

# **277A Gray's Inn Road London WC1X 8QF**

## **PRELIMINARY RESIDENTIAL INTERNAL BUILDING FABRIC REPORT 20890/IBF**

For:

Eurobuild Properties Co Ltd  
4-5 Coleridge Gardens  
London  
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20 January 2015

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## ATTACHMENTS

Figure 20890/DP1  
Figure 20890/MP1  
Table 20890/IW

This report has been prepared by Hann Tucker Associates Limited (HTA) with all reasonable skill, care and diligence in accordance with generally accepted acoustic consultancy principles and the purposes and terms agreed between HTA and our Client. Any information provided by third parties and referred to herein may not have been checked or verified by HTA unless expressly stated otherwise. This document contains confidential and commercially sensitive information and shall not be disclosed to third parties. Any third party relies upon this document at their own risk.

## 1.0 INTRODUCTION

This report sets out the acoustic requirements for the internal building fabric of 277A Gray's Inn Road and provides acoustic advice to assist the design team. The advice presented herein has been formulated on the basis of achieving the requirements of Building Regulations, and Code for Sustainable Homes.

## 2.0 CRITERIA

This section provides a breakdown of the various performance criteria applicable to the development.

### 2.1 Building Regulations Approved Document E

Building Regulations Approved Document E contains the following acoustic requirements:

#### 2.1.1 ADE Requirement E1

Requirement E1 of ADE covers protection against sound from other parts of the building and adjoining buildings. 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.

The normal way of satisfying Requirement E1 is to build separating walls and floors together with the associated flanking constructions, in such a way that they achieve the sound insulation values shown below.

	Airborne sound insulation $D_{nT,w} + C_{tr}$ dB (minimum values)	Impact sound insulation $L'_{nT,w}$ dB (maximum values)
Walls	45	-
Floors and stairs	45	62

In the case of walls or floors separating a dwelling from other parts of the same building, or adjoining building, that are used for communal or non-residential purposes, reasonable resistance to sound will require at least the standard of sound insulation shown above. This will include, for example, walls and floors separating dwellings from corridors, stair cores, lift shafts and plantrooms. However, although these walls must be constructed to the same standard they do not need to be tested.

The performance of separating walls and floors, together with the associated flanking construction, must be verified by undertaking pre-completion testing as set out in ADE 2003.

### 2.1.2 ADE Requirement E2

Requirement E2 of ADE covers protection against sound within dwelling-houses, flats and rooms for residential purposes. 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.

Requirement E2 does not apply to –

- (a) an internal wall which contains a door;
- (b) an internal wall which separates an en-suite toilet from the associated bedroom.

The normal way of satisfying Requirement E2 will be to use constructions for new walls and floors within a dwelling-house, flat or room for residential purposes that provide the laboratory sound insulation values set out in Table 2.

Airborne Sound Insulation $R_w$ dB (Minimum Values)	
Walls	40
Floors	40

As these are laboratory values it is not appropriate to verify performance by pre-completion testing. There is therefore no requirement for an on-site performance figure or for pre-completion testing.

### 2.1.3 ADE Requirement E3

Requirement E3 of ADE covers reverberation in common internal parts of buildings containing dwellings, but only applies to areas that give access to the dwellings. The common internal parts of buildings which contain dwellings shall be designed and constructed in such a way as to prevent more reverberation around the common parts than is reasonable.

The intention is to prevent excessive build up of sound in corridors, stairwells, hallways and entrance halls and in doing so reduce the noise transmitted to adjoining rooms.

It is our understanding that the ADE requirement does not apply to areas that do not give direct access to rooms for residential purpose. The requirements for this development should be clarified with Building Control as it will depend upon their interpretation of the requirement.

The simplest method (Method A) of determining ADE compliance is to cover an area equal to or greater than 100% of the floor area of corridors and entrance halls with a Class C absorber or better.

