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TECHNICAL REPORT

1 STRICKLAND PLACE

Design Advice for Compliance with Part E of the Building Regulations

Adrian James Acoustics Document Control Sheet

Report prepared for:	Southwold Town Council Town Hall Market Place Southwold IP18 6EF
Filename:	13621 Report 1.docx

QA Control

Rev	Date	Author	Checked by	Approved by
-	03 March 2023	Ben Hunt	Andy Thompson MIOA	Andy Thompson MIOA

Revision History

Rev	Details

Disclaimer

1 INTRODUCTION

1.1 Background

We have been appointed by Southwold Town Council to provide acoustic design advice for a residential conversion scheme at 1 Strickland Place, Southwold. The development will convert a single house into a one-bedroom ground-floor flat and a three-bedroom duplex flat spanning the first and second floors.

The development is subject to Approved Document E of the Building Regulations (hereafter referred to as ADE), which came into force on 1 July 2003. We understand that the acoustic specification makes no demands other than compliance with ADE.

Our scope of work for the project is:

1. To identify the acoustic requirements to be met under ADE
2. To advise on constructions and details which would comply with these acoustic requirements

This report contains the results of the above work. It is not necessary to be familiar with the technical aspects of acoustic design to understand our conclusions and recommendations. Because of the technical nature of acoustic design, however, this report includes several specialised terms which are explained briefly in the appendices.

This report is based on the following drawings by Hamson Barron Smith:

Drawing No	Rev	Title
10	P01	Existing Plans & Elevations
11	P01	Proposed Plans & Elevations

Recommendations given in this report are for acoustic purposes only, and should be checked for compliance with other requirements and regulations, including (but not limited to) structural requirements, Standards, building controls, safety, and control of fire.

Any materials and proprietary products referred to in this report should not be substituted without approval.

Please note that this is an acoustically complex building with several different types of separating wall, floor, and wall linings. We have as far as possible provided critical junction details between these but please contact us if any clarifications or further information is required.

2 SOUND INSULATION REQUIREMENTS

2.1 Basic requirements

The development is subject to Approved Document E (hereafter referred to as ADE) of the Building Regulations, which came into force on 1 July 2003. We understand that the acoustic specification makes no demands other than compliance with Approved Document E.

The requirements under ADE are as follows:

E1. Dwelling-houses, flats and rooms for residential purposes shall be designed and constructed in such a way that they provide reasonable resistance to sound from other parts of the same building and from adjoining buildings.

E2. Dwelling-houses, flats and rooms for residential purposes shall be designed and constructed in such a way that (a) internal walls between a bedroom or a room containing a water closet and other rooms and (b) internal floors, provide reasonable resistance to sound. This requirement does not apply to internal walls containing doors, to internal walls separating ensuite toilets from the associated bedrooms or existing walls and floors in a building subject to a material change of use.

E3. The common parts of buildings which contain flats and rooms for residential purposes shall be designed and constructed in such a way as to prevent more reverberation around the common parts than is reasonable.

E4. Relates to acoustic conditions in schools and does not apply to this project.

The performance standards defining “reasonable resistance to sound” are quantified in Approved Document E. These numerical standards are listed in the following sections of this report, which is our assessment of compliance with the Regulations.

For this project Requirements E1 and E2 apply.

2.2 Numerical criteria

2.2.1 Requirement E1 – walls and floors separating dwellings

This development is classified by ADE as 'Dwelling-houses and flats formed by material change of use', for which the numerical criteria are as follows:

	Airborne sound insulation $D_{nT,w} + C_{tr}$ dB (minimum values)	**Impact sound insulation $L'_{nT,w}$ dB (maximum values)**
Dwelling-houses and flats formed by material change of use		
Walls	43	-
Floors and stairs	43	64

Table 1 - Criteria to be achieved

Demonstration of compliance with the Building Regulations is through pre-completion testing of these constructions. These terms and the means of measuring them are explained in the Appendices to this report.

2.2.2 Requirement E2 – internal walls and floors within dwellings

To satisfy Requirement E2, new internal walls and floors within dwellings that do not contain doors should achieve the following laboratory sound insulation values:

	Airborne sound insulation R_w, dB (Minimum values)
Walls	40
Floors	40

Compliance is demonstrated by design, and these walls and floors are not intended to be subject to pre-completion testing. Existing internal (i.e. not separating) walls and floors do not need to meet these requirements.

These terms and the means of measuring them are explained in the Appendices to this report.

3 WALL CONSTRUCTIONS

3.1 Separating walls

3.1.1 Separating wall to adjoining house

We assume that there is no requirement to upgrade the sound insulation of the separating wall to the adjoining house given that the wall will continue to separate a pair of dwellings. This should be confirmed with Building Control.

3.1.2 Separating wall between Flat 1a Hall and Flat 1b Stairs

A new separating wall is to be built between the staircase and the entrance hall to the ground floor flat as shown in Figure 1.

Figure 1 - New separating wall

We understand that the wall will be built from the existing staircase and the available space is therefore minimal. We therefore propose the following slimline solution for the wall:

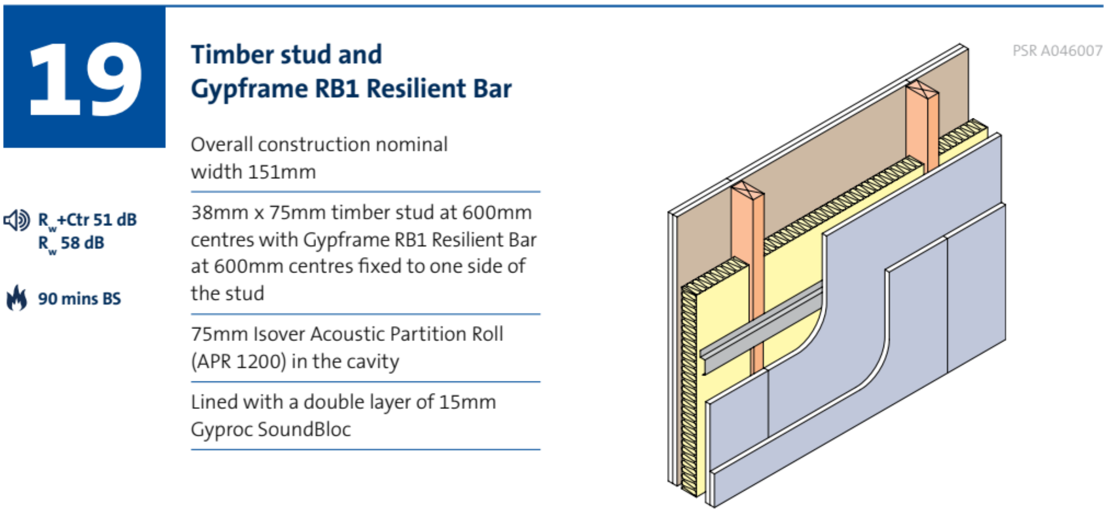


Figure 2 – British Gypsum timber stud wall with resilient bars

The resilient bars may be installed on either side of the wall, but it is important that they are not bridged by screws to the studwork frame. The wall should be installed in full accordance with instructions in the British Gypsum White Book.

The separating wall should extend from the floorboards to the ceiling and all gaps should be sealed airtight with non-hardening mastic. The plasterboard ceiling should not be continuous above the wall and should be interrupted by the timber head plate.

The void beneath the floorboards presents a path for flanking transmission. This pathway should be completely sealed off with a suitable construction (for example brick or blockwork). We can advise on alternative options if required.

