
**Proposed Apartments
123 Palatine Road, Manchester**

Acoustic Design Report

Project: No.123 Palatine Road, Manchester - Acoustic Design Report

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Signature	

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1. Introduction

- 1.1 RS Acoustic Engineering Ltd have been appointed by Cube Homes to undertake an acoustic assessment and provide design advice with regard to the proposed dwellings/apartments at No.123 Palatine Road, Didsbury, Manchester, M20.
- 1.2 The party floors and walls to habitable rooms (bedrooms and living rooms) will need to achieve the minimum performance standards stated within Approved Document E *Resistance to the Passage of Sound* of the Building Regulations 2010.
- 1.3 This report provides details of the relevant performance standards to be achieved (both airborne and impact sound insulation) and provides recommendations regarding appropriate separating constructions and acoustic enhancement.
- 1.4 Recommendations regarding the attenuation of flanking noise transmission and general acoustic detailing have also been provided.
- 1.5 The acoustic advice and construction recommendations have been provided by Mr Ryan Swales (BSc(Hons), MIOA), Principal Acoustic Consultant and Corporate Member of the Institute of Acoustics.
- 1.6 This assessment is based on architectural drawings produced by AEW Architects.
- 1.7 A sample number of floors and walls will need to be acoustically tested on completion in order to verify the sound insulation performance and satisfy Building Control requirements.

2. Acoustic Performance Criteria

Building Regulations 2010

- 2.1 The Building Regulations 2010 Approved Document E *Resistance to the passage of sound*, provides minimum sound insulation performance standards for separating party floor and wall constructions between adjacent dwellings (houses and flats).
- 2.2 The relevant acoustic performance standards of Approved Document E are repeated in Table 2.1.

Table 2.1 - Performance Standards of Approved Document E

Dwelling-houses and flats – performance standards for separating walls, separating floors, and stairs that have a separating function		
	Airborne sound insulation $D_{nT,w}+C_{tr}$ dB (Minimum values)	Impact sound insulation $L'_{nT,w}$ dB (Maximum values)
Purpose built dwelling-houses and flats		
Walls	45	--
Floors and stairs	45	62
Dwelling-houses and flats formed by material change of use		
Walls	43	--
Floors and stairs	43	64

- 2.3 In addition, the Building Regulations also state that new internal walls within an individual dwelling/apartment (e.g. between bedroom and bathroom) will need to provide a 'laboratory rated' performance standard of at least 40 dB R_w . The acoustic performance can often be confirmed via manufacturer's literature (e.g. Gypsum White Book) or alternatively via the project Acoustician.

New build apartments

- 2.4 With regard to the new party floors and walls, a minimum airborne performance of 45 dB $D_{nT,w}+C_{tr}$ applies and party floors must also achieve an impact performance of less than 62 dB $L'_{nT,w}$.

Existing villa apartments

- 2.5 Since the villa building is existing and will undergo refurbishment works, separating party floors and walls need to achieve a slightly lower minimum airborne performance of 43 dB $D_{nT,w}+C_{tr}$ and party floors must also achieve an impact performance of less than 64 dB $L'_{nT,w}$.