For stairwells, an area equal to the combined area of the stair treads, the upper surface of the intermediate landings, the upper surface of the landings (excluding ground floor) and the ceiling area on the top floor should be covered with a Class D absorber, or an area equal to at least 50% of this area covered with a Class C absorber or better. The absorptive material should be equally distributed between all floor levels.

Alternatively the existing absorption provided by all surfaces can be determined and the extra absorption required calculated. In some cases, this method (Method B) may allow greater flexibility in meeting the requirements of E3 and require less additional absorption than the Method A. However, for this preliminary review we have only considered Method A.

## 2.2 Code for Sustainable Homes

### Party / Separating Walls and Floors (ADE Requirement E1)

Party/separating walls and floors shall be in accordance with the Building Regulations Approved Document E and allow for any additional criteria arising from the Code for Sustainable Homes, planning conditions and Eurobuild Properties Co Ltd requirements.

The standards in the Code for Sustainable Homes are set above the minimum requirements of Approved Document E. Up to 4 credits are available for achieving higher standards of sound insulation than those given in Approved Document E. Credits are awarded as follows, with the target for 277A Gray's Inn Road being 1 credit:-

No. Credits	1	3	4
Airborne Sound	ADE + 3dB	ADE + 5dB	ADE + 8dB
Impact Sound	ADE – 3dB	ADE – 5dB	ADE – 8dB

In order to achieve the required performance the wall and floor constructions must incorporate appropriate junction details to control flanking sound. The interfaces between separating walls/floors and cladding require careful consideration to control flanking noise transmission.

Compliance with the above criteria shall be demonstrated by testing in accordance with the Approved Document E.

### Internal Partitions (ADE Requirement 2)

Internal partitions (within apartments) shall be in accordance with Approved Document E Requirement E2. Requirement E2 can be satisfied by using constructions for walls and floors within a dwelling that provide a laboratory sound insulation performance of at least Rw40dB. As this is a laboratory value site performance testing is not required.

#### **Points to note**

The following points shall be taken in consideration:-

- Soil and rainwater pipes shall be cast iron or HDPE not PVC.
- Soil and rainwater pipework routed through apartment ceiling voids shall be avoided wherever possible. Where this is not possible, the pipework shall be routed via an acoustic enclosure with acoustic access panels for any rodding eyes.
- Penetrations in separating (i.e. party) walls, including electrical sockets, shall be avoided wherever possible. Where they cannot be avoided they shall be detailed and constructed so as to minimise any degradation in acoustic performance. See Section
- Mechanical building services (including ducts and pipes) shall be supported off the structural load bearing walls and floors. No mechanical services shall be fixed to lightweight/drywall construction partitions.
- Wall hung WC pans and frames shall be located and supported so as to avoid structure borne noise transmission to adjacent bedrooms or apartments.
- Lift installations shall be located away from noise sensitive rooms where possible and lightweight constructions avoided, see Section 3.3 for details.
- Mechanical service risers shall be zoned away from sensitive rooms wherever possible.
- External plant shall be judiciously located and not overlooked by noise sensitive residential windows.
- Noisy plant (e.g. chillers and generators) shall be located away from noise sensitive rooms.

## **3.0 CONSTRUCTION GUIDANCE**

### **3.1 Residential Separating Floors**

We understand the separating floor constructions are proposed to be as follows:

20mm floor finish  
65mm screed with underfloor heating  
5mm resilient acoustic layer (eg regupol 4515 multi)  
225mm in situ RC slab  
100mm void  
12.5mm plasterboard ceiling

The above construction should be adequate to achieve the minimum requirements of ADE  $\pm 3$ dB i.e. 1 Code for Sustainable Home credit.

Screeds should not pass under separating (party) walls, they can however pass beneath internal walls within individual apartments.

We will review the slab edge details when they are issued by the architect. Until then, we offer the following general advice:

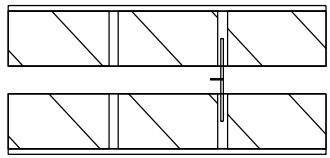
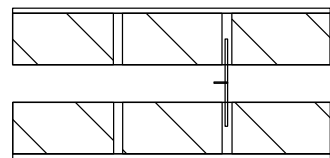
- If the floors are not built into the external walls, each party floor should abut two separate transoms.
- External wall linings should consist 2x12.5mm thick layers of plasterboard.

