Proceedings of The Institute of Acoustics

CASE STUDIES OF SOUND INSULATION IMPROVEMENT IN CONVERTED PROPERTIES

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INTRODUCTION

Grosvenor Terrace, London SE17, is a four storey, brick built, Victorian terrace. The property under study had previously been laterally converted into flats. This involved the blocking up of alternate front doors in the terrace, the remaining ones giving access to flats in the original property and also through the old party wall. In this way, each pair of houses was converted into eight flats, with access through one communal front door.

Grosvenor Terrace lies within the London Borough of Southwark, which is one of the local authorities currently enforcing the provision of sound insulation in conversions through the planning laws. The property is owned by the local authority, and had become void due to the need for an extensive refurbishment. The inadequacy of the sound insulation was a major factor behind these works.

PRACTICAL INVESTIGATIONS

Prior to treatment all rooms contained traditional suspended timber floors. The original lath and plaster ceilings had been removed during an earlier refurbishment; all ceilings were simply plasterboard with uncovered plain-edged floorboards.

The two methods of insulation being investigated were employed in the building as follows: independent ceiling (fig.1)between first floor and ground floor flats; floating floor with pugging (fig.2)between ground floor and basement. A 12 mm layer of fibreboard was laid over all floors after treatment and this was considered as part of the treatment for test purposes.

The independent ceiling was chosen for use in these premises because previous tests of its performance had given promising results, and shown that the Building Regulation Grade I standard could be achieved. The specification used here had been derived from previous experience in Southwark and other places, and included a detail for circumventing high window heads where necessary.

The treatment incorporating slagwool pugging with a floating floor had also been used elsewhere in the borough with some success. The incorporation of plasterboard and chipboard as materials laid on top of the floorboards to increase the mass, with an inherent rise in the floor level, was considered. Whilst this treatment can be considered as a practical alternative, it is a benefit of the scheme used here that the floor level is substantially unaltered. The extensive nature of the works carried out in these premises allowed some of the problems experienced elsewhere to be eliminated at the design stage.

Tests were carried out between the living rooms, kitchens and bathrooms of the family flats, and between the studio rooms of the smaller flats. Room arrangements and sizes on all floors were identical.

The measurements were made in accordance with BS 2750: 1980, 'Methods of measurement of sound insulation in buildings and of building elements.' Initial measurements were made of both airborne and impact sound insulation. The improvement achieved was then measured on completion of the refurbishment works.

The corrected levels, the Building Regulation Standard, and the aggregate adverse deviations for the averaged results are shown graphically in figures 3-6.

DISCUSSION

The primary intention of this exercise was to improve the sound insulation of the party floors between flats. Cursory examination of the results shows that this has been achieved. However, closer study, both of the results and treatments used is necessary to draw valid conclusions from the exercise.

The Building Regulation Standard requires that the average aggregate deviation (AAD) should not exceed 23 dB for either airborne or impact sound. The tests on the untreated floors shows the insulation provided by these floors to be very poor indeed. The fact that all AADs were well in excess of 200 dB illustrates the inadequacy of the insulation between these flats and the need for effective remedial action.

The installation of independent ceilings reduced an airborne AAD of 235 dB down to only 21 dB, which meets the Building Regulation Standard. The impact insulation AAD was reduced by this treatment from 227 dB to 8 dB, again meeting the party floor grade.

Insufficient room height in the basement prevented the installation of independent ceilings. It is this problem, encountered in many standard conversions, which lead to the development of treatments able to be applied to rooms only possessing the minimum height. The slagwool and floating floor treatment reduced an airborne AAD of 273 dB down to 58 dB, and an impact AAD of 279 dB down to 40 dB. These floors therefore failed to meet the Grade I standards for airborne or impact sound, although the lower Grade II standards were achieved.

The quoted results were obtained by averaging levels from four sets of tests, and hence illustrate the repeatability and predictability of these treatments. This has been further confirmed by individual tests of these treatments in other properties. Independent ceilings, erected to the same specification, have given AADs of 3/19, and 10/0 (airborne/impact). Similarly, the slagwool treatment has given results of 29/43, and 35/14, when tested in Southwark.

In all these cases, the need has been shown for such insulation works to be carried out under strict supervision. The effectiveness of these treatments can be significantly reduced by incorrect use of methods or materials, and the people responsible for inspection must understand the principles behind the treatments being used.