3.2 Flanking walls

Masonry walls that continuously flank between ground and first floor should not be a significant path for noise if their mass per unit area is >365kg/m^2. We would expect this density requirement to be met by 9” brick walls (for example, external walls), but there appear to be several internal walls which are approximately 100mm brick or blockwork, which we would not expect to meet the required minimum density and may therefore be a flanking path.

Until the ceiling treatment is installed, it is difficult to determine whether the 100mm flanking walls would be enough of a weakness to cause a sound insulation test across the floor to fail. To determine this, one approach could be to install a new sound insulating ceiling as set out in Section 4 and then test a pair of rooms to judge the noise contribution through the flanking walls. Should the tests pass, no further treatment to the flanking walls would be necessary.

If the tests fail, or are not desired, we recommend installing plasterboard wall linings on all masonry walls of density less than 365kg/m^2 that continuously flank between ground and first floor. The linings should be installed on at least one side of the floor (as shown in Section 5.1.1).

A suitable wall lining would be the GypLyner Single system, as follows:

- Plasterboard lining of at least two layers of 12.5mm dense plasterboard (e.g. Gyproc SoundBloc or an approved equivalent) to give a minimum combined mass per unit area of at least 20kg/m^2, on GypLyner fixings to provide a minimum 35mm void containing at least 25mm mineral wool insulation (10-36kg/m^3). All instructions in the British Gypsum White Book should be followed. This is illustrated in principle in Figure 3.

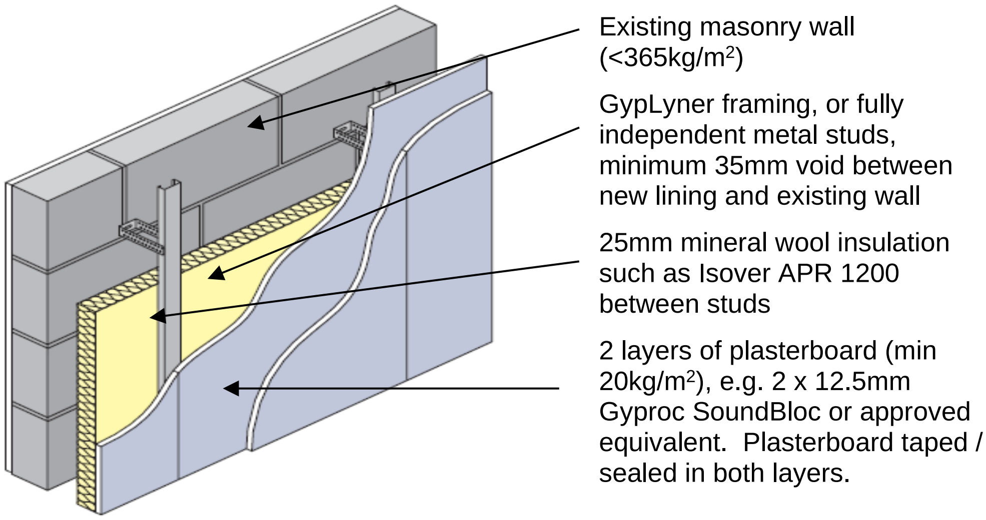


Figure 3 – Sound insulating lining specification

We would not expect the linings to be required on walls within hallways, so only the room side would require treatment. Figure 4 shows locations on the ground floor potentially requiring lining, but walls at first floor level could be lined instead (or a combination of the two).

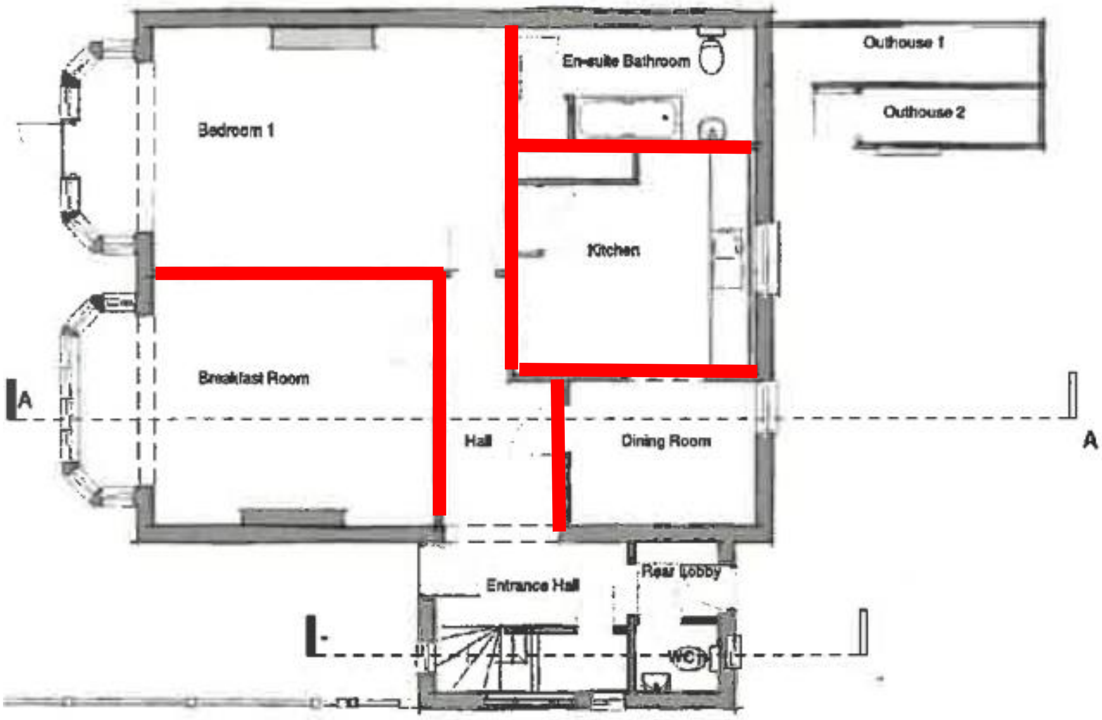


Figure 4 - Walls potentially requiring sound insulating linings

3.3 Chimneys / fireplaces

Provided that the flues are not shared between flats on either side of the separating floor, and the chimneys / fireplaces are constructed from at least 9" solid brickwork and therefore have a mass of at least 365 kg/m^2, we would not expect the chimneys or fireplaces to provide a significant path for flanking sound transmission. However, if further investigation shows that the above mass is not met, it may be necessary to install sound insulating linings to reduce flanking transmission of noise as described in Section 3.2.

3.4 Internal walls

Internal walls within individual flats are not required to achieve the same standard of sound insulation as separating walls between dwellings. ADE requires that new internal walls that do not contain doors are built to a construction capable of achieving 40 dB Rw when measured under laboratory conditions. However, there is no requirement to upgrade existing internal walls to meet this standard. Pre-completion testing is not required across internal walls.

Suggested constructions for new internal walls are as follows:

- **Dry lined walls (no mineral wool) –** 70 mm timber or metal stud frame with two or more layers of plasterboard (min 10 kg/m^2 per sheet) on each side and all joints well-sealed.
- **Dry lined walls (with mineral wool)** – 70 mm timber or metal stud frame with a single layer of plasterboard (min 10 kg/m^2 per sheet) on each side, 25 mm mineral wool in cavity (min 10 kg/m^3) and all joints well-sealed.

4 FLOOR & CEILING CONSTRUCTIONS

4.1 Floors and ceilings summary

We propose two separating floor/ceiling constructions in the following areas:

1. The area above the ground floor entrance, dining room, and WC.
2. The remaining rooms in the ground floor flat (living room, bedroom, kitchen, bathroom, and hallways).

4.1.1 Type 1 - GF to 1F – Landing and WC

Figure 5 outlines the ceiling area above the ground floor dining room, entrance, and WC, where the ceiling height is particularly low.

