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SOUND INSULATION ADVICE
Proposed Development at Linley Court,
Bingham, Nottingham, NG13 8FA.

Client: Thurcroft Properties Ltd.

Report by
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Acute Acoustics Ltd.

Report Date: 4th May 2022
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Site Visited by: P M Dyson
Site Visit: 26th April 2022

Institute of Acoustics

ANC ACOUSTICS & NOISE CONSULTANTS

1.0 INTRODUCTION

Acute Acoustics Ltd (AAL) was instructed by the Thurcroft Properties Ltd. (TPL) to make recommendations about sound insulation between dwellings on a development site at Linley Court, Bingham, Nottingham, NG13 8FA.

The aim of the project is to convert the first floor of the building from office space to two flats. The second floor is already occupied by two flats and the ground floor is occupied by two retail units which are to remain.

This report considers the existing construction of the building and makes recommendations to upgrade the sound insulation performance. Appendix 1 contains information about mineral wool quilt, mineral wool slabs, acoustic decks, flanking strip and acoustic rated back boxes followed by separating wall and floor information.

2.0 CRITERIA

For airborne sound insulation, Part E of The Building Regulations relies on a "single number value" for assessment of sound insulation; this term is known as $D_{nT,w}+C_{tr}$; $D_{nT,w}$, was the previous single figure term and C_{tr} is a spectrum adaptation term designed to give more weight to the performance of separating structures at low frequencies. For dwellings and rooms for residential purposes formed by a material change of use, the airborne sound insulation should achieve a value of 43 dB $D_{nT,w}+C_{tr}$ or higher. The larger the $D_{nT,w}+C_{tr}$ the <u>better</u> the airborne sound insulation.

For impact sound and separating floors, the required value is an L'nT,w of 64 dB or less for constructions subject to a material change of use. The smaller the L'nT,w the better the impact sound insulation.

3.0 EXISTING CONSTRUCTION & SITE DESCRIPTION

The original building was built in 2001 with external cavity walls and 150mm deep pre-stressed plank flooring with a bonded screed. The ground and first floor ceilings are suspended MF ceilings with drop in tiles.

The internal wall between the two first floor offices is cavity masonry.

4.0 RECOMMENDATIONS – SEPARATING WALLS

4.1 Existing Walls – Cavity Masonry

The doorway to be bricked up with equivalent cavity masonry of either two skins of brickwork or two skins of dense concrete blockwork. The existing plasterwork to be removed and a 6mm scratch coat applied to each face. Apply one layer 15mm Soundbloc plasterboard on dabs to each room face.

NB. It is important that any continuous void above or below the wall (i.e. ceiling void or floor void) is blocked up with wood, plasterboard or other dense material to prevent noise flanking over or under the wall.

4.2 New Separating Walls between Flats/Hallways – Option 1.

It is recommended that Wall Type 4 from ADE, 'Framed Walls with Absorbent Material' is used for new separating walls.

This is shown at Figure 1 of Appendix 1. The two timber studs to have 2 layers of 12.5mm Soundbloc plasterboard to the room face and 50mm (preferably 100mm) dense mineral quilt infill (minimum density – 10kg/m^3) in the cavity.

Do ensure that the minimum distance between the inner faces of the plasterboard to each stud is 200mm so the overall thickness of the wall will be ≈250mm.

External walls to be stripped at the junction with the new separating walls.

50mm (or wider) metal studs can be used in place of timber studs if preferable.

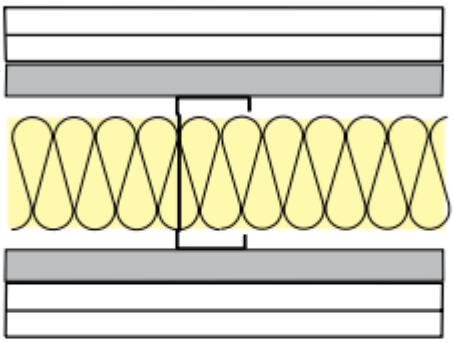
Do ensure that socket boxes are not mounted back to back but separated by 0.5m and fitted with acoustic rated back boxes.

The separating walls should be built off the concrete floor and continue up to the underside of the concrete plank above.

It is important that any continuous void below the walls (i.e., floor void) is blocked up with wood, plasterboard or other dense material to prevent noise flanking under the walls.