Impact noise will be controlled by means of a suitably specified resilient layer installed beneath the screed, as noted in the floor build-up detailed above. This construction should be continued in balconies and corridors occurring above residential apartments

### 3.2 Residential Separating Walls

We understand the separating walls are currently proposed to be cavity blockwork.

A couple of examples are presented in the following table together with their anticipated acoustic rating (subject to build quality).

Type	Guidance	Example	$D_{nT,w} + C_{tr}$	Sketch
Wall Type 2	Two layers of dense aggregate concrete block with 50mm cavity, plaster on both room faces. Minimum overall mass 415kg/m <sup>2</sup> .	13 mm plaster 100mm block (1990kg/m <sup>3</sup> ) 50 mm cavity 100mm block (1990kg/m <sup>3</sup> ) <u>13 mm</u> plaster <u>276mm</u> overall	$\approx 52$	
Cavity Masonry	Two layers of lightweight aggregate block with 75mm cavity, plaster on both room faces. Minimum overall mass 300kg/m <sup>2</sup> .	13 mm plaster 100mm block (1371kg/m <sup>3</sup> ) 75 mm cavity 100mm block (1371kg/m <sup>3</sup> ) <u>13 mm</u> plaster <u>301mm</u> overall	$\approx 48$	

With suitable details at the junctions, the above constructions should be adequate to achieve the minimum requirements of ADE +3dB.

We will review the junctions with the external walls when they are issued by the architect. Until then, we offer the following general advice:

- If the walls are not built into the external walls, each party wall should abut two separate mullions.
- External wall linings should consist 2x12.5mm thick layers of plasterboard.

The walls could be independently lined with 12.5mm thick plasterboard on a 48mm stud (or narrower) to prevent the need for electrical wiring chases.

### **3.3 Walls Separating Apartments from Lift Shafts or Stairs**

Walls separating residential areas from lift shafts will require an independent lining to be constructed as follows:

- 200mm in-situ concrete shaft
- 10mm clearance
- 48mm studs
- 25mm mineral wool quilt
- 2 x 12.5mm (min) Soundbloc or similar

### **3.4 Apartment Front Doors**

Apartment front doors should meet the minimum requirement of  $R_w$  29dB. Where there are no lobbies present within the apartments and in view of the Cfsh uplift targeted we would suggest that uprating the front doors to  $R_w$  35dB may be considered appropriate due to the reduced sound insulation provided by a single doorset.

### **3.5 Residential Internal Partitions**

Table 20890/IW, attached, summarises the internal wall construction guidance offered by ADE 2003.

The criterion of  $R_w$  40 dB is only the minimum required to meet Building Regulation standards. We would suggest that a higher standard of sound insulation may be considered appropriate for 'quality developments'.

To re-iterate, Requirement E2 only applies to internal walls between a bedroom or a room containing a water closet, and other rooms and internal floors. It does not apply to an internal wall which separates an en-suite toilet from the associated bedroom or internal walls which contain a door.

### **3.6 Service Risers**

#### **3.6.1 Wet/Dry SVP, Water, Electricity, Gas Risers**

ADE states that pipes and ducts (excluding gas pipes) are required to be enclosed (full height) where they penetrate a floor separating habitable rooms.

ADE states that the enclosure should be constructed of material having a mass per unit area of at least  $15\text{kg/m}^2$  and that the enclosure should be lined or the duct or pipe should be wrapped within the enclosure with 25mm unfaced mineral wool.