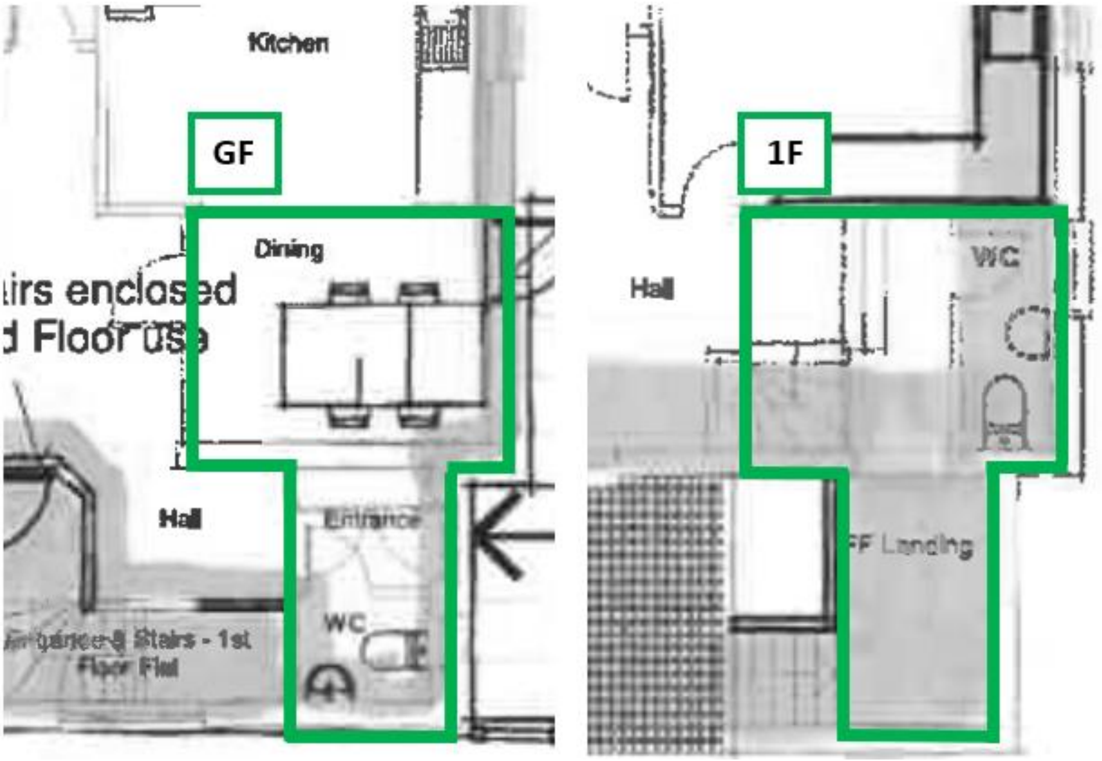


Figure 5 – GF Dining, Entrance and WC areas to 1F Landing and WC areas

We understand that raising the floor level in 1F landing and WC is unlikely to be feasible due to the impact this would have on stair levels and the existing WC door frame. We also understand that independent ceilings cannot be installed in the corresponding ground floor areas because there is insufficient head height. Therefore, to meet the acoustic requirements without significantly altering the floor or ceiling height, we recommend:

- Remove the existing ceiling in these areas
- Install 100 mm mineral wool insulation in the floor void (10 – 60 kg/m^3), e.g. Isover APR 1200
- Fix a new ceiling comprising of at least two layers of 12.5 mm dense plasterboard (e.g. Gyproc SoundBloc or an approved equivalent) to British Gypsum RB1 resilient bars mounted at right angles to the floor joists. This is illustrated in Figure 6.
- Seal all gaps in floorboards so that they are airtight by overlaying with hardboard or sealing with flexible mastic.
- Install a bonded soft floor covering (e.g. Regupol Sonus Core 5) on top of the floorboards. Carpet or hard floor finishes may be installed on top of this resilient layer.

Note that it is vital to ensure that the plasterboard is screwed only into the resilient bars, and there is no contact between the plasterboard and the joists. Screws should therefore be carefully sized in accordance with the manufacturer's guidance.

The joints between boards in the plasterboard ceiling should be staggered and sealed airtight in both layers by taping and filling or sealing with flexible mastic.

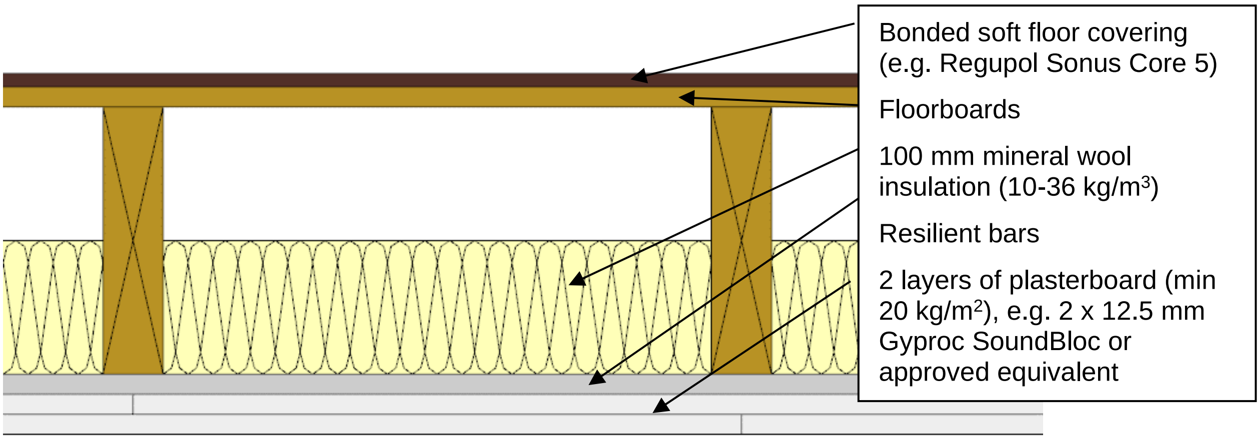


Figure 6 - SECTION: Proposed floor / ceiling solution for 1F landing / WC area

4.1.2 *Type 2 - GF to 1F – All other rooms*

We understand that it is preferable to retain the existing ceilings, and we would therefore recommend that a new independent sound insulating ceiling is installed beneath the existing floor structure. A suitable specification is therefore as follows:

- Any gaps in the existing floor boarding should be sealed by overlaying with hardboard or filling with sealant. If the floorboards are to be replaced, boarding should be tongue-and-groove with a minimum thickness of 18 mm.
- The existing ceiling should be inspected and upgraded to a minimum mass per unit area of 20 kg/m^2 by overlaying with plasterboard as necessary.
- A new independent ceiling should be supported from either independent joists fixed only to the surrounding walls **or** by an acoustically resilient MF suspension system (such as British Gypsum GAH Hangers).
- There should be a void of at least 125 mm between the underside of the existing ceiling and the upper surface of the independent ceiling.
- The new ceiling should consist of two or more layers of plasterboard with staggered joints, attached to the underside of the independent joists or MF ceiling system. The plasterboard should have a minimum combined mass per unit area of 20 kg/m^2 (e.g. two layers of Gyproc Wallboard TEN or SoundBloc board by British Gypsum). Joints in both faces of board should be taped and sealed.
- There should be at least 100 mm of mineral wool of minimum density 10 kg/m^3 laid between the new ceiling joists. The mineral wool should not be tightly compressed between the new ceiling joists and existing ceiling as this may bridge the cavity.

This is illustrated in Figure 7.