4.3 New Separating Walls between Flats – Option 2

If space is limited, then a metal stud frame with resilient bars can be used. The wall to consist of 90mm metal stud with resilient bars to each side and 50mm mineral wool quilt infill, 2 layers 15mm Soundbloc plasterboard to each room face; overall thickness ≈180mm.



Two layers of board each side of Gypframe 'C'
Studs at 600mm centres with Gypframe RB1
Resilient Bar at 600mm centres to both sides.
50mm Isover Acoustic Partition Roll (APR 1200)
in the cavity.

External walls to be stripped at the junction with the new separating walls.

Do ensure that socket boxes are not mounted back to back but separated by 0.5m and fitted with acoustic rated back boxes.

The separating walls should be built off the concrete floor and continue up to the underside of the concrete plank above.

Please note that Option 1 is the preferred option.

Important Note No 1: All separating walls must be built before floor and/or ceiling treatments are added.

5.0 RECOMMENDATIONS – SEPARATING FLOORS

5.1 Ground Floor/First Floor

As the ground floor retail units are to remain open during the conversion works, any upgrading of the floor would have to be carried out from above.

It is considered likely that the existing concrete floor with bonded screed should meet the airborne sound performance requirement of the Building Regulations. (There is no requirement to protect occupants of the ground floor retail units from footfall or other impact noise generated in the flats above).

However, in order to add a safety margin of performance, it is recommended that after all existing floor finishes have been removed, an acoustic deck be

laid as a floating floor treatment onto the concrete floor with flanking strip around the perimeter. Examples are included at Appendix 1.

5.2 First Floor/Second Floor

All existing suspended ceilings to be removed from the first floor rooms to expose the underside of the concrete floor above.

It is recommended that **either** option 1 or option 2 below is installed to all First Floor rooms and corridors where there are rooms or corridors above:

Secondary Ceiling Option 1 - 'Floor Treatment 1' from Approved Document E is used for the floor comprising 2 layers 12.5mm Soundbloc or Fireline plasterboard with 100mm dense mineral quilt infill (minimum density – 10kg/m^3).

Figure 2 at Appendix 1 shows the construction details for Floor Treatment 1 and also shows a detail for areas above windows with low head height.

Secondary Ceiling Option 2 – A heavy MF ceiling comprising acoustic hangers and 2 layers 12.5mm plasterboard (either Fireline or Soundbloc) with 100mm dense mineral quilt infill (minimum density – 10kg/m^3).

At the site visit, both options were discussed, and it was considered that option 1 was the likely choice.

6.0 PIPEWORK

It was discussed when onsite that in order to achieve a satisfactory drop, a drainage pipe may pass through the separating floor between the second and first floor and run below the concrete floor fully enclosed within the ceiling void above the independent ceiling in the first floor flats.

Do ensure that mineral wool quilt is still included in the void above or below the pipework and that the opening in the concrete floor is only slightly bigger than the pipework and sealed with sealant or neoprene.

Approved Document E gives guidance on this in section 3.79-3.81

3.79 *Pipes and ducts that penetrate a floor separating habitable rooms in different dwellings should be enclosed for their full height in each dwelling.*

3.80 *The enclosure should be constructed of material having a mass per unit area of at least 15 kg/m2. Either line the enclosure, or wrap the duct or pipe within the enclosure, with 25 mm unfaced mineral wool.*

3.81 *Leave a small gap (approx. 5 mm) between the enclosure and floating layer and seal with sealant or neoprene.*

7.0 GENERAL POINTS TO WATCH - PARTY WALLS

The following section is general advice and not all points may apply in every situation.

7.1 Sound Transmission Paths

With regard to the party walls, the potential sound transmission paths that can allow sound to pass from one room to another are:

- Directly through the walls, due to poor intrinsic performance of the partition.
- Sound flanking over the top of the wall via a roof/ceiling void.
- Sound flanking around the walls along the external walls.
- Sound flanking under the wall via a floor void, or a continuous floating screed (probably only for lightweight party walls).
- Sound flanking around the walls, via the doors and corridor.

8.0 GENERAL POINTS TO WATCH - PARTY FLOORS

8.1 Sound Transmission Paths

For party floors, the potential sound transmission paths that can allow sound to pass from one room to another are:

1. Poor intrinsic performance of the floor/ceiling.
2. Sound flanking around the walls via the external wall.
3. Sound flanking through the floor via openings for pipework and service ducts.