However, the above measures will not ensure inaudibility within the habitable rooms especially where offsets are proposed. In order for noise from the pipes to be approaching inaudibility within the adjacent areas we would advise the following treatment:

- Cast iron or HDPE soil pipes are used throughout;
- Minimise the use of transitional sections;
- Wrap pipe in 25mm thick unfaced mineral wool throughout;
- Minimum gap of 10mm between pipes and wall/studs to be maintained throughout;
- Box in with double layer of 12.5mm Soundbloc (or equivalent) grade plasterboard;
- Any necessary penetrations required for services serving an apartment shall be finished in accordance with Sketches 20890/DP1 and 20890/MP1 enclosed.

Access to soil pipes can be provided by an access hatch comprising 2No. layers of plasterboard with compressible seals to maintain the integrity of the treatment.

### **3.6.2 CHP Flue Riser**

The CHP riser is located next to a lift shaft, both separated from the adjacent apartment by a core wall. The core wall (assumed minimum 200mm concrete) should be lined on the apartment side with an independent wall.

- 200mm in-situ concrete shaft
- 10mm clearance
- 48mm studs
- 25mm mineral wool quilt
- 2 x 12.5mm (min) Soundbloc or similar

## **3.7 Reverberation in Common Parts**

In terms of the potential noise impact from noise generated in common areas into apartments, the common areas can be divided into two categories; common areas that open directly into apartments (e.g. corridors); and common areas that do not open directly into apartments (e.g. fire escape stairs, areas separated from apartments by a lobby).

### **3.7.1 Common Areas that open directly into Apartments**

For corridors and common areas that open directly into residential apartments it will normally be convenient to cover the entire ceiling area with the additional absorption in the form of a proprietary Absorption Class C acoustic ceiling; however, the absorptive material can be applied to any surface that faces into the space.

A Class C absorber is one which has an overall weighted absorption coefficient ( $\alpha_w$ ) of between 0.60 and 0.75. Typically British Gypsum's Gyptone (perforated plasterboard) systems fall into Class C depending on the pattern of perforation. Most acoustic suspended ceilings would fall into into Classes A to C.

Evidence that Requirement E3 has been satisfied should be presented, for example on a drawing or in a report, which should include:

1. A description of the enclosed space (entrance hall, corridor, stairwell etc);
2. The approach used to satisfy Requirement E3, in this instance Method A, stating the absorber class and the area to be covered.

### **3.7.2 Common Areas that do not open directly into Apartments**

For common areas that do not open directly into residential apartments (e.g. entrance lobby's and fire escape stairs), agreement may be sought from Building Control such that installation of additional absorption is not required in these areas on the grounds that reverberant noise from these areas is controlled by either concrete separating constructions or lobbied doors. HTA will be able to provide support in this respect, if required.

## **3.8 General Construction Guidance**

At this stage in the design we provide the following general construction guidance based on good acoustic practice.

- Partitions will need to be built full height (slab-slab).
- Separating partitions must not be built off a floating screed. Partitions should extend down to the structural slab with the floating screed poured with resilient perimeter strips to de-couple the screed from the structure.
- Where two layers of board are fixed to studs, they should be installed with staggered joints. All joints should be wet-plastered to form an airtight seal.
- A generous and continuous bead of mastic should be applied to all stud frames where they are fixed to the structure on all sides (soffit, floor slab, masonry wall/column).
- Where partitions/floors abut external cladding, the external walls internal lining should overlap the junction full-height on both sides of the wall. In no instances should linings to the external wall or columns run continuously between rooms. Curtain walling mullions/transoms, if applicable, will need to achieve a sound flanking criterion depending on the room adjacencies. Double (rather than split) mullion/transom configurations will be required at interfaces with separating (i.e party) walls/floors.
- Room-to-room partitions should penetrate corridor partitions to eliminate flanking via a continuous corridor partition cavity or a continuous room side plasterboard leaf.

