SOUND CONTROL FOR HOMES. (WHAT THE APPROVED DOCUMENT DOESN'T SAY).

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INTRODUCTION

Approved Document E 1/2/3 contains much useful and detailed advice on the construction of separating walls and floors to optimise their sound insulation performance and thus tend to meet the requirements of the Building Regulations (1985). This information will undoubtedly prove valuable to architects and builders and, if they observe the details, will do much to eliminate the poor field performance witnessed by the Building Research Establishment during their survey of dwellings built during the 1970s [1].

The Building Regulations cover only separating walls and floors in new dwellings. This has tended to emphasise the design of separating walls and floors to the exclusion of all other aspects of domestic sound insulation. Consequently, the data base for anything other than separating walls and floors is lacking and not available in an appropriate form for the practising architect.

The Construction Industry Research and Information Association (CIRIA) have engaged Bickerdike Allen Partners to prepare a state-of-the-art manual on all aspects of domestic sound insulation for architects. The objective is to enable the architect to deal with straightforward noise and sound insulation design problems in housing himself.

This paper illustrates the scope and content of this new designer's manual.

SCOPE OF THE MANUAL

The manual is a housing design aid. It will assist the architect in undertaking the following aspects of acoustic design:

(1) Site noise appraisal.
(2) Planning to control external noise.
(3) Planning to control internal noise.
(4) Selection of appropriate forms of construction to control external and internal noise.
(5) Detailing for noise control.

The contents of the Approved Document form a major part of items 4 and 5.

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CONTENTS OF THE MANUAL

The manual is divided into three parts.

PART A: Principles of Acoustics and Noise Control
There is a general feeling that architects will simply not read anything of a scientific nature if they can possibly avoid it [2]. However, it was considered that it would be essential for the user to grasp the simple physical principles which govern sound insulation if the manual was to be truly successful. Thus the main aim has been to communicate these principles to the user in a palatable form. The approach adopted was to describe the principles primarily in words. Formulae, graphs and tables are optional reading. They are generally found to the side of the main text - conveniently placed for immediate reference but not intended to hinder the flow of practical information. To underline the principles, common misconceptions have been highlighted in 'pitfalls' sections.

It was recognised that many users would not read part A - they would have an immediate design application for the manual and would not have time to read background information. To assist them, certain key words in sections B and C appear in CAPITALS. If the reader is unsure of their definition or interpretation, he can refer back to part A for an explanation.

PART B: Scheme design
This section emphasises the practical planning measures which are available to the architect at project inception and provides a basis for selection of constructional methods for separating walls and floors, partition walls and floors and the building envelope.

PART C: Detailing
Part C assists the architect in detailing his selected construction methods and provides site inspection checklists for use during operations on site. All the constructions given in the Approved Document appear in this section. Average sound insulation performances are given for each construction type as, clearly, all the Approved Document constructions do not give the same result. Under each construction type, advice is given on walls or floors of lesser performance - for use as internal partitions - and of higher performance than implied by the Building Regulations.

In addition, there are sections on:

Walls in conversions.
Timber joist floors in conversions.
Windows.
Doors.
Pitched roofs.
Flat roofs.

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DISCUSSION

Subjects requiring further research

Some of the advice given in the manual is less certain than we would have liked due to a dearth of basic research in certain subject areas. As our brief required us to give positive advice to the architect, we have expressed a view wherever possible. However, there are some cases where no opinion can cover a lack of data. For example, we could find no field or laboratory sound insulation values for a brick/cavity/block external wall, despite its widespread use in British homes.

Some research has been undertaken on the sound insulation of roofs [3,4,5,6], but this has tended to be limited in extent when compared with field surveys of the sound insulation of separating walls and floors. Perhaps the intended government-funded research on the sound insulation of roofs aginst aircraft noise [7] will provide a more certain source of information in due course.

Domestic noise sources are generally not well researched. There is little practical advice to be found on noise from domestic water services [8]. It would seem uneconomic to isolate all domestic water pipes, so the suggestion in the manual is that only mains-pressure pipes supported on lightweight constructions need be isolated. In principle, lift noise could be controlled by specification but, in the authors' experience, manufacturers tend not to have noise data for their equipment and cannot be relied upon to meet a numerical performance standard. Perhaps architects should impose a market force for more noise data.

Amongst domestic appliances, the washing machine is the most problematic, particularily when spinning clothes and generating vibration at a frequency of between 10 and 20 Hz. Could one ever be situated on a timber joist separating floor without disturbance to the downstairs neighbour?

In these uncertain areas, the manual's emphasis has been placed on good building planning to avoid a difficult design problem.

Personal interpretation of the Building Regulations

The 1985 Building Regulations require the airborne sound insulation of certain walls and the airborne and impact sound insulation of certain floors to be 'reasonable'. (Presumably all other domestic walls may have unreasonable sound insulation - the Regulations do not specify). For interpretation, one must refer to the Approved Document. Its status is not immediately apparent as there is no obligation to adopt any particular solution in the document if you prefer to meet the requirement in some other way. However, ignoring the document will tend to show that you have not complied unless you can demonstrate that you have met the requirement.

There are two ways in which you can comply with the Approved Document and thus tend to show that you have complied with the Regulations. You can copy one of the manual's four basic wall contructions or three basic floor constructions in your building. These are specified in much greater detail than the former deemed-to-satisfy constructions and, if followed in design and on site, should reduce the incidence of poor field performance. If you wish to adopt a form of construction not given in the document, you should obtain field test results for the construction type used in similar circumstances. The Approved Document gives guidance on interpretation of the word 'similar' and on the numerical performance standard which should be obtained.

If you wish to adopt a form of construction not given in the document and cannot obtain field sound insulation results obtained in sufficiently similar circumstances to your intended use, you must demonstrate that you have met the requirement in some other way. Presumably, the building control officer will call for supporting evidence to substantiate any such claim. This suggests that both the architect and the building control officer will require expert support before such a construction can be approved. This would appear to be the situation until certifying officers have been approved under the Regulations to appraise architects' proposals.

The Approved Document calls for sound insulation field testing in advance of construction only. It appears that testing after completion would only arise in cases where the building occupant or owner is not satisfied and wishes to gather evidence to demonstrate that reasonable sound insulation has not been provided. However, the Approved Document clarifies that a failure of new construction to meet the specified values is not in itself evidence of a failure to comply with the requirements of the Regulations. Presumably, this will be left to the Law courts to decide.

SUMMARISING REMARKS

Approved Document E1/2/3 gives the architect clear and detailed guidance on the sound insulation of separating walls and floors in new constructions. The CIRIA manual, 'Sound Control for Homes', attempts, in addition, to advise the architect on the wider aspects of domestic sound insulation and how they should be taken into account at all stages in the design process. Its preparation has underlined a lack of basic information in some areas in which, for the time being, the best advice which can be given is to avoid problems by means of good planning.

As for the Building Regulations, it appears inevitable that the Approved Document will take on the character of 'deemed-to-satisfy' provisions. The main change is in the nature of the test evidence required for other constructions; ie. test similar examples before you build and hope that no-one will find cause to test afterwards. Innovative forms of construction are likely to necessitate more detailed negotiation with the building control officer than hitherto.

REFERENCES

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