

SOUND INSULATION BETWEEN DWELLINGS - A POST-CONSTRUCTION/PRE-OCCUPANCY REQUIREMENT AND TEST?

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1. INTRODUCTION

Poor airborne sound insulation in new build residential units can be a significant problem for occupants.

Those most at risk of suffering from the effects of poor sound insulation are generally those members of society who are least able to act to remedy the problem, the disadvantaged being poorer and generally in more cramped and more densely packed accommodation.

Local Authority codes prior to 1965, and subsequently the Building Regulations and supporting Approved Documents, deal with sound insulation between dwellings. There are questions, however, over the efficacy of the current methods, where the fundamental principles involved may limit or even discourage improvements in standards. A post-construction sound insulation test is proposed here as an appropriate advance in providing alternative control.

2. BACKGROUND

Sound insulation between dwellings has been an issue for a number of years. The Building Regulations first dealt with sound insulation in 1965¹, when 'adequate' insulation was required. Example constructions were included as a way of demonstrating compliance with the Regulations.

The Regulations were revised in the 1972² to include consideration of flanking transmission and to allow constructions 'similar to' those found by test to be satisfactory, complying with a performance standard.

In 1985³ changes were made to the Regulations which reduced them to functional requirements (constructions were required to have 'reasonable resistance' to the passage of sound). The Regulations were supported by technical guidance in separate Approved Documents. In England and Wales, the 1985⁴ Approved Document E dealt with 'Sound'; Scotland and Northern Ireland have broadly parallel documents. Scotland had the Building Standards (Scotland) Regulations⁵ and Part H⁶ of the supporting Technical Standards, and Northern Ireland, the Building Regulations (Northern Ireland) 1994⁷ and Technical Booklet G (1990)⁸ and G1 (1994)⁹.

In 1992 the Regulations in England and Wales were amended to include conversions and a new laboratory sound insulation test procedure was given as an alternative means of demonstrating compliance¹⁰. Information on sound insulation and the 1992 edition of Approved Document E is discussed in Building Research Establishment Information Paper IP 18/92¹¹, and detailed breakdowns of constructions in the Approved Document E are given in the BRE/CIRIA publication 'Sound Control for Homes'¹².

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3. USAGE AND IMPLEMENTATION OF THE REGULATIONS

The installed performance of a party wall or floor lies in the hands of the builder or developer. There are three ways in which compliance with the Regulations can be achieved. These are:

- by adopting the forms of construction specified in Approved Document E;
- by adopting a form of construction similar to one that has been shown by field tests to comply with the requirements;
- testing part of the Construction in a specified type of acoustic chamber.

It is interesting to note that nowhere in the Regulations does the actual construction built have to meet a performance requirement. Indeed, in Section 3.8 of the Approved Document it is stated that:

'A failure of a new construction to achieve the values in the Table [the implicit performance requirements] is not in itself evidence of a failure to comply with the requirements of the Regulations.'

The Approved Document provides positive guidance, dependent on concerned parties adhering to the spirit of the guidance rather on a prescriptive standard. There is no provision to check that the lack of sound insulation will not threaten the health of the occupants. Where sound insulation between dwellings is poor and occupants experience problems, the areas not included in the Approved Document and Regulations become most apparent:

- there is no legal requirement to meet a specific performance, although in case law the implicit performances are often stated;
- there is no developer or Local Authority testing requirement at any stage or any provision for this;
- no specific party is identified as being responsible for the sound insulation performance.

Even when failure is beyond doubt, the lack of a clearly defined, responsible party can represent a significant problem for occupants in obtaining redress. In many cases it is not possible to simply establish whether poor sound insulation is the result of bad workmanship or inadequate design.

There is comforting work being carried out by some Housing Associations, Housing Association Property Mutual (HAPM) and the National House-Building Council (NHBC). These bodies are examining testing, providing specifications and assessing details critical to sound insulation. However, efforts are uncoordinated, isolated and generally atypical of the building industry as a whole across the UK.