3. Internal Sound Insulation

Separating party floors

Existing villa building

- 3.1 The existing separating floor construction is expected to comprise of 22 mm thick timber floor boards, circa 175 mm deep joists and a lath/plaster ceiling. It is likely that there is no mineral wool insulation between the joists.
- 3.2 It is anticipated that the existing floor construction will provide an airborne sound insulation performance in the region of 30 to 35 dB $D_{nT,w}+C_{tr}$ and will therefore fail to meet the minimum performance standards of Approved Document E.
- 3.3 Acoustic enhancement is therefore required to the separating timber floor construction.
- 3.4 It is anticipated that applying significant acoustic enhancement to the upper side of the floor (such as a cradle-and-batten system) will be impractical due to creating issues with floor/step-heights.
- 3.5 It is therefore recommended that a new acoustic ceiling is installed within the ground floor and first floor apartments consisting of a minimum 2 x 12.5 mm Soundbloc plasterboard (or 2 x 15 mm Fireline) suspended via a metal-framed system.
 - [Gyproc SoundBloc 12.5mm | Acoustic Plasterboard | British Gypsum \(british-gypsum.com\)](#)
 - [Gyproc FireLine 15mm | Fire Resistant Plasterboard | British Gypsum \(british-gypsum.com\)](#)
- 3.6 It is often recommended that the minimum mass per unit area of a new acoustic ceiling is at least 20 kg/m². Using two layers of dense plasterboard will satisfy this requirement.
- 3.7 Retaining the existing lath/plaster ceiling will provide an additional mass layer within the overall floor build-up which will increase the acoustic performance.
- 3.8 Should the lath/plaster ceiling be removed, it is recommended that 150 mm thick dense mineral wool slabs (Rockwool slabs) are friction-fitted between the existing timber joists (which can be accessed from below with the lath/plaster ceiling removed).
- 3.9 The dense plasterboard should be installed with staggered joints. The joints to the outer board layer should be sealed with tape or caulked with sealant and the perimeter edge of the ceiling boards should also be sealed with flexible sealant. Ideally, a small perimeter gap (2 – 3 mm) should be maintained to ensure the new ceiling boards do not touch the surrounding walls.
- 3.10 A suitable suspension system would be the CasoLine metal frame:
 - [CasoLine MF Ceiling System | Gyproc](#)
- 3.11 It is recommended that acoustic hangers are used to isolate the plasterboard from the party floor structure.
- 3.12 Suitable acoustic hangers include British Gypsum's GAH1/GAH2 or Cella's AH50.
 - [Gypframe GAH1 Acoustic Hanger | For GypCeiling MF | British Gypsum \(british-gypsum.com\)](#)
 - [AH50 - Cella](#)
- 3.13 The suspension depth between the lath/plaster ceiling (or joists if ceiling removed) and the top of the acoustic plasterboard should be as large as possible (and at least 200 mm) to improve performance.

- 3.14 It is also recommended that a minimum of 150 mm thick mineral wool insulation (e.g. Knauf's acoustic partition roll or Isover's APR1200) is placed within the cavity above the acoustic plasterboard.
- 3.15 It is also recommended that recessed down-lighting is avoided where possible. Such lighting degrades the high frequency sound insulation of the ceiling. If down-lighting is required, acoustically-rated down lighters should be installed or alternatively acoustic hoods should be installed over the unit.

Acoustically resilient layer

- 3.16 It is further recommended that an acoustically resilient layer is installed on top of the floorboards to the first and second floor in order to increase the impact sound insulation of the party floor.
- 3.17 As an example, Regupol 3912 should be suitable for the floor build-up:

- [Regupol 3912 Acoustic Underlayment - CMS Danskin](#)

Existing ceilings removed

- 3.18 Where the existing ceilings are to be removed, it is also recommended that 18 mm or 22 mm thick tongue-and-groove timber boarding is installed on the first and second floor in addition to the Regupol resilient layer.
- 3.19 Alternatively, a resiliently backed overlay panel such as the Hush Panel 28 could be used instead of the Regupol layer and timber board combination.
- [Hush Panel 28 Soundproof floor panels \(hushacoustics.co.uk\)](#)

Anticipated sound insulation performance

- 3.20 With the recommendations fully implemented, the separating floor is expected to achieve an airborne sound insulation performance of approximately 44 to 47 dB $D_{nT,w}+C_{tr}$ and an impact sound insulation performance of approximately 55 to 60 dB $L'_{nT,w}$.
- 3.21 The anticipated sound insulation performance will therefore achieve the minimum requirements of Part E of the Building Regulations.

