Report VA1820.190724.ADR

18 Iron Bridge Close, London

Acoustic Design Review

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1. Introduction

It is proposed to convert the existing commercial premises 18 Iron Bridge Close, London for residential use.

Venta Acoustics has been commissioned by Dan Pathirana to undertake a review of the acoustic separation between the new floors.

A review of the proposed constructions with regard to meeting the requirements of Approved Document E (2003) of the Building Regulations is presented in this report.

2. Sound Insulation Performance Requirements

Approved Document E (2003) requires that the minimum sound insulation performances shown in Table 2.1 are achieved for converted dwellings.

Test Type	Test Element	Minimum ADE Requirement
Airborne Sound Insulation	Walls and Floors	$D_{nT,w} + C_{tr} \geq 43$ dB
Impact Sound Insulation	Floors	$L'_{nt,w} \leq 64$ dB

Table 2.1 – ADE 2003 and design values for airborne and impact sound insulation (conversion)

NB Higher values of $D_{nT,w} + C_{tr}$ represent better airborne sound insulation.
Lower values of $L'_{nT,w}$ represent better impact sound insulation

3. Sound Insulation Design Review

A review of the Ammro Consulting Limited drawings for the scheme has been undertaken, as well as information provided by Mr Pathirana.

3.1 Party Floors

3.1.1 Concrete Floor

Approximately half of the floors in the building are understood to comprise a concrete floor system.

It is understood that these are pre-cast concrete planks supported off a steel frame, with a total depth of 250mm.

Although it is unknown, it assumed that the top surface has been screeded to provide a level finish in the office.

It is assumed that with the depth of the floor, the total mass per unit area of the concrete floor and top screed would be in excess of 380kg/m^2. Should site investigations show the mass to be lower than this, the sound insulation performance would be expected to decrease accordingly.

To ensure that the airborne and impact sound insulation requirements are achieved, the following works should be undertaken:

- Above floor, any gaps, penetrations or damage in screed should be filled and repaired;
- Resilient layer to be installed on top of floor, nominally 6mm thick, with timber floating floor above, minimum 9mm T+G boards, flanking strips used to perimeters of rooms;
- New m.f. ceiling to be installed on resilient hangers at least 75 below underside of concrete soffit, ceiling to comprise 1 layer plasterboard minimum mass 10kg/m^2, e.g. 12.5mm SoundBloc;
- 30mm mineral wool in ceiling void, minimum density 20kg/m^3.

3.1.2 Timber Floor

In areas where the existing mezzanine is to be removed, a new timber floor is to be installed at the same height as the existing concrete floor.

The floor is understood to be using 47mm x 250mm timber joists at 400mm centres.

The following works are recommended to ensure the timber floors meet the requirements.

- Resilient layer to be installed on top of timber sub-floor, nominally 6mm thick, with timber floating floor above, minimum 9mm T+G boards, flanking strips used to perimeters of rooms;
- T+G timber 18mm thick subfloor;
- 100mm mineral between joists, minimum density 20kg/m^3;
- Ceiling attached to joists using resilient bars. Ceiling to comprise 2 layers 15mm dense plasterboard (minimum mass per board 12kg/m^2), joints staggered, taped and skimmed.

3.2 Party Walls

No details have been provided regarding party walls. However, to aid with selection, the following constructions would typically be capable of achieving the required performances.

Option 1

A staggered stud arrangement, having an overall thickness of 208mm may be considered as follows:

- 2 layers 15mm dense plasterboard (minimum mass 14kg/m2 per board), joints staggered and taped;
- Two rows of Gypframe 92 I 90 ‘I’ studs in Gyprfame 148 DC 60 Deep Flange floor and ceiling channel;

- Alternate studs staggered in channels at 300mm centres;
- Minimum 50mm Isover APR 1200 mineral wool in void;
- 2 layers 15mm dense plasterboard (minimum mass 14kg/m2 per board) on both faces, joints staggered and taped.

For clarity, an overhead view of a staggered stud is shown below in Figure 3.1.

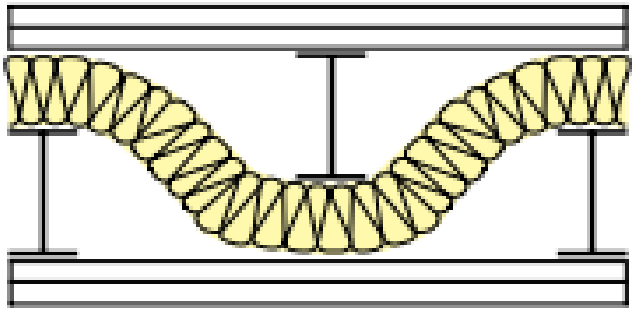

Figure 3.1 – Plan view of staggered stud

This system has a specified performance of R_w+C_{tr} 55dB and is expected to meet the requirements of ADE.

Option 2

Acoustically, the preferred option would be a twin frame system such as the following system having a width of 200mm:

- 2 layers 15mm SoundBloc, joints staggered, taped and skimmed;
- 60 I 70 'I' studs at 600mm centres;
- Cavity (total width between inner faces 190mm), 100mm Isover APR1200 in void;
- 60 I 70 'I' studs at 600mm centres;
- 2 layers 15mm SoundBloc, joints staggered, taped and skimmed.

