenzie, Housing and Sound Insulation: Improving existing attached dwellings for conversions, Arcamedia, Edinburgh 2006.