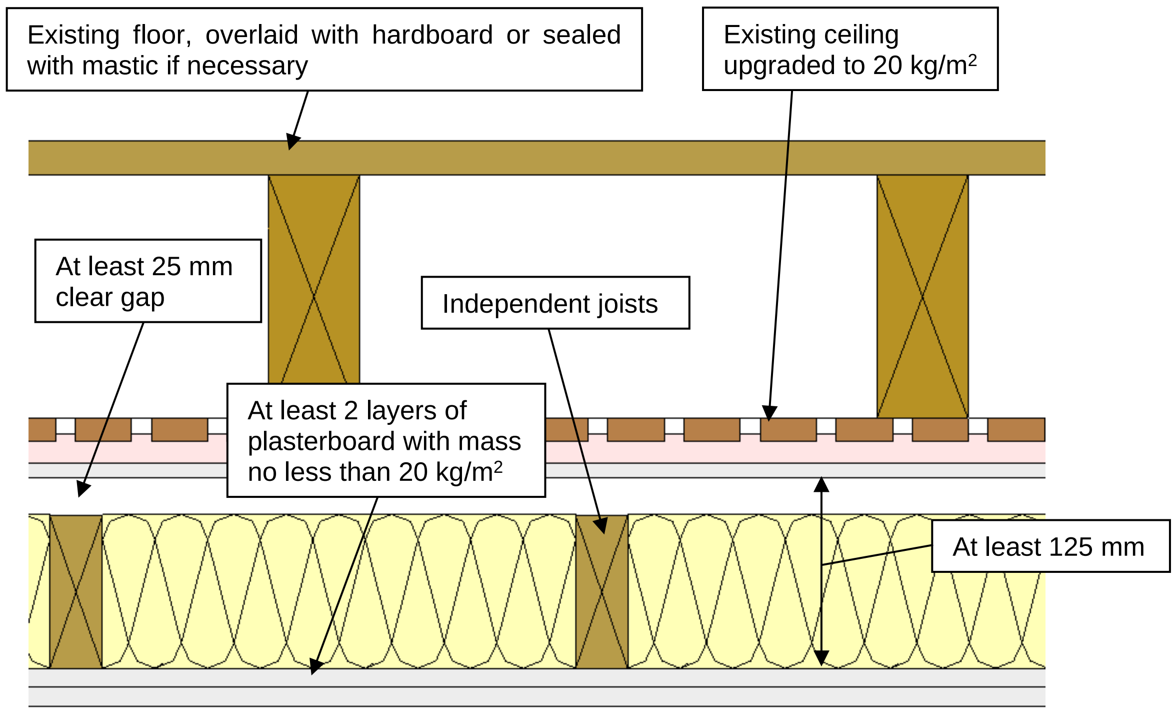


Figure 7 - SECTION: Example separating floor with new independent ceiling

5 JUNCTION DETAILS

5.1 Floors

5.1.1 Floor Type 1 - GF bedroom, living room, kitchen, bathroom

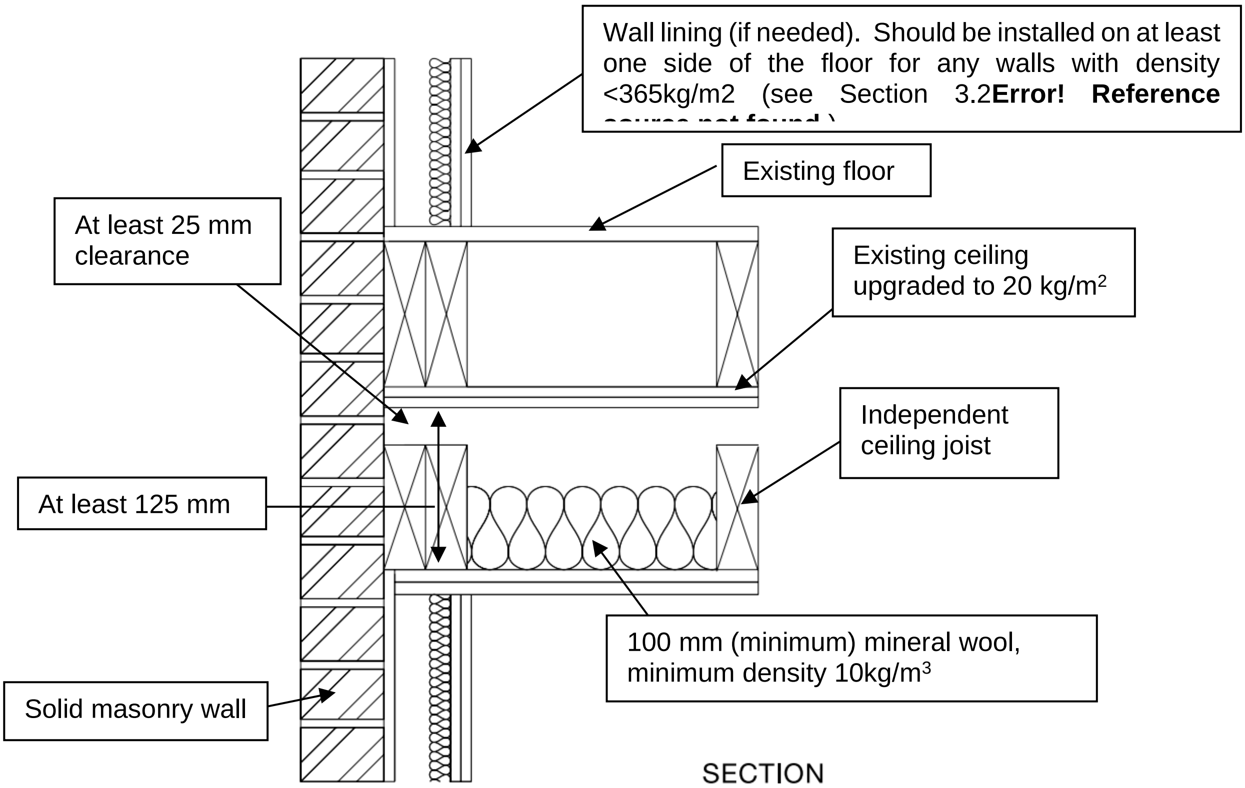


Figure 8 – EXTRACT: ADE D4.5 (p.61) – SECTION: Example junction detail between separating floor and solid masonry wall

5.1.2 Floor Type 2 - GF entrance, dining room, WC

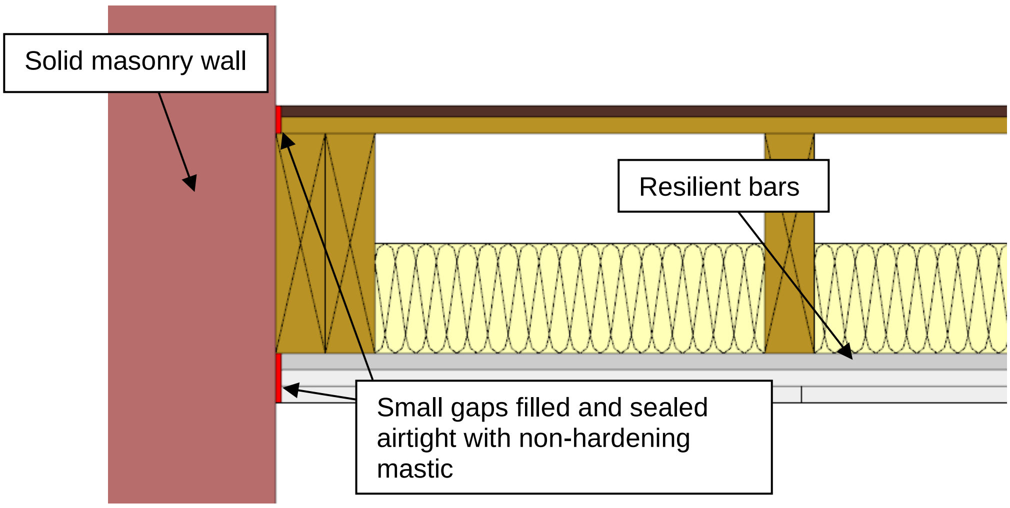


Figure 9 – SECTION: Example junction detail between separating floor and solid masonry wall (flanking wall linings may be needed)

5.2 Separating wall junctions

5.2.1 Separating wall to external walls

Figure 10 shows the junction between an external solid masonry wall and a single stud separating wall as shown in Section 3.1 between the ground floor entrance hall and the stairs to the first floor flat.