This independent frame construction has a specified performance of R_w+C_{tr} 57dB and is commonly used in party wall constructions, and provides a more robust solution as the two frames are separates, unlike the staggered stud, which shares a floor channel.

Floor/Wall Interface

It is recommended that the ceiling be interrupted at party walls. At the head of the wall, the channel should be attached to the underside of a joist or the soffit, with the ceiling running to either side of the lined partition. The joint should be sealed with a non-hardening mastic sealant.

It is recommended that the floor channel is attached directly to the subfloor deck or concrete floor, with the acoustic underlay running to the sides of the lined partitions, and flanking strips to the edges to maintain the discontinuity between the subfloor and the isolated floor, returned to underneath the skirting boards. This is indicated in Figure 3.2.

Figure 3.2

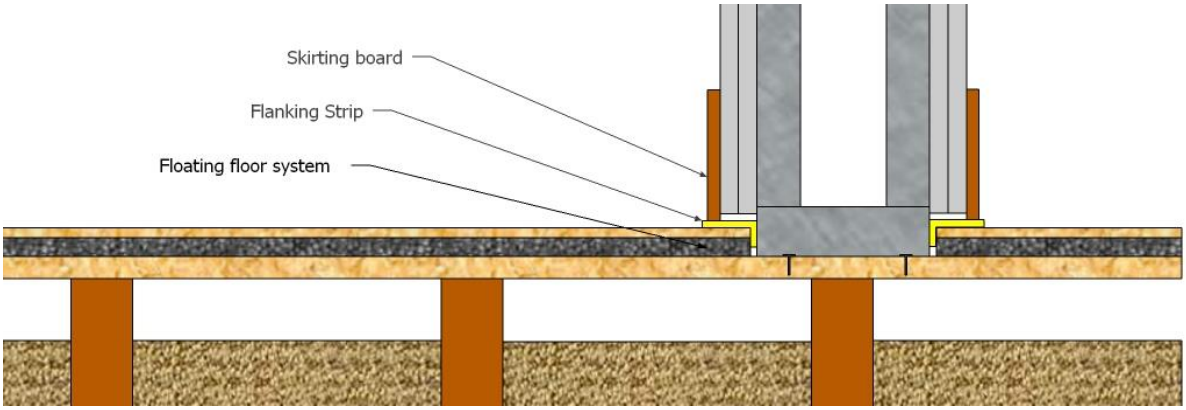

Figure 3.3 – Illustration of wall floor interface

3.2.1 Internal Walls

Internal walls need to provide a minimum performance of R_w 40dB, although this is not tested on site.

The following minimum construction for internal partitions would be:

- 12.5mm wallboard
- 48mm metal stud, with 25mm mineral wool in void
- 12.5mm wallboard

3.2.2 External Walls

To minimise flanking between floors, external walls should be lined with the following:

- Independent studwork lining using 70mm studs built against the existing wall structure;
- 50mm Isover APR 1200 mineral wool between studs;
- Wall to be lined with 1 layer 15 minimum SoundBloc.

The party wall partitions should break the lining to the external wall with appropriate cavity stops used on the line of the party structure. In this fashion flanking along the external walls is expected to be adequately controlled.

3.3 Doors

Approved Document E states that entrance doors to dwellings should have '…good perimeter sealing (including the threshold where practical) and a minimum mass per unit area of 25 kg/m^2 or a minimum sound reduction index of 29 dB R_w …'.

There are no acoustic requirements specified for internal doors within rooms for residential purposes.

3.4 Downlighters

It is recommended that downlighters are not installed, with surface mounted lights used where possible.

If downlighters are to be installed, they should be fitted in accordance with the manufacturer's guidelines with acoustic hoods at a density of no more than 1 light per 2m^2 of ceiling and at centres not less than 0.75m. Openings should be no larger than 100mm diameter, or 10mm x 100mm.

3.5 Architectural Detailing

Any mechanical and electrical penetrations should be carefully detailed and well-sealed.

ADE recommends that wrapping piped services (other than gas) in 25mm thick mineral wool insulation (10kg/m^3) and enclosing in two layers of plasterboard (11kg/m^2 per board) should be sufficient to maintain sound insulation and noise breakout, which is as per the design drawings.

Socket backs should be boxed in using two layers of plasterboard of the same mass as the partition wall and should be staggered by at least 300mm.

3.6 Reverberation in Common Parts (Part E – Section 7)

Common areas are assumed to be all those which are readily accessible as general circulation space with residential rooms' front doors opening directly onto them.

In order to comply with Method A of Section 7 of ADE an area equal to or greater than the floor area should be covered with a Class C absorber or better. This is the approach currently proposed and is considered to meet the requirements of ADE.

Alternatively, it is considered that with the use of a high grade 20mm carpet this requirement would be satisfied by the carpet alone (without the need for acoustic ceiling tiles).

4. Conclusion

A review of the internal building fabric has been undertaken by Venta Acoustics for the building to be converted to apartments at 18 Iron Bridge Close, London with the target of achieving the requirements of Approved Document E (2003) of the Building Regulations.

Provided the recommendations in the report are adopted, the construction is expected to achieve the required minimum performance.

Jamie Duncan MIOA