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PRACTICAL IMPLICATIONS OF A POST-CONSTRUCTION/PRE-OCCUPANCY SOUND INSULATION TEST

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1. INTRODUCTION

Poor sound insulation plays a contributory part in noise nuisance from neighbours.

There is no explicit sound insulation performance requirement in the UK for new build residential party walls and floors. This paper examines the need for post-construction testing as a valuable addition to the relevant Approved Documents to the Building Regulations, and describes some of the formats available for implementation and some of the issues.

Improvements in standards of sound insulation to a minimum performance will not necessarily eliminate neighbour disturbance, but will reduce the numbers of people disturbed and allow more consistent assessment of the disturbing noise. Even where intruding noise is not actionable, improvements to a minimum standard will lead to a better environment for householders.

2. BUILDING REGULATION OPERATION

The history and operation of the Building Regulations are outlined in Reference 1. In summary, the Building Regulations require resistance to the transmission of sound to be achieved and refer to Approved Documents for detail. Airborne sound insulation between dwellings for walls and floors and impact sound insulation for floors is covered. There is no requirement for sound insulation internal to a dwelling, no requirement for impact sound insulation for walls and no façade sound insulation requirement.

There are two established methods of achieving compliance with the Regulations; use of a construction detailed in the relevant Approved Documents [Refs 2 and 3] referred to here as 'Deemed to Satisfy', or use of a construction 'Similar to' one previously shown to meet levels laid down in the Approved Document.

There is no *explicit* performance requirement for sound insulation between dwellings.

Building control submissions for dwellings may be made either to the NHBC or the Local Authority Building Control Department. In neither of these cases is there a clear route for direct feedback to the individuals or department where noise nuisance is identified, and there is no formal method for dealing with poor sound insulation.

3. THE NEED FOR A POST-CONSTRUCTION TEST

Over recent years there has been a significant rise in domestic noise complaints (see Figure). This is the result of a number of factors. It is unlikely that the sole or major cause of this rise is due to sub-standard sound insulation in new build dwellings. However sound insulation plays a part in noise nuisance and it is believed that an improvement by ensuring a minimum standard will reduce the risk of nuisance, and improve amenity.

It is difficult to accurately establish the number of new dwellings which fail to meet the implicit performance requirement. However, where a form of post-construction testing has been implemented in Scotland, there has been a reported drop in party walls and floors which fail, from an overall 60% failure rate overall to approximately 20% for floors and 7% for walls, over a decade. Whilst many of the of the constructions in Approved Document E, reasonably consistently provided levels in excess of the implicit performance requirements, many do not, and there is little or no control over 'similar to' constructions.

Private communication between a number of acoustic professionals and the Author, shows that many believe that the current system of control is far from adequate and that a post-construction test is a potential way forward.

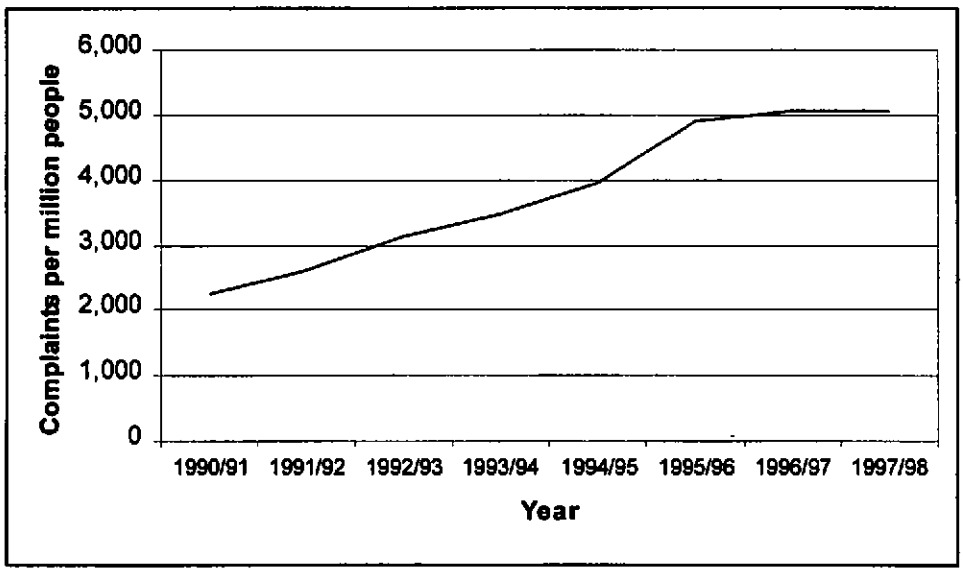

Figure: Domestic Noise Complaints to Local Authorities

Source: Chartered Institute of Environmental Health

4. THE PERFORMANCE REQUIRED

The performance required by any post-construction test is critical. The implicit performances in the Approved Documents are given below and have a basis in practical constructions, the philosophy of providing a mean and single figure number reflecting the natural spread of all measurements in the field. There is a general feeling that the performances for a single test will provide a level that is both practical to meet, and with background noise levels found in many houses, will be deemed reasonable by many

people.

It is suggested here that for tests of single walls and floors that the mean values in the Approved Document be taken as the performance requirements. The suggested levels are repeated in Table 1 for clarity.