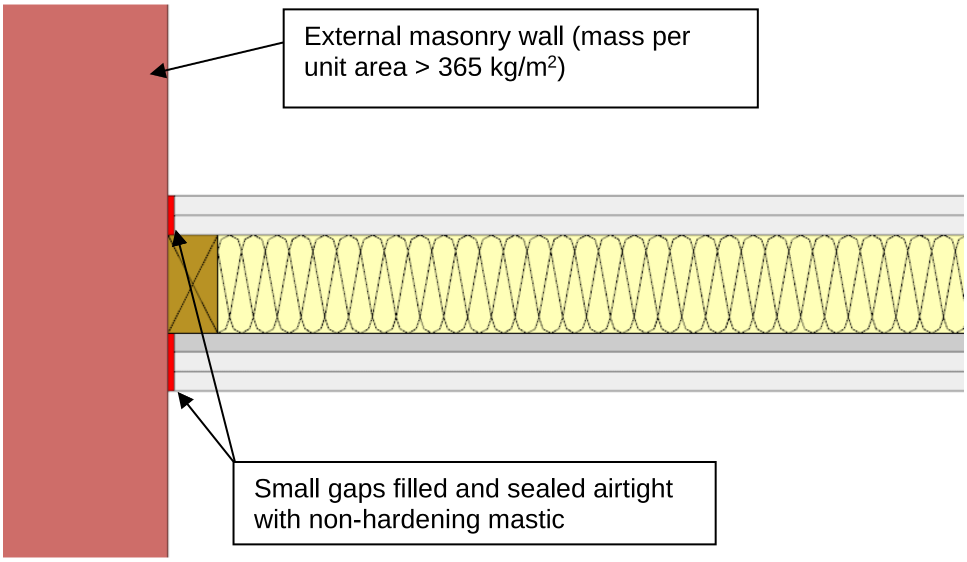


Figure 10 – PLAN: Example junction between new single stud separating wall and masonry flanking wall

5.2.2 Separating wall to floor and stairs

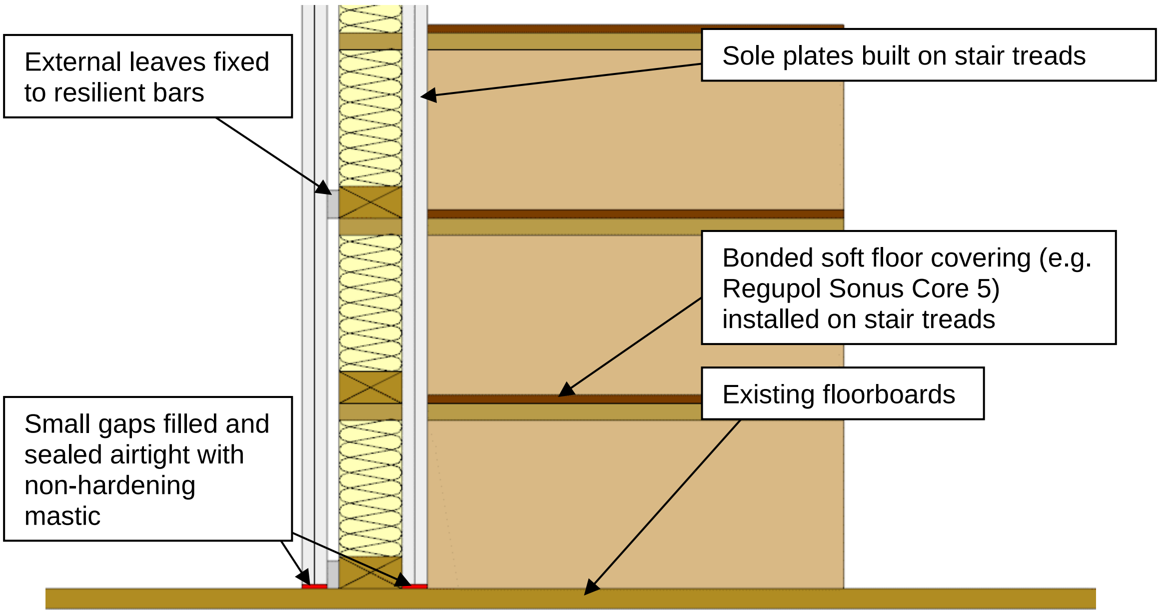


Figure 11 – SECTION: Example junction between new single stud separating wall and existing floorboards and staircase

5.3 Service penetrations

5.3.1 Separating wall between Flat 1a Hall and Flat 1b Stairs

We recommend that piped services or socket boxes should be kept to an absolute minimum in separating walls. Where used, sockets and switches should not be mounted back-to-back and the following details must be used:

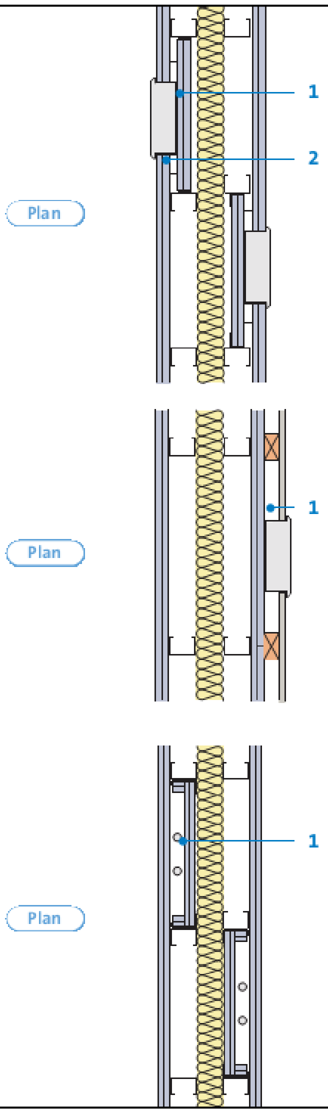


Figure 12 – Service details in separating walls

There are several proprietary solutions as an alternative to building plasterboard back-boxes for sockets. Further details are given in Appendix E.

