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IMPROVING SOUND INSULATION IN HOMES

Many people are bothered by neighbour noise. The problem can occur in any type of existing or new built house or flat where there is a common separating wall or floor. Poor quality conversions or building work (flats, lofts, extensions etc.) frequently cause noise complaints from residents.

In flats converted before June 1992 there may have been little or no sound insulation improvement undertaken on the floor. If this is the case, upgrading the floor is likely to lead to significant improvements. Conversions carried out after July 2003 should already have been tested and shown to have achieved the Building Regulation performance standards (Approved Document E, ADE[1]) for sound insulation. Similarly all relevant building elements used in the construction of new houses built from July 2004 should have been sound tested or approved by Robust Details Ltd[2].

You may be bothered by your neighbour's noise because:

- you are unusually sensitive to noise
- your neighbour behaves unreasonably
- the sound insulation between your homes is poor

While everybody sometimes hears some noise such as raised voices, laughter or occasional loud music, you should not normally be able to hear your neighbour's ordinary conversation or television. In some cases you may wish to have the sound insulation tested to determine whether the floor or wall is performing as it should be (particularly if legal action is anticipated). ***BRE provides a UKAS accredited sound testing service and can undertake this for you, call 01923 664500 to discuss your requirements or e-mail acoustics@bre.co.uk***. Alternatively you may prefer to attempt to improve the sound insulation directly either by employing a builder or taking a DIY approach. This document outlines some of the principals of sound insulation and their application to DIY measures.

First of all you have to decide how the sound is travelling into your home. It may be coming directly through the separating wall or floor or it may be coming along another indirect route (called a flanking path). The most common such path is the inner leaf of an external cavity wall. Some examples of flanking paths are shown in Figure 1. Direct and indirect sound can together contribute to a noise problem.

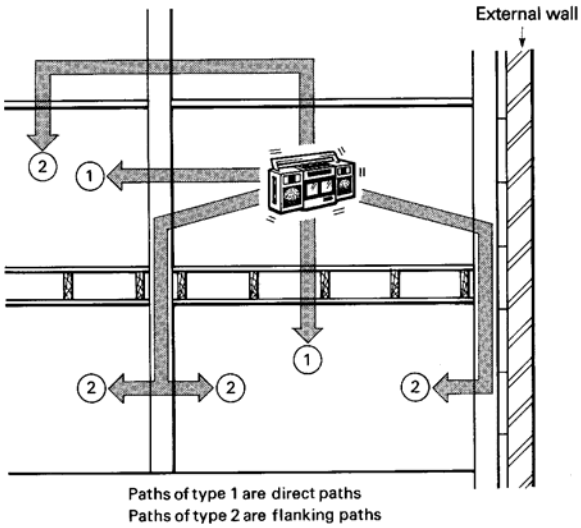

Figure 1. Transmission paths for airborne sound through rooms in a pair of flats separated by a timber floor

Problems with airborne and structure borne sound are often associated both with direct transmission through a floor and flanking transmission via supporting walls and other associated structures. It is essential to establish if your problem is due to direct transmission, flanking transmission or a combination of both so that the most effective remedial treatment can be chosen.

The unwanted noise travelling along direct and flanking paths makes the building structure vibrate and this causes the sound to radiate into your room. One solution is to build another wall or ceiling beside the original, but not connected to it (often called an independent wall or ceiling). A basic description of this treatment is given below.

There are two distinct types of noise to consider for noise coming through floors. Impact noise, (for example footsteps directly on the floor above) and airborne noise, (for example speech and music). Remedial treatment can be applied to the ceiling below, the floor above or a combination of both.

Remedial Treatment: Walls

The following steps for construction are suggested, see Figure 2:

- build a studwork frame, attached to the ceiling and floor but not fixed to the original wall
- hang mineral wool inside the cavity, and tack between the studs or to a batten on the wall
- line the studwork with two layers of plasterboard, (make sure the joints between the sheets in the first and second layer do not coincide)
- seal the perimeter and all other sound paths with flexible sealant
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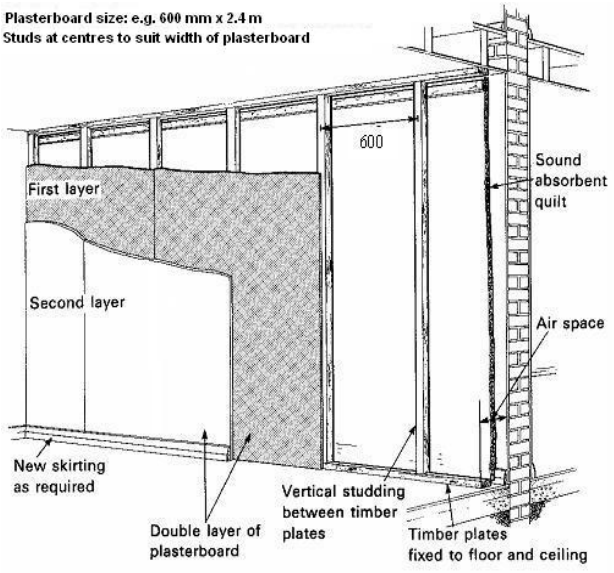