4. No resilient component to reduce impact noise or the resilient component has been compromised.

Appendix 1

Product Information

Examples of Mineral Wool Quilt include:

JCW Acoustic Quilt	(https://www.acoustic-supplies.com/)
Knauf Acoustic Mineral Wool RS60	(https://www.ikoustic.co.uk)
Rockwool RWA45	https://www.building-supplies-online.co.uk

Examples of Mineral Wool Slabs include:

Hush Slab 100 (available in different thicknesses)	Hush Acoustics https://www.hushacoustics.co.uk/
Rockwool RWA45 Semi-rigid Slabs (available in different thicknesses)	Various stockists
Isover Acoustic Slabs (available in different thicknesses)	Isover

https://www.isover.co.uk/products/acoustic-slab

Examples of Acoustic Deck include:

JCW Acoustic Deck 28 (28mm thick) - JCW Acoustic Supplies (https://www.acoustic-supplies.com/)

JCW Acoustic Deck 32 (32mm thick) - JCW Acoustic Supplies (https://www.acoustic-supplies.com/)

Monarfloor Deck 18 (26mm thick) – Soundstop UK

https://www.soundstop.co.uk/ZMFDECK18.php

Do note that there are thinner, cheaper alternatives available, but these offer less acoustic performance and should be avoided.

Examples of Flanking Strip include:

JCW Acoustic Isolation Strips JCW Acoustic Supplies

Cellecta YELOfon FS30 Flanking Strip Cellecta
https://www.insulationshop.co/cellecta_yelofon_fs30_flanking_strip.html

Hush Flanking Strips Hush Acoustics
https://www.hushacoustics.co.uk/

Monarfloor Flanking Band
http://www.monarfloor.co.uk/products/accessories/monarfloor-flanking-band.aspx

Examples of Acoustic Rated Back Boxes include:

RD Compliant Acoustic Sockets Boxes Sound Reduction Systems
https://www.soundreduction.co.uk/products/soundproofing-for-walls/acoustic-socket-boxes/

SRS Socket Boxes Trim Acoustics
https://www.trimacoustics.co.uk/product/srs-acoustic-socket-boxes/

JCW Acoustic & Fire Socket Box Inserts - Double x 35mm
https://www.insulationsuperstore.co.uk/product/jcw-acoustic-fire-socket-box-inserts-double-x-35mm.html

Wall type 4: Framed walls with absorbent material

2.141 In this guidance only a timber framed wall is described. For steel framed walls, seek advice from the manufacturer.

2.142 The resistance to airborne sound depends on the mass per unit area of the leaves, the isolation of the frames, and the absorption in the cavity between the frames.

Construction

2.143 The construction consists of timber frames, with plasterboard linings on room surfaces and with absorbent material between the frames.

2.144 One wall type 4 construction (type 4.1) is described in this guidance.

2.145 Details of how junctions should be made to limit flanking transmission are also described in this guidance.

2.146 Points to watch

Do

a. Do ensure that where fire stops are needed in the cavity between frames that they are either flexible or fixed to only one frame.

b. Do stagger the position of sockets on opposite sides of the separating wall, and use a similar thickness of cladding behind the socket box.

c. Do ensure that each layer of plasterboard is independently fixed to the stud frame.

d. Do control flanking transmission from walls and floors connected to the separating wall as described in the guidance on junctions.

Do not

a. Where it is necessary to connect the two leaves together for structural reasons, do not use ties of greater cross section than 40mm x 3mm fixed to the studwork at or just below ceiling level and do not set them at closer than 1.2m centres.

b. Do not locate sockets back to back. A minimum edge to edge stagger of 150mm is recommended. Do not chase plasterboard.

2.147 Wall type 4.1 *Double leaf frames with absorbent material (see Diagram 2-37)*

- minimum distance between inside lining faces of 200 mm
- plywood sheathing may be used in the cavity as necessary for structural reasons
- each lining to be two or more layers of plasterboard, each sheet of minimum mass per unit area 10 kg/m^2, with staggered joints
- absorbent material to be unfaced mineral wool batts or quilt (which may be wire reinforced), minimum density 10 kg/m^3
- minimum thickness of absorbent material:

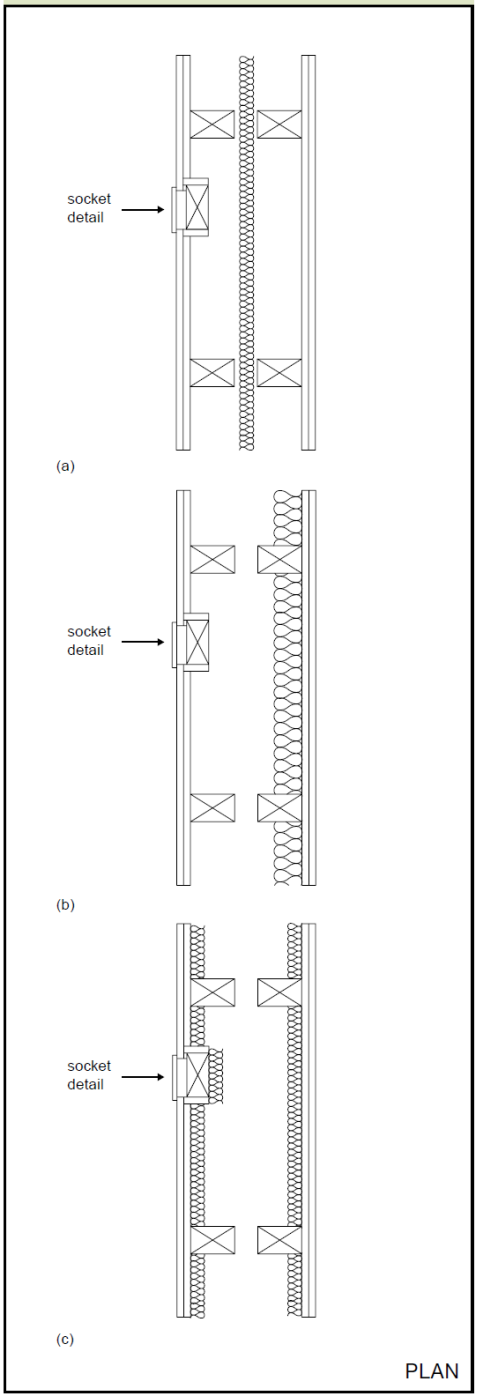
(a) 25 mm if suspended in the cavity between frames,

(b) 50 mm if fixed to one frame,

(c) 25 mm per batt (or quilt) if one is fixed to each frame.

Note: A masonry core may be used where required for structural purposes, but the core should be connected to only one frame.

Diagram 2-37: **Wall type 4.1**



Junction requirements for wall type 4

Junctions with an external cavity wall with masonry inner leaf

2.148 No guidance available (seek specialist advice).

Junctions with an external cavity wall with timber frame inner leaf

2.149 Where the external wall is a cavity wall:

(a) the outer leaf of the wall may be of any construction, and

(b) the cavity should be stopped between the ends of the separating wall and the outer leaf with a flexible closer. See Diagram 2-38.

2.150 The wall finish of the inner leaf of the external wall should be:

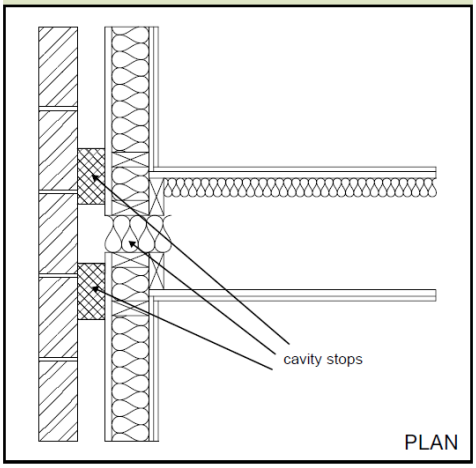
(a) one layer of plasterboard, or

(b) two layers of plasterboard where there is a separating floor

(c) each sheet of plasterboard of minimum mass per unit area 10 kg/m², and

(d) all joints should be sealed with tape or caulked with sealant.

Diagram 2-38: **Wall type 4 – external cavity wall with timber frame inner leaf**



Junctions with an external solid masonry wall

2.151 No guidance available (seek specialist advice).

Junctions with internal framed walls

2.152 There are no restrictions on internal walls meeting a type 4 separating wall.

Junctions with internal masonry walls

2.153 There are no restrictions on internal framed walls meeting a type 4 separating wall.

Junctions with internal timber floors

2.154 Block the air paths through the wall into the cavity by using solid timber blockings or continuous ring beam or joists.

Junctions with internal concrete floors

2.155 No guidance available (seek specialist advice).

Junctions with timber ground floors

2.156 Block the air paths through the wall into the cavity by using solid timber blockings or a continuous ring beam or joists.

2.157 See Building Regulation Part C - Site preparation and resistance to moisture, and Building Regulation Part L - Conservation of fuel and power.