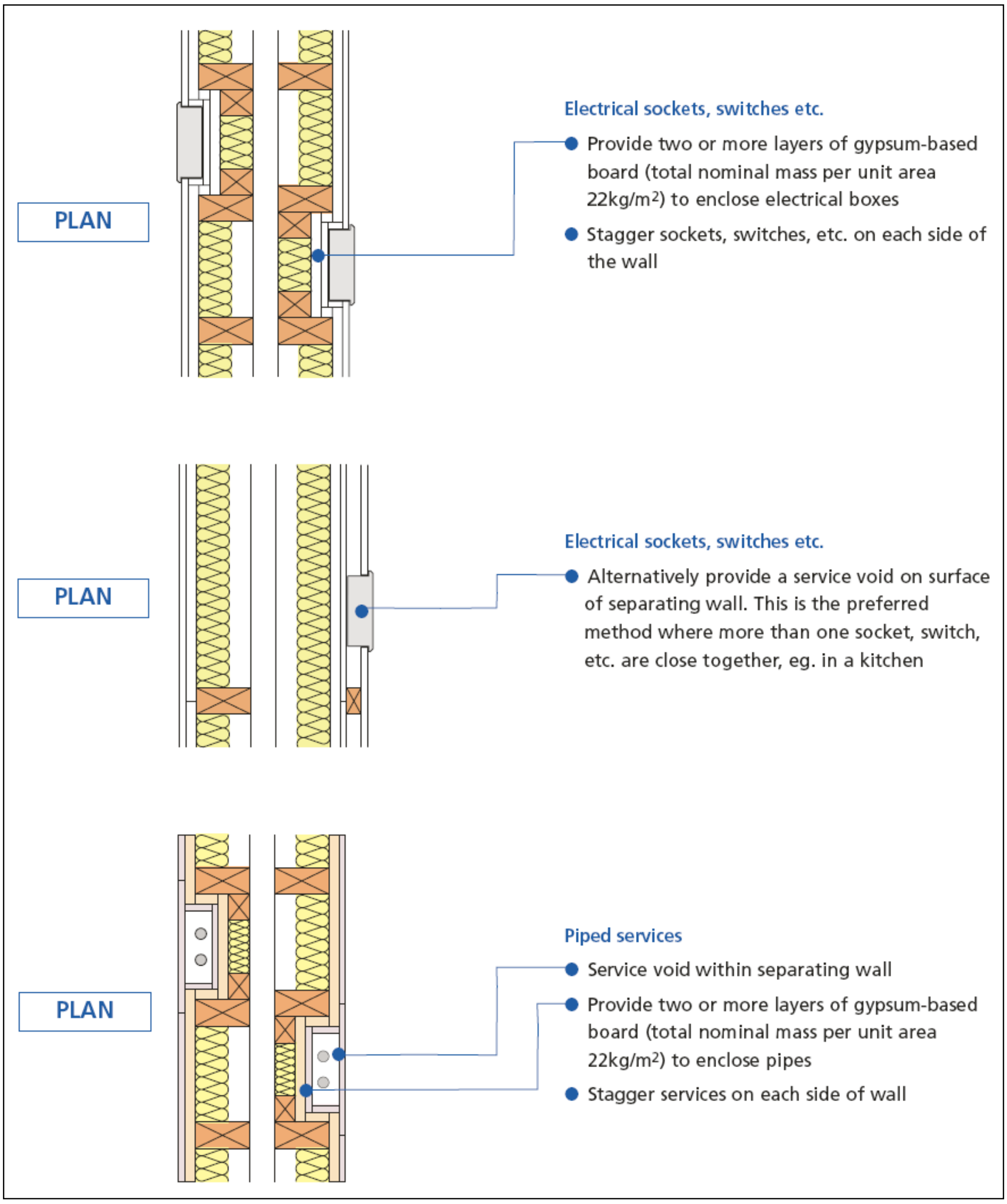


Figure 13 – Service penetration details for timber separating walls

5.3.2 Through separating floors

Pipe penetrations should be in accordance with the principles shown in Figure 14. The pipe should be surrounded with 25 mm mineral wool and boxed in with 2 layers of 12.5 mm plasterboard providing a minimum density of 20 kg/m^2 (e.g. 2 layers of Gyproc WallBoard TEN or 12.5 mm Gyproc SoundBloc). We can advise on individual penetration detail proposals as required.

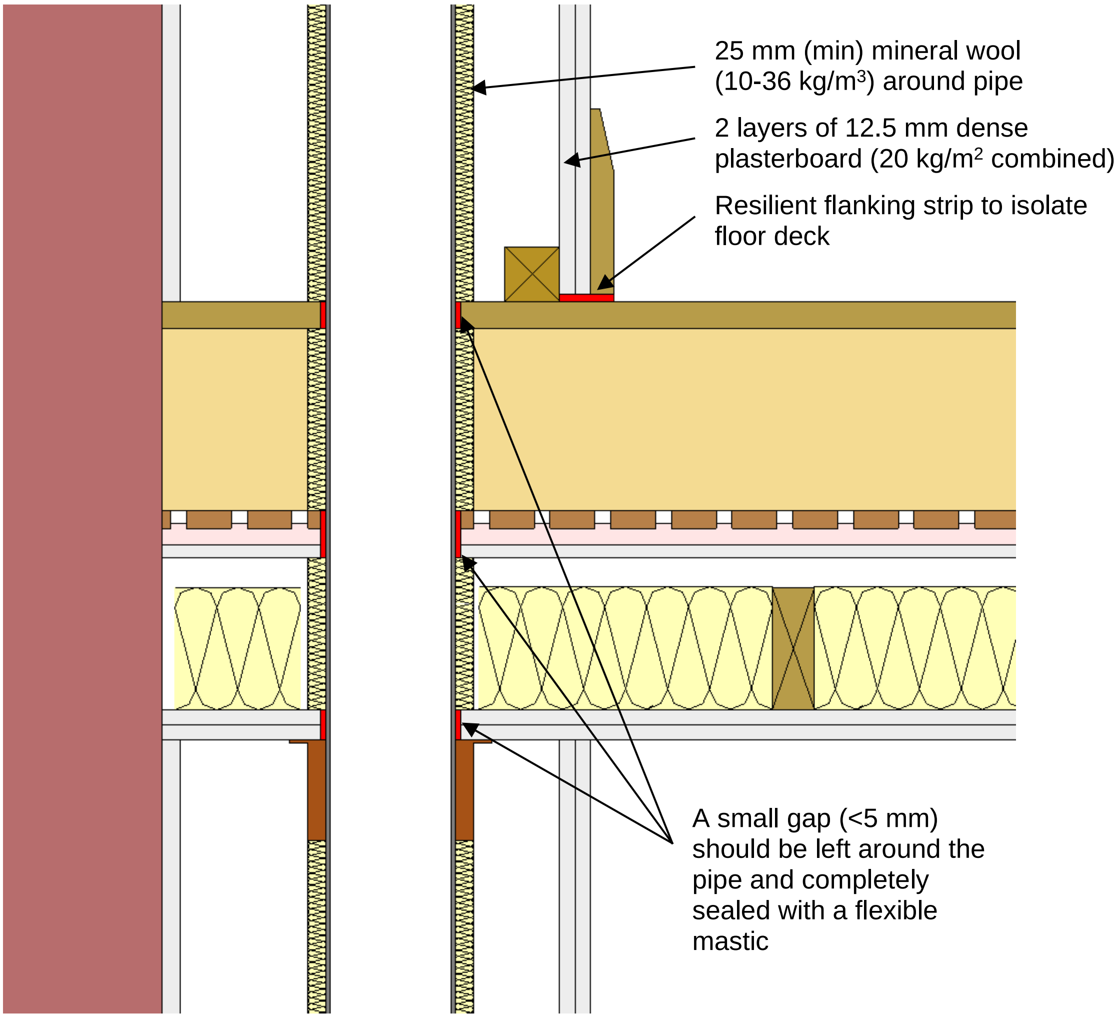


Figure 14 - SECTION: Example details showing service penetration through floor

5.3.3 In ceilings

Cable penetrations may be made for a standard ceiling rose, provided that the hole is made as small as possible. Ideally, the gap around the cable should be no more than 5mm. After installation of the electrical cable the hole should be fully sealed with flexible non-hardening mastic. Similar detailing would be required for other ceiling-mounted devices such as smoke detectors and intruder alarms.

Downlighters of recessed lighting units may be used if they are installed in accordance with the manufacturer's guidance, and as follows:

- No more than one light per 2 m^2 of floor area
- At centres greater than 0.7 m^2.
- Into openings not exceeding 100 mm diameter or 100 mm x 100 mm

A greater density of light fittings may be acceptable provided that they have been acoustically tested in accordance with BS EN ISO 140-3 and BS EN ISO 140-6, and shown to not reduce the acoustic performance of the ceiling by more than 1dB.