New build apartments

- 3.22 There is currently no construction information regarding the party floor in the new apartment building.
- 3.23 From the drawing dimensions, it is assumed that the party floor will be of a concrete slab or plank construction with an overall thickness of approximately 300 mm (minimum mass per unit area of 365 kg/m² including any bonded screed).
- 3.24 With regard to improving impact sound insulation (to the ground floor apartments), it is recommended that an acoustically resilient floor covering is bonded to the concrete base, such as the Regupol acoustic layer detailed above.
- 3.25 The suspended ceiling may be installed using the CasoLine metal frame system and it is recommended that the lining consists of either 12.5 mm Soundbloc or 12.5 mm Fireline plasterboard, as opposed to ordinary wallboard.
- 3.26 It is also recommended that a minimum 100 mm thick mineral wool insulation (e.g. Knauf's acoustic partition roll or Isover's APR1200) is placed within the cavity above the plasterboard.

Service penetrations through the separating floor

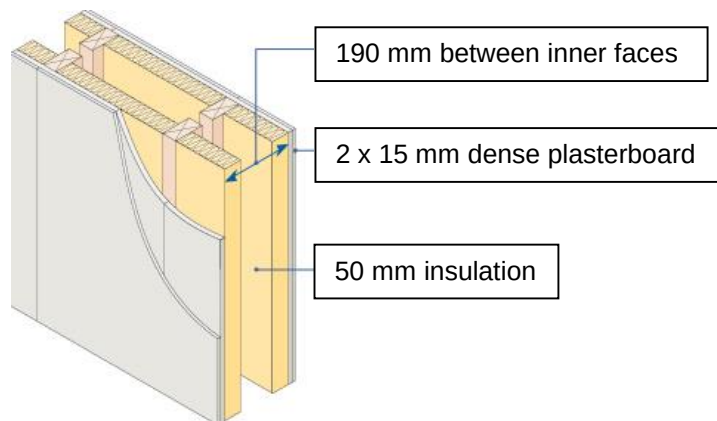
- 3.27 Service penetrations should be avoided between adjacent habitable rooms where possible. Any pipes/services that penetrate the separating floor should be enclosed for their full height in each room.
- 3.28 The enclosure should be constructed from two layers of Soundbloc or Fireline plasterboard. The enclosure should also be lined with 25 – 50 mm thick mineral wool or alternatively wrap the pipe within the enclosure.
- 3.29 A small gap (5 mm) should be maintained between the service enclosure and the floor base and the gap sealed with flexible sealant. Similarly, the small gap between the enclosure and the ceiling boards should also be sealed with flexible sealant.

Separating party walls

Existing villa building

- 3.30 It is recommended that the party wall between adjacent open-plan living rooms/kitchens consists of a twin-framed metal stud (or timber) construction, consisting of 2 x 15 mm Soundbloc plasterboard each side (or 2 x 15 mm Fireline), minimum distance of 50 mm between frames (or 190 mm between internal linings) and 50 mm thick mineral wool insulation fixed to each frame (batts or quilt).

Figure 3.1 - Diagram showing twin-framed separating wall construction



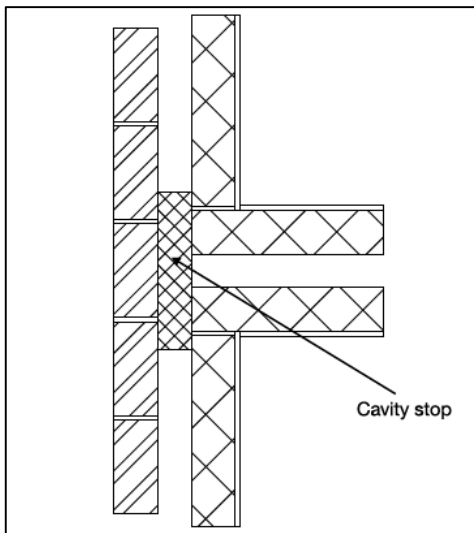
- 3.31 A slightly reduced gap between frames may be acceptable, however it should be noted that the resulting sound insulation performance will be reduced slightly.
- 3.32 A suitable metal-stud system would be the GypWall twin framed partition:
- [GypWall Twin Frame Independent Internal Partition Systems | British Gypsum \(british-gypsum.com\)](https://www.british-gypsum.com/gypwall)
- 3.33 The separating wall should be full height (i.e. taken up past the line of new suspended ceilings).
- 3.34 Party walls on the 2nd floor will need to be taken to the underside of the roof (and not stop at ceiling level).
- 3.35 To maintain acoustic performance, electrical sockets/switches should be enclosed (clad) at the back using the same plasterboard thickness and type as the wall lining.
- 3.36 Holes in the plasterboard should always be neatly cut and flexible sealant should be applied to the edges to maximise acoustic performance.
- 3.37 The double framed construction is expected to achieve an airborne sound insulation performance of approximately 44 to 48 dB $D_{nT,w}+C_{tr}$.