Figure 2. Wall improvement layout of studwork and plasterboard

Remedial Treatment: Ceilings

The principle used in the wall treatment can be equally applied to ceilings, the idea being to build a new ceiling below the existing one. The following steps for construction are suggested, see Figure 3:

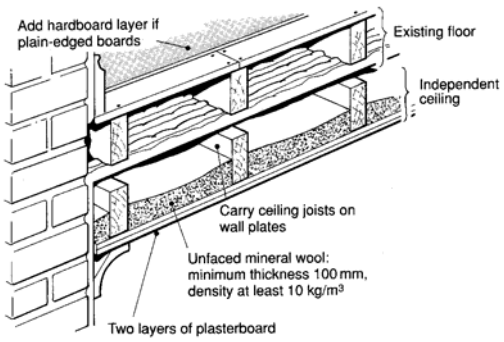

Figure 3. Independent ceiling layout

- attach wall plates to the walls to give the shortest room span and run new ceiling joists between them
- fix mineral wool between the new ceiling joists, or drape it over them
- line with two plasterboard layers, making sure the joints between the sheets in the first and second layer do not coincide
- seal the perimeter and all other sound paths with flexible sealant

In some situations there may be insufficient ceiling height to accommodate new full size timber joists, or restrictions on the depth of the wall linings. For timber structures, the plasterboard layers may be attached to the joists or studs using resilient bars (specialised metal fixings) which still give some isolation from the main wall or ceiling structure but may not be as effective as a fully independent partition. Specialised metal frame ceiling systems are also available which often make use of resilient hangers to help isolate new ceilings from the structure above. For masonry constructions, alternative solutions as detailed in ADE[1] may be more effective (seek further advice).

Remedial Treatment: Floors

If access to the ceiling is not possible, another solution is to construct a floating platform floor in the room above which isolates the walking surface from the basic floor structure below. This should significantly reduce the impact noise and may also help to reduce the airborne noise. It is essential to check that the joists can carry the increased floor loads satisfactorily.

The following steps are suggested, see Figure 4:

- remove original floor and skirting boards and insert glass fibre or rock wool quilt between the joists.
- refit the floor boarding and lay 25mm of glass fibre or rock wool (for this layer a density between 60 and 80 kg/m^3 is required) and cover with 19mm plasterboard, laid loose with a gap at the perimeter walls.
- glue, (not nail), a top surface of tongue and grooved chipboard of not less than 18mm thick, leaving perimeter gap of 10mm.
- seal the perimeter and all other sound paths with flexible sealant

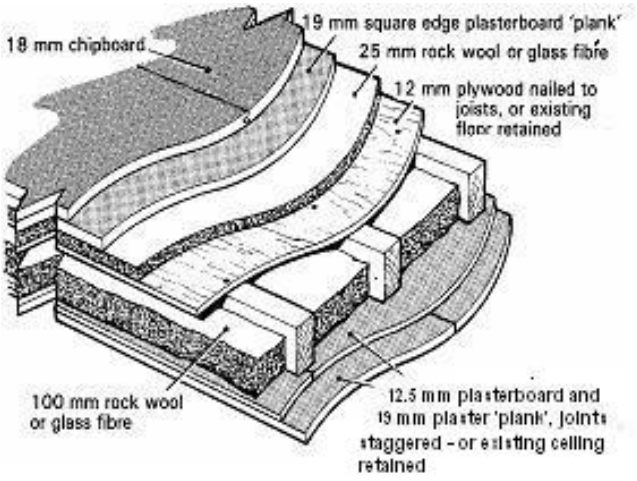

Figure 4. Floating floor improvement layout

- it is important that the floating layer is not bridged by nailing into the boards below or re-fitting skirting boards too tightly to the surface (a flexible foam strip is often inserted around the edge gap of the floor to prevent this).

This method will raise the floor by about 65mm so adjustments to doors, stairs and other fittings may need to be taken into account.

Other types of proprietary flooring systems are now available including resilient battens that support the walking surface and resilient foam layers, these vary considerably in performance and price.

A more in-depth description of wall & floor treatments and other information can be found in Approved Document E of the Building Regulations[1]. It is recommended that you read this publication before starting any building work.

Provided that the sound is mainly entering your home through a direct path then the correct use of the constructions explained above should reduce it substantially. However, there is always a risk that the treatment of a wall or floor alone will not be sufficient. A more thorough acoustic investigation may be necessary before the appropriate remedial measures can be decided upon.

Footnote: walls, floors and ceilings

A number of manufacturers now produce a range of systems designed to improve sound insulation in homes, the effectiveness of these will varying depending on the situation in which they are installed. If such products are to be used, detailed information on the likely sound insulation performance when installed in your property should be requested from the supplier. You are advised to give careful consideration to the data supplied by a manufacturer before using a proprietary product.

Do remember that remedial work to improve the sound insulation can result in considerable weight being added to the structure of a property. Thus it is essential to check that the ceiling or floor joists can carry the increased loads satisfactorily.

Further fee based consultancy advice on acoustic design can be provided by BRE, call 01923 664500 to discuss your requirements or e-mail acoustics@bre.co.uk.

Specific publications referred to in this leaflet are:

1. Approved Document E of the Building Regulations (2003 Edition)
   (see http://www.planningportal.gov.uk/england/professionals/en/4000000000263.html)
2. Robust Details Part E, Resistance to the passage of sound
   (see www.robustdetails.com)