Element	Sound	Rating	Minimum Required Value (dB)
Party Walls	Airborne	Weighted Standardised level differences (Dn,Tw) defined in BS EN ISO 717-1: 1997	53
Party Floors	Airborne	Weighted Standardised level differences (DnT,w) defined in BS EN ISO 717-1: 1997	52
Party Floors	Impact	Weighted Standardised level differences (L'nT,w) defined in BS EN ISO 717-2: 1997	61

Table 1: Suggested Minimum Values for Airborne and Impact Sound

The performances given in the Table will reduce noise from normal domestic occupancy to a generally reasonable level, believed sufficient to avoid disturbance. However, a performance requirement cannot be taken as a guarantee of providing protection from unreasonable neighbours.

5. THE REQUIRED EXTENT OF TESTING

It is suggested that it is sufficient to test a percentage, and not all, party walls and floors in new housing. It is widely recognised that certain constructions are more likely to fail to meet a performance requirement than others. Also, the workmanship employed by some builders may be inadequate and may therefore need to be more closely checked.

In the absence of reliable data on the full range of suspect constructions currently used and the response of the Industry to a test, target numbers or percentages of tests for types of construction, can not be made. However, any target number or percentage of constructions to be tested might decrease year on year, as a response to decreasing numbers of failures.

A pilot scheme might be considered before full introduction of a full post-construction test.

6. THE COSTS OF A POST-CONSTRUCTION TEST

There are a number of explicit and hidden costs associated with the introduction of a post-construction test.

- The cost of the test itself
- Any cost associated with additional construction beyond that currently used.
- Remediation and retest costs in the case of failure
- Administration costs

The most obvious cost is that of the test itself. A cost has been estimated (Ref 1) to be around £300 per test for large volumes of tests this cost is believed to be an overestimate.

In addition to this cost, there is the additional cost of building constructions that meet the requirements. In theory current constructions and workmanship should currently meet the implicit performance requirements. In practice this is not always so. However, it is believed the additional material and labour costs for improvement to meet these standards are a very small percentage of the total build cost of dwellings and are unlikely to be a significant issue.

The cost of remediation and retesting in the case of failure is likely to be significant. There is a potential time penalty in not being able to sell the unit when anticipated, a cost in additional material and works to relocate fixtures and fittings and add remediation, and a potential loss of space to rooms. It is important that all those involved with the process understand the implications of failure to meet a performance requirement and the risks involved in certain constructions. There would then be a disincentive to use construction which are known to be prone to failure.

It is difficult to estimate the administrative cost, beyond that currently required to ensure compliance with Approved Document E. However, there is likely to be an increase in the time and resources required to ensure a performance is met.

7. THE TEST PROCESS

All tests need to be carried out by properly trained personnel because of the equipment and the specialist knowledge required. It is believed that the majority of tests currently carried out are done so honestly, with very little evidence of abuse. Some tests are carried out, either on reduced numbers of measurement locations or speaker/tapping machine positions and on reduced reporting of detail, and therefore fail to exactly meet the letter of the relevant Standards. Whilst this may be appropriate for a variety of current uses, for post-construction testing, some form of accreditation would have to be addressed, because of the volumes of tests and financial implications involved.

It is suggested here that the BS EN ISO Standards currently referenced in the Building Regulations are an appropriate test method for the introduction of a post-construction test. Measurement equipment has progressed sufficiently far that the actual measurements form a very small part of the total time required, in relation to travel, liaison, set up and reporting. The time saved by using a 'quick' test method will not be significant in the overall cost and the method is open to question relating to reproductability and repeatability.

The Standards currently referenced in the Building Regulations are comprehensive, however it is suggested that clarification be offered for impact testing of floors, stating that floors should be tested in the absence of a carpet.

8. GUIDANCE

It is possible to construct party walls or floors with no knowledge of sound insulation or how good sound insulation can be achieved. However, this leads to questionable reliability in performance as there is no routine feedback under the current system. A builder, designer or developer has little or no knowledge about the achieved standards, how these might be improved or against what the onsite performance might be judged.

In order to smooth the implementation of a post-construction test, guidance would be required at all

stages, to describe the implications of a test, how it would work, points to consider in design and construction of a sound insulating construction and how to build in remediation where necessary. Prior to any launch and in the early stages after implementation, a publicity campaign and help line to the industry could ease the introduction of a post-construction test.

9. THE FUTURE OF THE BUILDING REGULATIONS

A post construction sound insulation test is a major change in philosophy behind the Building Regulations. However the change has advantages to future editions of the Regulations.

An explicit performance requirement allows standards to be examined and where necessary simply changed in line with future changes to public need and society.

A post construction test allows direct feedback on the success or otherwise of constructions in the field and removes the need to check the detail of built constructions to ensure compliance with the Approved Document.

There is likely to be an improvement in construction, as a test will provide feedback to all those involved.

10. CONCLUSIONS

The practical implications of a post-construction test are discussed here. The main benefits of a test being the improved sound insulation, in the long term a reduction of liability for builders and an improvement in the national housing stock. The main perceived disbenefits are likely to be those of cost, both of the test and of remediation where a construction has been shown to be sub-standard. Despite these disbenefits it is suggested here that a post-construction test is an appropriate way to improve sound insulation between dwellings.

REFERENCES

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