APPENDIX A TECHNICAL TERMS AND UNITS IN RATING NOISE

General units and quantities

Decibel (dB) – This is the unit used to measure sound. The human ear has an approximately logarithmic response to sound over a very large dynamic range - typically from 0.00002 to 200 Newtons per square metre (N/m^2). Decibels provide a logarithmic scale to describe sound pressure and sound power levels. The threshold of hearing for most people corresponds to a sound pressure level of 0 dB and the threshold of aural pain to a sound pressure level of 140 dB.

Loudness and addition of decibels – Because of the logarithmic scale, decibels do not add in a linear fashion. When two identical sounds occur simultaneously, the resulting level is only 3 dB higher than for a single source. By contrast, an increase of 10 dB normally represents a doubling of "loudness" of the sound. Hence doubling the amount of sound energy results in very much less than a doubling in subjective loudness.

Sound Power Level (L_W or SWL) – This is a function of the noise source alone and is independent of its surroundings. It is a measure in decibels of the amount of sound power emitted by the source.

Sound Pressure Level (L_p or SPL) - This is a function of the source and its surroundings and is a measure in decibels of the total instantaneous sound pressure at a point in space. The SPL can vary both in time and in frequency. Different measurement parameters are therefore required to describe the time variation and frequency content of a given sound. These are described below.

Assessment of non-steady sound

Most sounds are not steady, so that the sound pressure level fluctuates with time. A measurement is therefore meaningless unless we know whether it represents a minimum, maximum or some kind of time-averaged level. Various parameters have been derived to measure sounds of differing characters, and the most relevant to this report are as follows:

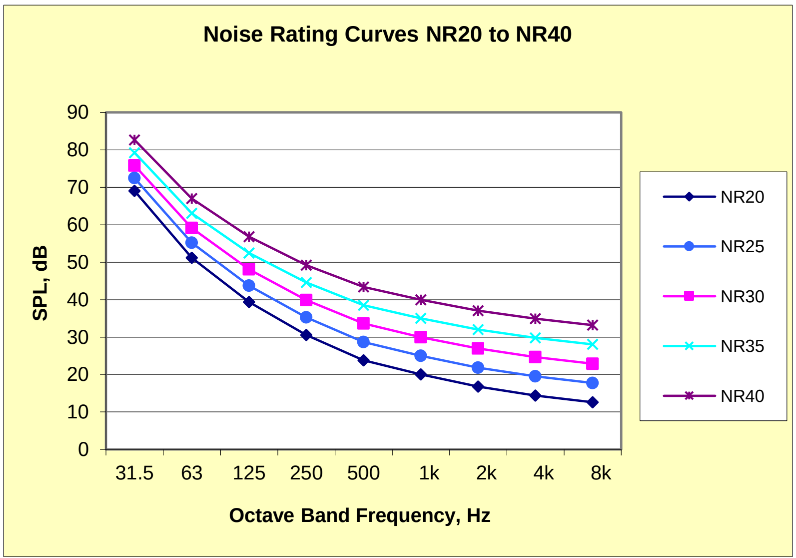
> **$L_{eq,T}$** – The equivalent continuous noise level is used widely to measure noise that varies with time. It is defined as the notional steady noise level that would contain the same acoustic energy as the varying noise. Because the averaging process used is logarithmic, the $L_{eq,T}$ level tends to be dominated by the higher noise levels measured.
>
> **$L_{90,T}$** – This is the sound pressure level exceeded for 90% of the measurement period T. It is an indication of noise levels during the quieter periods of measurement and is widely used to measure background noise.
>
> **L_{max}** – This is the maximum level measured and is used to assess sleep disturbance from intermittent sources such as aircraft and train noise. L_{max} is normally defined as the maximum reading given by a sound level meter set to "Fast" response (with a 0.125-second time constant).

Frequency content and weighting

Octave and One-Third Octave Bands – The human ear is sensitive to sound over a frequency range of approximately 20 Hz to 20,000 Hz (1 Hz = 1 cycle per second), and is generally more sensitive to medium and high frequencies than to low frequencies. To define the frequency content of a noise, the spectrum is divided into frequency bands, the most common of which are octave bands, in which the mid frequency of each band is twice that of the band below it. For some applications, each octave band may be split into three one-third octave bands, and for finer analysis narrow band filters may be used.

'A' Weighting – A number of frequency weightings have been developed to imitate the ear's varying sensitivity to sound of different frequencies. The most commonly used is the 'A' weighting. The 'A' weighted SPL can be measured directly or derived from octave or one-third octave band SPLs. The result is a single figure index which gives some idea of the subjective loudness of the sound, but which contains no information as to its frequency content. The addition of the subscript "A" to any of the indices described above indicates that these have been measured using the 'A' weighting (e.g. $L_{Aeq,T}$ or L_{Amax}).

Noise Rating (NR) and other curves – 'A'-weighted levels cannot be used to define a spectrum or to compare sounds of different frequencies. NR curves convey frequency information in a single-figure index by defining the highest measured or specified level at each frequency. To measure the noise rating of a given environment, the SPL is measured in octave or one-third octave bands and the noise rating is then the highest NR curve touched by the measured levels. The graph below shows curves NR20 to NR40.



NC curves are similar to NR curves and are more commonly used outside Europe. They are not defined at 31.5 Hz.

NR and NC curves were derived theoretically from the response of the human ear under laboratory conditions. More recent research has found that at low noise levels, noise spectra matching these curves allow too much noise at very high and very low frequencies compared with the levels at mid-frequencies. PNC curves have begun to be used more widely in the USA and UK for noise control in concert halls and theatres.

APPENDIX B MEASUREMENT AND RATING OF SOUND INSULATION

B1 – Airborne sound insulation

All methods of measuring and rating sound insulation require a steady continuous sound source. This normally consists of recorded “pink” or “white” noise, filtered as required and played through an amplifier and loudspeaker to provide a high level of constant noise across the frequency range of interest. The resulting sound levels in the source and receiving rooms are then measured in octave or one-third octave bands. As the sound levels will vary with location, these are averaged either across a number of fixed microphone positions or by using a continuously moving microphone.

Recommended procedures are set out in British Standard BS EN ISO 140:Part 4: *“Measurement of sound insulation in buildings and building elements - Field measurement of airborne sound insulation”*. Using this standard, the following parameters can be determined in each frequency band:

- *The level difference* D is the difference between the average sound pressure levels in the source room and the receiving room. This is the quantity which ultimately determines the acceptability of sound insulation between rooms.
- *The standardised level difference* D_{nT} is the level difference corresponding to a reference value of the reverberation time T in the receiving room. It is a useful quantity for assessing sound insulation in dwellings, where the reference value of T is taken as 0.5 seconds.
- *The apparent sound reduction index* or *apparent transmission loss* R’ is the level difference corrected for the area of the floor or wall under test and for the amount of acoustic absorption in the receiving room. (The adjective *apparent* is used because the results may be affected by sound transmitted along other paths, known as *flanking transmission*). This parameter is independent of the acoustics of the receiving room and so is used to describe the sound insulation afforded by a specific construction or material.

BS EN ISO 717-1 sets out a method for calculating the *weighted sound reduction index* R_w and *weighted level difference* D_w. along with other frequency weighting corrections C and C_{tr} These are single-figure indices intended to allow easy comparison of different materials and constructions. These figures can be normalised in the same way as above. Prior to July 2003, the Building Regulations quote standards in terms of the *weighted standardised level difference* $D_{nT,w}$. From 1 June 2003 the new Regulations require standards in terms of $D_{nT,w} + C_{tr}$. This places greater importance on sound insulation at low frequencies.