Research by Grimwood¹³ and opinion reported by Charles¹⁴ would indicate that the implicit performances stated in the Approved Document are practical and reasonable.

Papers by Burnett¹⁵, Craik, McPherson and Somerville¹⁶, Cogger¹⁷ and Somerville¹⁸, can be taken to show the need for a post-construction test, as does analysis of the work by Tinsdeall, Grimwood and Seller¹⁹.

4. THE FUTURE OF THE REGULATIONS

A sufficient period of time has elapsed since the introduction of the Regulations in 1965 and the last major change to the Approved Document in 1985, to enable predictions to be made as to the future efficacy of the Regulations and their influence on construction.

The Regulations have, with traditional construction techniques and workmanship, provided in the more distant past a housing stock that is generally regarded as satisfactory. There are however several factors that will lead to a general degradation in sound insulation. The lack of a performance

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requirement and absence of checking is discussed above, and additional factors are provided in the following paragraphs

4.1 New Construction Types

Increasingly, constructions shown to have widely varying or poor performances are claimed to achieve Approved Document compliance^{20,21}. Claims vary in authority from validated test reports from reputable laboratories and British Board of Agreement Certificates through to simple trade literature. No case the Author is aware of provides all the details of the construction including, critically, flanking and wall and door penetrations relevant to sound insulation.

There is no register of constructions shown to achieve Approved Document Compliance, no review or independent checking mechanism over claims, no control and no way to remove a construction previously shown to have had few successes in the past.

The number of suspect and poor constructions that have in some circumstances been shown to achieve Approved Document compliance, under the current system can therefore only increase. Current building trends, which show an increasing use of constructions most likely to cause concern, ie the use of lightweight blockwork, block and beam floors, and lighter constructions will continue if action is not taken.

4.2 Developers and Builders

There is increasing competition between builders and developers. Margins, especially at the cheaper, mass production, side of the building trade have been reducing over the years. Clearly there is a limit to savings that can be made by builders and developers, and in this cost cutting environment, there is pressure to build down to the implicit standards or lower.

It can be economically advantageous to cut building costs and materials to the minimum feasible and procrastinate over cases where an owner may attempt to achieve redress, in the hope they will not pursue their case. The savings on building and materials can more than offset the costs for the cases which receive remediation. This lack of a financial penalty can be seen as a corporate incentive to cut constructions to the minimum.

4.3 Complexity

Since inception, the Building Regulations and Approved Documents have continued to increase in complexity and, despite significant advances in presentation with the 1985 Approved Documents, complex technically important points are easily misinterpreted. The Approved Document represent decades of intensive high level research and experience, and if current philosophy is carried forwards further revision will not shorten or simplify the guidance.

5. A POST-CONSTRUCTION TEST

A post-construction sound insulation requirement and test is the only practicable way to guarantee that reasonable sound insulation is provided between new build dwellings.

There is no precedent for an explicit post-construction test in the UK and many of the issues are open to debate. The main issues are highlighted here and an opinion provided.

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A number of important issues need to be addressed before a post-construction test can be implemented. The main issue is cost, both of the test and of remediation in the case of failure.

5.1 Cost

There are several parties which might feel financially exposed. These include any testing/regulatory authority, the builder/developer, manufacturers of materials in use, designers and the providers of technical advice. A post-construction test must clearly identify responsibilities and control.

It would seem reasonable that costs of construction failure be met by the builder/developer. It is suggested that the party responsible for the failure funds remedial works and subsequent re-testing. The builder/developer might be expected to pass costs on where others are responsible for the failure, ie in the case of bad design or faulty materials. There is substantial evidence to suggest that the numbers of failures (and therefore costs) fall after initial introduction of a test (Burnett¹⁵, Craik et al¹⁶).

The cost of initial testing depends on the numbers of tests. Based on data from the English House Condition Survey²² it believed that approximately 70,000 party walls are constructed annually. Should the mean cost of a test be £300 this implies an annual cost of around £21M if all new walls are tested.