The need for any treatment to be applied across the whole of the common areas of the two flats has also been illustrated. One of the independent ceiling results quoted above was obtained in a flat where only the living room was treated. During the test all internal doors and windows were closed, but of course in normal occupation this cannot be controlled. Flanking transmission through the untreated areas hence led to a subjective deterioration of the insulation for the inhabitants of the flat.

SUMMARY

Since the acoustic performances achieved by the two treatments are different, they should not be considered as alternatives. The improvement achieved is considerable in both cases, given the original deficiencies of the sound insulation. However, the independent ceiling is more effective and can be predicted to give Grade I in most properties. The slagwool treatment can be predicted to achieve the Grade II standard. Whilst it is felt that Grade I should always be used as a target, this treatment nevertheless achieves a very worthwhile improvement in sound insulation.

REFERENCE

[1] The Building Regulations 1976 S.I. 1976/1676 HMSO

ACKNOWLEDGEMENTS

The authors wish to thank the Head of Environmental Health (Commercial) Services for his permission to publish this work, and their colleagues in the Environmental Health Service and Surveyors Division for their co-operation and assistance.

The views expressed here are those of the authors only.

FIGURE 1

Indpendent ceiling

existing floor and ceiling retained

50mm low density quilt

2 X 9.5mm plasterboard

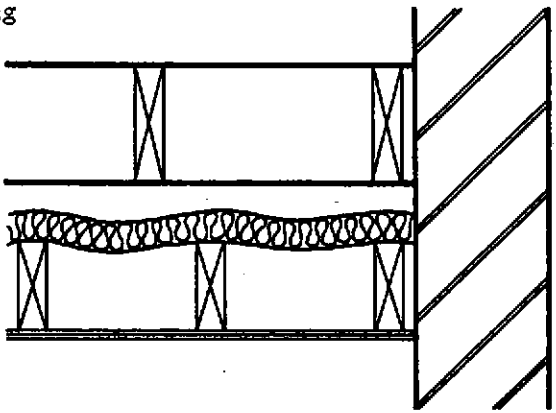

FIGURE 2

Slagwool pugging + floating floor

25mm resilient quilt 60kg/m^3

100mm slagwool pugging 150kg/m^3

2 X 9.5mm plasterboard

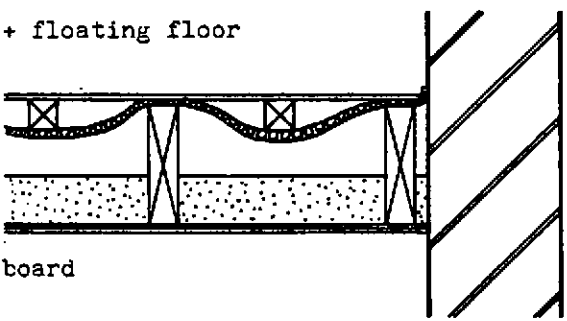

FIGURE 3

Ind.ceiling

X-X-X
Before
AAD 235dB

O-O-O
After
AAD 21dB

Airborne
insulation

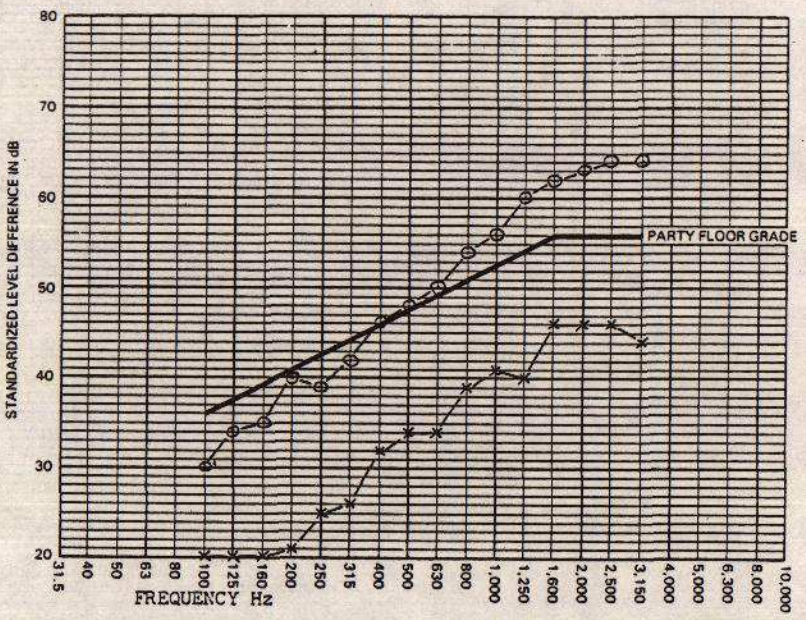

FIGURE 4

Ind.ceiling

X-X-X
Before
AAD 227dB

O-O-O
After
AAD 8dB

Impact
transmission

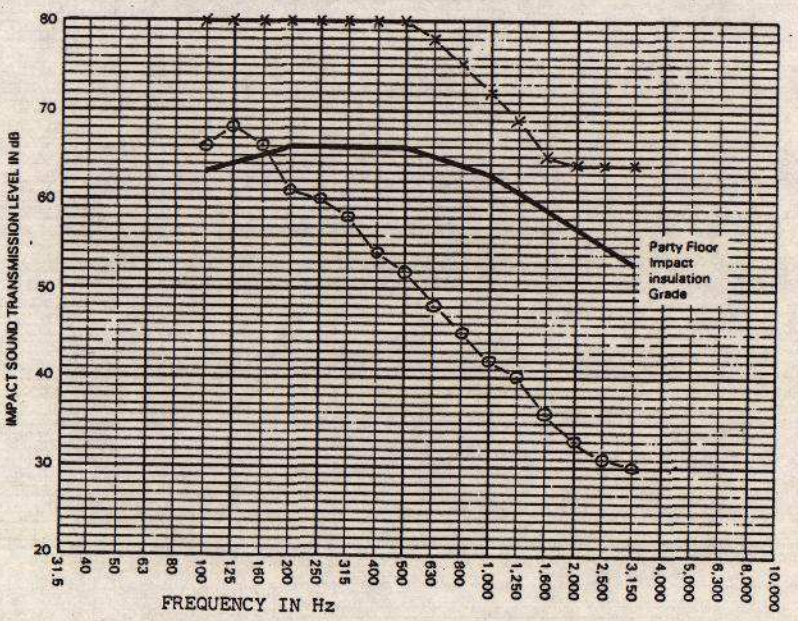

FIGURE 5

Slagwool pugging

X-X-X
Before
AAD 273dB

O-O-O
After
AAD 58dB

Airborne insulation

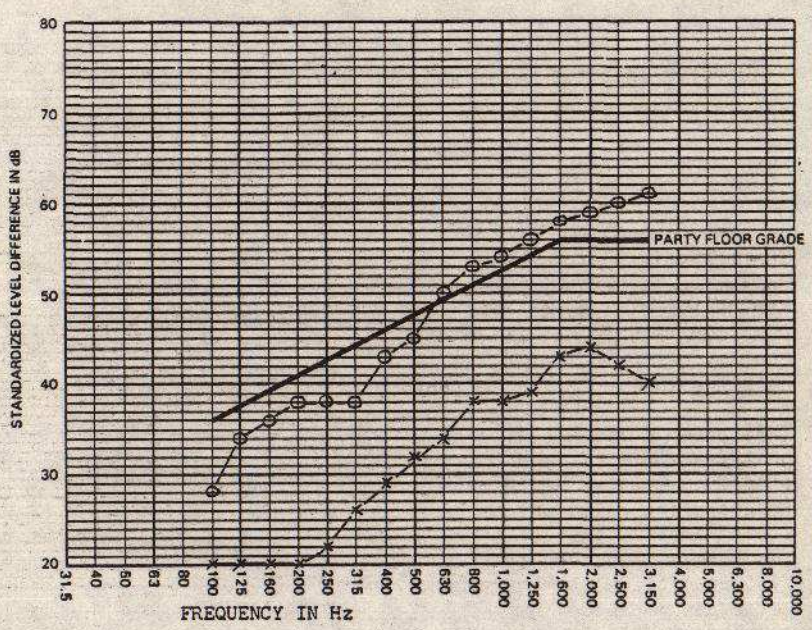

FIGURE 6

Slagwool pugging

X-X-X
Before
AAD 279dB

O-O-O
After
AAD 40dB

Impact transmission