It is possible to design to a specified level difference by using constructions for which the sound reduction index is known and correcting these for the acoustic characteristics of the rooms in question.

B2 – Impact sound insulation

All methods of measuring impact sound insulation of floors between two rooms require a standardised source of impact sound known as a *Tapping Machine.* This consists of a series of hammers of specified weight and material, driven by an electric motor so as to produce a continuous series of impacts on the floor to be measured. The resulting sound level in the room below (the receiving room) is then measured in octave or one-third octave bands. As the sound levels will vary with location, these are averaged either across a number of fixed microphone positions or by using a continuously moving microphone.

Recommended procedures are set out in British Standard BS EN ISO 140:Part 7: *"Measurement of sound insulation in buildings and building elements - Field measurement of impact sound insulation between rooms"*. Using this standard, the following parameters can then be determined in each frequency band:

- *The impact sound pressure level* L_i is the time- and space-averaged sound pressure level in the receiving room. This is the quantity which ultimately determines the acceptability of impact sound insulation.
- *The standardised impact sound pressure level* L'_{nT} is the *Impact sound pressure level* L_i corresponding to a reference value of the reverberation time T in the receiving room. It is a useful quantity for assessing impact sound insulation in dwellings, where the reference value of T is taken as 0.5 seconds.

BS EN ISO 717:Part 2 sets out a method for calculating the *weighted normalised impact sound pressure level* $L_{n,w}$ and *weighted standardised impact sound pressure level* $L'_{nT,w}$. These are single-figure indices intended to allow easy comparison of different materials and constructions.

It is therefore possible to design to a specified impact sound pressure level using constructions for which the standardised impact sound pressure level is known, and correct these for the acoustic characteristics of the rooms in question.

Note *– It is important to realise that impact sound insulation is measured in terms of an absolute sound level, so that a lower figure indicates a better standard of insulation. This is the opposite of airborne sound insulation, which is based on differences in levels so that a lower figure indicates a worse standard of insulation.*

B3 Background noise and audibility

The Building Regulations and Approved Document E only set the minimum standards for sound insulation. Meeting these standards does not guarantee that noise transmission will not be audible. In particular, in very quiet areas, the lack of background noise from traffic etc means that noise from other sources becomes much more audible. In many cases it will be appropriate to design to a standard more stringent than merely complying with the minimum requirements of building regulations.

APPENDIX C MASONRY CONSTRUCTION GUIDELINES FOR SOUND INSULATION

Need for good workmanship – The sound insulation of a wall relies as much on the detailed construction as on the materials. In such critical applications, small errors or imperfections can have a surprisingly large effect on the sound insulation. For example a crack only 300 mm long by 6 mm wide can reduce the sound level difference between two rooms from 50 to 42 dB at high frequencies.

For this reason a high standard of workmanship will be required. Only operatives trained in this type of work should be used, and the Contractor should operate a rigorous quality control and inspection procedure.

The following notes are for the guidance of the Contractor only and are additional to the requirements set out in the architect's and structural engineer's specification. In the event of any apparent conflict between this document and the specifications, the contractor should seek guidance from the architect.

Materials – Where not otherwise stated, materials are to be the best of their respective kinds, appropriate to their use, and to current building standards and regulations where relevant. Blockwork should not be less than the specified density and laid weight. Broken, cracked, chipped or otherwise defective blocks, bricks or boards should not be used. Mortar should be applied so that all joints between blocks are completely filled, without bridging any airgaps in cavity walls.

Construction and configuration – All acoustically critical walls should be built full-height and sealed to the roof or structural soffit. Apertures and penetrations not shown on the drawings should not be made, and walls should not be chased or cut without the consent of the acoustics consultant or architect.

In sound insulating walls, lintels and other elements incorporated in the depth of the wall should be of the same surface mass as the rest of the wall.

No debris should be allowed to fall into the cavity between leaves of any acoustically critical double-leaf wall.

Joins with door frames, window frames and other elements – It is important that there are no weaknesses or gaps at these points. Individual details will depend on the type of frame or doorset used. Door and window suppliers will normally provide proposals for constructions to maintain the acoustic integrity of the doorsets and windows. Proposed details should be submitted by the contractor for design team approval.

In general, all such joins should be airtight. Any gaps of more than 15 mm should be completely filled with grout, and smaller gaps should be tightly packed with mineral wool and sealed with a continuous non-hardening mastic bead at least 15 mm deep.

Expansion joints – Expansion, movement or similar joints should be less than 15 mm wide, tightly packed with mineral wool and sealed on either side of the wall with a continuous non-hardening mastic bead at least 15 mm deep. The joint should be completely airtight on both sides. Such joins should be referred to the acoustics consultant for further guidance.

APPENDIX D GUIDELINES FOR SOUND INSULATION IN DRY LINING

Need for good workmanship – A high standard of workmanship will be required. Only operatives trained in this type of work should be used, and the Contractor should operate a rigorous quality control and inspection procedure. In general these notes are in accordance with the procedures set out in the White Book and the construction and detailing should generally be in accordance with those procedures.

Inspection and quality control – It is important that the Contractor should inspect and approve the inner skin of each partition before the outer layer is installed.

Storage and cutting of boards – Boards should be stored, transported, and cut only as recommended by the board manufacturer. In particular, boards should be stored only in dry conditions and care must be taken to avoid damage to board edges and corners. Damaged or damp boards may not be used. Cut edges should be kept to a minimum.

Framework – Channels and studwork are to be constructed so that boards are flat and flush, without additional packing or distortion of the boards.

Boarding – Boards should be cut so that gaps in either the inner or outer skin are no more than 5 mm maximum. Joins between boards should be either taped and filled, or sealed, using the manufacturer’s recommended materials to ensure a smooth, effectively airtight construction in both the inner and outer skins. Joins should be staggered by at least 600 mm so that joins in the outer skin do not overlay those in the inner skin. Vertical joins should not be located on a common stud.

Fixing – Proprietary screws should be used to fix the boards so as not to break the board.

Joins with door frames, window frames and other elements – It is important that there are no weaknesses or gaps at these points. Individual details will depend on the type of frame or doorset used. Door and window suppliers will normally provide proposals for constructions to maintain the acoustic integrity of the doorsets and windows. Proposed details should be submitted by the contractor for design team approval.

In general, all such joins should be airtight. Gaps of more than 5 mm shall not be allowed. Smaller gaps should be tightly packed with mineral wool and sealed with a continuous non-hardening mastic bead at least 15 mm deep.

Services penetrations (general principles) – Where ducts, pipes, conduits, or other services pass through walls, floors, ceilings or partitions in these rooms, openings should be the minimum size necessary to allow installation with a continuous strip of neoprene gasket installed under compression to provide an airtight seal. Any remaining small gaps should be sealed using dense, non-hardening mastic. Alternative details may be considered but shall only be used with the acoustics consultant’s written approval of the contractor’s detailed installation drawings for each type of penetration.

APPENDIX E SPECIALIST ACOUSTIC MATERIALS AND SUPPLIERS

Note – this is not a comprehensive list as there are many suppliers in the UK, but the following are all known to supply products suitable for this project:

Acoustic back boxes for dry-lined partitions

- The Hilti CP 617 putty pad – see http://www.hilti.co.uk
- SRS Acoustic back boxes – see http://www.soundreduction.co.uk/1.html

Bonded resilient floor coverings

- Regupol Sonus Core 5 – see https://acoustics.regupol.com/
- Isorubber Base – see https://www.thermal-economics.co.uk/