Raising sums of this magnitude would be difficult from either Central or Local Government. Similarly it is likely that the building industry would have substantial objections to such additional cost. It would, therefore, appear likely that full testing of all constructions is not wholly practicable on financial grounds.

5.2 Extent of testing

There is evidence^{20, 21} to suggest that certain constructions are more likely to exceed the implicit performances in the Approved Document than others. Therefore it is likely that certain constructions are less in need of testing to ensure that implicit performances are met. It would be inappropriate to constrain the body responsible for testing to numbers or percentages of tests on types of construction. An independent testing body would soon gain insight as to what failures (if any) are occurring where, and be able to focus on problem constructions.

Nationally, the purpose of testing is not to test per se, or even to establish the performances of all party walls and floors, but to decrease the number of constructions providing poor sound insulation and therefore reduce disturbance. It is expected that as knowledge of constructions and techniques important to sound insulation increases, the failure rate will decrease and reduce the need to check further constructions.

The need to test will therefore change with construction type, area, builder and time.

5.3 Form of testing

If, as is suggested, the results of the test have financial implications for those responsible, the test procedure and results must be robust. A number of 'survey' methods to measure sound and sound insulation tests have been advanced. It is suggested here that the existing BS EN ISO 140-4:1998 and BS EN ISO 140-7:1998, and ratings to BS EN ISO 717-1:1997 and BS EN ISO 717-2:1997, are currently the most suitable for establishing the performances required.

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5.4 Responsibility for testing

Local Authority Building Control are currently responsible for enforcement of the Building Regulations, and would be appear the natural choice for initial testing responsibility. An alternative would be a centralised agency sponsored by the Government, such as the Building Research Establishment or National Physical Laboratory. A centralised system presents particular challenges in liaison, additional cost and integration into local building control and would be complex to implement. Should a Local Authority be responsible it is moot as to whether testing should be carried out in-house or by an external agency acting for the Local Authority. It may be appropriate to certify individuals or organisations as competent to test sound insulation.

5.5 Subsequent to a test

In the event of a construction meeting a performance requirement, the wall or floor should be taken as complying with the Regulations. As an aside, it is interesting to consider whether a test result should be made available, and to whom.

Where a construction does not meet a performance requirement, the wall or floor should be taken as failing to comply with the Regulations and the dwellings should not be occupied, until such works and subsequent re-testing prove the sound insulation is adequate.

Where a construction does not comply with the Regulations and remedial work is required, many builders will need guidance on how to improve the sound insulation. This might be gained from manufacturers and suppliers and from acoustic consultants, however it is believed that low cost independent advice should be made available to reduce the financial impact.

It would be possible for the testing body(s) to record the pass/failure rate and generic constructions. This, fed through to Government or Government sponsored agencies to publicise changes, could usefully inform interested parties. Some advice on the improvement of poor sound insulation already exists, however it is believed that builders and developers would benefit from an increase in the amount of information available from reputable sources.

6. CONCLUSIONS

Without a performance specification for sound insulation, a significant proportion of new build dwellings will continue to fail to meet reasonable standards and occupants will continue to suffer unnecessarily from neighbour noise. It is suggested here that the Building Regulations should be amended to include a post-construction test. Clearly there are several formats and methods under which Post-Construction testing could be implemented.

It is believed that where a Local Authority has reason to doubt a construction method or workmanship on a particular dwelling with a party wall or floor, it may undertake tests against performance requirements set out in the Approved Document (AD) E. Where such tests show the construction fails to meet these requirements then the Party responsible for the construction of the property should undertake such remedial works and sound insulation tests as are necessary to demonstrate compliance with the AD before the property is occupied.

Should reasonable requests for access be refused then the Local Authority may require the Party responsible for the construction of the property to undertake such sound insulation tests as are necessary to demonstrate compliance with the AD before the property is occupied. On the granting of access the Local Authority should all test within a reasonable period of time.

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