- 3.38 The anticipated sound insulation performance will therefore achieve the minimum requirements of Part E of the Building Regulations.

New build apartments

- 3.39 There is currently no construction information regarding the party walls in the new apartment building.
- 3.40 From the drawing dimensions, it is assumed that the party walls will be of a traditional cavity wall construction consisting of 140 mm blockwork, 75 mm cavity, 140 mm blockwork.
- 3.41 It is recommended that the blockwork is at least medium density ($>1350 \text{ kg/m}^3$) in order to help minimise flanking noise transmission via the masonry walls. Lightweight blockwork should be avoided where possible ($<950 \text{ kg/m}^3$).
- 3.42 The cavity may be partially-filled (with 50 mm mineral wool insulation) or fully-filled depending on the thermal requirements.
- 3.43 A cavity stop should be used at the interface with the external wall, unless the cavity is fully-filled with insulation.

Figure 3.2 - Diagram showing cavity stop in external wall



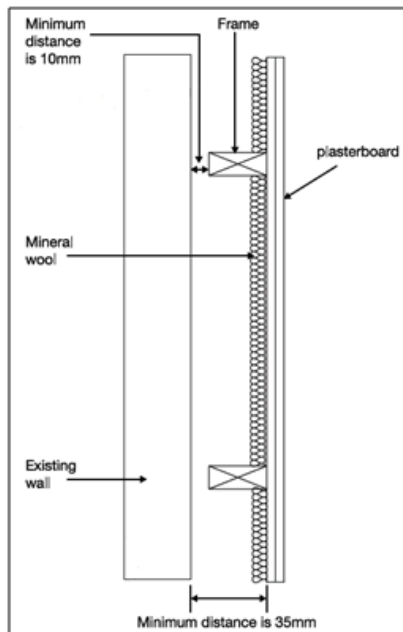
- 3.44 It is also recommended that 12.5 mm thick Soundbloc or Fireline plasterboard (or similar dense board) is used to line the walls, as opposed to ordinary Wallboard (assuming the linings will be fixed via a dot-and-dab method). It should be noted that ordinary wallboard on dot-and-dab fixings can undermine the acoustic performance of the masonry wall.

Flanking noise transmission and acoustic wall linings

Existing villa building

- 3.45 Without appropriate enhancement, vertical flanking transmission via the external brickwork walls can undermine the sound insulation performance of the separating party floor.
- 3.46 Appropriate wall linings are therefore necessary to help sufficiently reduce the level of flanking sound energy from being radiated via the wall construction.
- 3.47 It is therefore recommended that the brickwork walls are lined with either a fully independent or virtually independent wall lining system. The simple diagram below shows a fully independent wall lining (the supporting frame does not touch the masonry wall).