Junctions with concrete ground floors

2.158 The ground floor may be a solid slab, laid on the ground, or a suspended concrete floor. A concrete slab floor on the ground may be continuous under a type 4 separating wall. A suspended concrete floor may only pass under a wall type 4 if the floor has a mass per unit area of at least 365 kg/m².

2.159 See Building Regulation Part C - Site preparation and resistance to moisture, and Building Regulation Part L - Conservation of fuel and power.

Junctions with ceiling and roof space

2.160 The wall should preferably be continuous to the underside of the roof.

2.161 The junction between the separating wall and the roof should be filled with a flexible closer.

2.162 The junction between the ceiling and the wall linings should be sealed with tape or caulked with sealant.

Where the roof or loft space is not a habitable room and there is a ceiling with a minimum mass per unit area 10 kg/m² and with sealed joints, either:

(a) the linings on each frame may be reduced to two layers of plasterboard, each sheet of minimum mass per unit area 10 kg/m², or

(b) the cavity may be closed at ceiling level without connecting the two frames rigidly together and then one frame may be used in the roof space provided there is a lining of two layers of plasterboard, each sheet of minimum mass per unit area 10 kg/m², on both sides of the frame.

2.163 Where there is an external wall cavity, the cavity should be closed at eaves level with a suitable material.

Junctions with separating floors

2.164 There are important details in Section 3 concerning junctions between wall type 4 and separating floors.

Figure 1: Wall Type 4

E DWELLING-HOUSES AND FLATS FORMED BY MATERIAL CHANGE OF USE

Floor treatment 1: Independent ceiling with absorbent material

4.26 The resistance to airborne and impact sound depends on the combined mass of the existing floor and the independent ceiling, the absorbent material, the isolation of the independent ceiling and the airtightness of the whole construction.

4.27 Independent ceiling with absorbent material (see Diagram 4-3)

- at least 2 layers of plasterboard with staggered joints, minimum total mass per unit area 20 kg/m²
- an absorbent layer of mineral wool laid on the ceiling, minimum thickness 100 mm, minimum density 10 kg/m³.

The ceiling should be supported by one of the following methods:

- independent joists fixed only to the surrounding walls. A clearance of at least 25 mm should be left between the top of the independent ceiling joists and the underside of the existing floor construction, or
- independent joists fixed to the surrounding walls with additional support provided by resilient hangers attached directly to the existing floor base.

Note: This construction involves a separation of at least 125 mm between the upper surface of the independent ceiling and the underside of the existing floor construction. However, structural considerations determining the size of ceiling joists will often result in greater separation. Care should be taken at the design stage to ensure that adequate ceiling height is available in all rooms to be treated.

4.28 Where a window head is near to the existing ceiling, the new independent ceiling may be raised to form a pelmet recess. See Diagram 4-4.

4.29 For the junction detail between floor treatment 1 and wall treatment 1, see Diagram 4-5.

4.30 Points to watch

Do

a. Do remember to apply appropriate remedial work to the existing construction.

b. Do seal the perimeter of the independent ceiling with tape or sealant.

Do not

a. Do not create a rigid or direct connection between the independent ceiling and the floor base.

b. Do not tightly compress the absorbent material as this may bridge the cavity.

Diagram 4-3: **Floor treatment 1**

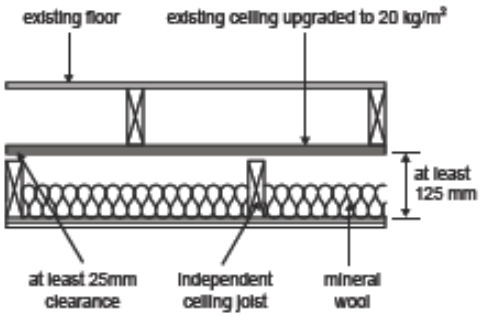


Diagram 4-4: **Floor treatment 1 - high window head detail**

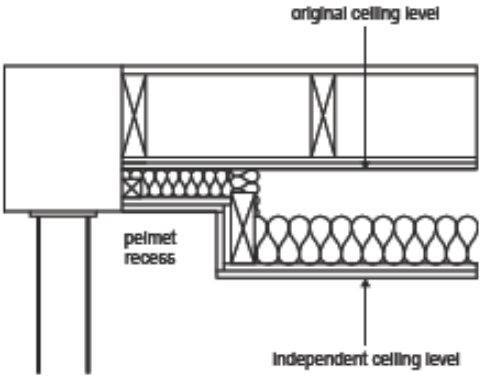


Figure 2: Floor Treatment 1