Figure 3.3 - Diagram showing example independent wall lining



- 3.48 The wall lining should comprise of a minimum 1 x 12.5 mm Soundbloc plasterboard (mass per unit area 10.6 kg/m²) or alternatively 1 x 15 mm Fireline plasterboard (mass per unit area 11.7 kg/m²) with 50 mm thick mineral wool insulation (or acoustic slab) fitted between studs.
- 3.49 The greatest level of flanking sound attenuation will be achieved via a fully independent wall lining system and it is therefore recommended that an independent lining is used where possible.
- [GypLyner Independent Wall Lining System | British Gypsum \(british-gypsum.com\)](http://british-gypsum.com)
- 3.50 The supporting framework for the linings can be constructed from metal studs and floor/ceiling channels or alternatively from timber (e.g. 3" x 2" timber battens).
- 3.51 Where metal is preferred, the independent frame can be constructed from Gypframe floor and ceiling channels with Gypframe 'I' studs friction-fitted vertically within the channel sections to form the framework. There should be a gap of at least 10 mm between the metal frame and the existing masonry (to prevent acoustic bridging).
- 3.52 Where it is impractical to install independent wall linings, a virtually independent wall lining may be used, such as the GypLyner Single metal-framed lining system:
- [GypLyner Single Wall Lining System | British Gypsum \(british-gypsum.com\)](http://british-gypsum.com)
- 3.53 To maximise sound insulation, the acoustic ceiling should be installed prior to the installation of the new wall linings.
- 3.54 The current architectural drawings show a new masonry wall lining to the full perimeter of each floor (highlighted in blue). Figure 3.4 overleaf also shows additional recommended wall linings (highlighted in red) in order to help attenuate horizontal flanking noise transmission via the internal masonry wall.
- 3.55 It is recommended that the existing separating brickwork wall between adjacent bedrooms is lined as above but with two layers of 12.5 mm thick dense plasterboard (Soundbloc or Fireline).

Figure 3.4 - Additional wall linings to first and second floor apartments



Internal stud walls

- 3.56 Internal walls (between bedrooms and bathrooms etc) will need to achieve a 'laboratory rated' sound insulation performance of at least 40 dB R_w .
- 3.57 Suitable constructions include:
- 1 x 15 mm Wallboard each side of a 75 mm x 38 mm timber stud with 25 mm mineral wool cavity insulation (40 dB R_w).
 - 1 x 12.5 mm Soundbloc each side of a 75 mm x 38 mm timber stud with 25 mm mineral wool insulation (40 dB R_w).
 - 1 x 15 mm Fireline each side of a 75 mm x 38 mm timber stud with 25 mm mineral wool insulation (41 dB R_w).
 - 1 x 15 mm Wallboard each side of a 70 mm metal 'C' stud with 25 mm mineral wool insulation (43 dB R_w).
 - 1 x 12.5 mm Soundbloc each side of a 70 mm metal 'C' stud with no mineral wool insulation (40 dB R_w).
 - 1 x 15 mm Fireline each side of a 70 mm metal 'C' stud with no mineral wool insulation (41 dB R_w).

Entrance doors, construction & acoustic performance

- 3.58 Approved Document E states that main entrance doors should achieve a minimum laboratory rated sound insulation performance of 29 dB R_w .
- 3.59 A performance of 29 dB R_w can be typically achieved with a 44 – 56 mm thick solid-core fire door of at least 25 kg/m² mass closing onto a rebated frame with wipe or compression acoustic door seals to head, jambs and threshold.
- 3.60 Good quality acoustic seals are essential in achieving the performance standard and will also help with regard to fire safety. The exclusion of perimeter sealing is likely to result in a reduction in performance of approximately 5 to 10 dB. A doorset without sealing would therefore provide a reduced sound insulation performance in the region 20 to 25 dB R_w .
- 3.61 As an example, for seals along the head and jambs, 'batwing' seals (e.g. Lorient LAS1010 and LAS1212) work well as they fit in the corner of the frame and continue past door locks and hinges. They will often be used in combination with a 'double fin seal' such as the LAS1011 Firtree.
- 3.62 For threshold seals, either an automatic drop-threshold seal can be used (e.g. Lorient IS8020 Si or IS8040) or alternatively a fixed threshold seal such as the IS3015 can be used in combination with an aluminium threshold plate.
- 3.63 The following suppliers provide high performance acoustic seals for internal doors:
- <http://www.lorientuk.com/>
 - <https://norseal.co.uk/browse/acoustic-perimeter-seals>