- Ideally sockets/switches should not be located within separating (i.e. party) wall constructions. Where absolutely necessary sockets should be separated with a minimum edge to edge stagger of 150mm and must not be located back to back. Where there is no blockwork core wall they should also be 'boxed-in' to the rear with a material having the same mass per unit area as that of the wall leaf in which they are inserted (i.e. no putty pads). Where there is a blockwork core wall boxing-in to the rear is not necessary. Similarly, boxing of sockets and switches is not necessary in internal walls.
- Where live ducts or pipes penetrate the building structure, it is essential to acoustically sleeve the penetrations to prevent transmission of noise and vibration. Sketches 20890/DP1 and 20890/MP1 enclosed illustrate how this may be achieved.
- Where wire trunking/baskets penetrate apartment walls above the front doors they should be finished in accordance with the relevant firestopping requirements.
- It is unacceptable for ductwork to run directly through separating (i.e party) walls/floors. Where this is unavoidable any instance must be brought to the attention of Hann Tucker and be considered on an individual basis.
- Crosstalk silencers will be required if/where ductwork is common to two or more dwellings/rooms. Currently, we understand there is no ductwork proposed to penetrate separating (i.e party) walls.
- Where ducts pass through internal partitions/floors the penetrations shall be acoustically sealed. Sketches 20890/DP1 and 20890/MP1 enclosed illustrate how this may be achieved.

## 4.0 WORKMANSHIP

In most cases, the acoustic criteria are specified in terms of an on site performance. Since the acoustic performance of on-site constructions depends on many factors, the effects of which cannot be anticipated or predicted to any great accuracy (such as buildability, flanking paths, build quality, sealing of junctions with other building elements and of service penetrations), it is not possible to provide indemnity.

The acoustic performance requirements for each building element, together with proposed forms of construction detailed in this Report, should (with appropriate avoidance of flanking paths, acoustic decoupling where appropriate and intimate site supervision) satisfy the acoustic performance requirements. It shall be the responsibility of the contractor, however, to comply with the requirements.

## 5.0 PRE-COMPLETION TESTING

Pre-completion testing will be required to prove compliance with the requirements of ADE Requirement E1. It is the duty of the person carrying out the building work to ensure appropriate sound insulation testing is implemented according to the guidance set out in ADE across separating walls and floors. The locations for such tests will be selected by the Building Control Body.

Building Control should stipulate at least one set of tests for every ten “dwellings”, assuming no test fails. The sound insulation criteria have built in allowances for measurement uncertainty, so if any test does not achieve the criteria by any margin the test has failed. If a test fails the Developer will need to determine the cause. It will then be necessary for the Developer to undertake appropriate remedial treatment, to the satisfaction of Building Control. The rate of testing should be increased until Building Control is satisfied the problem has been solved.

Building Regulations require that sound insulation testing “be carried out by a test body with appropriate third party accreditation” and advise that “Test bodies conducting testing shall preferably have UKAS accreditation (or a European equivalent) for field measurements”.

## 6.0 CONCLUSIONS

The report presents a review of the acoustic criteria applicable to this development as stipulated by Building Regulations Approved Document E: 2003 Edition, Code for Sustainable Homes and Eurobuild Properties Co Ltd requirements.

Suitable constructions and finishes have been reviewed and/or proposed to satisfy the acoustic requirements, along with general acoustic design advice pertinent to the internal building fabric.



Prepared by  
Paul Hill  
HANN TUCKER ASSOCIATES


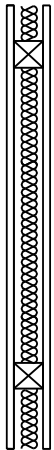
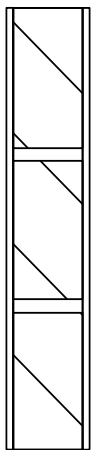


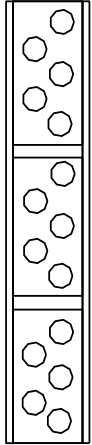
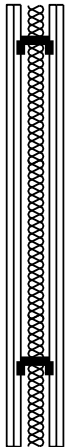
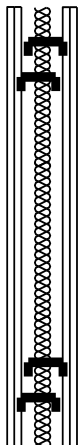
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John Ridpath  
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# REQUIREMENT E2 TABLE 20890/IW

## PROTECTION AGAINST SOUND WITHIN A DWELLING ETC

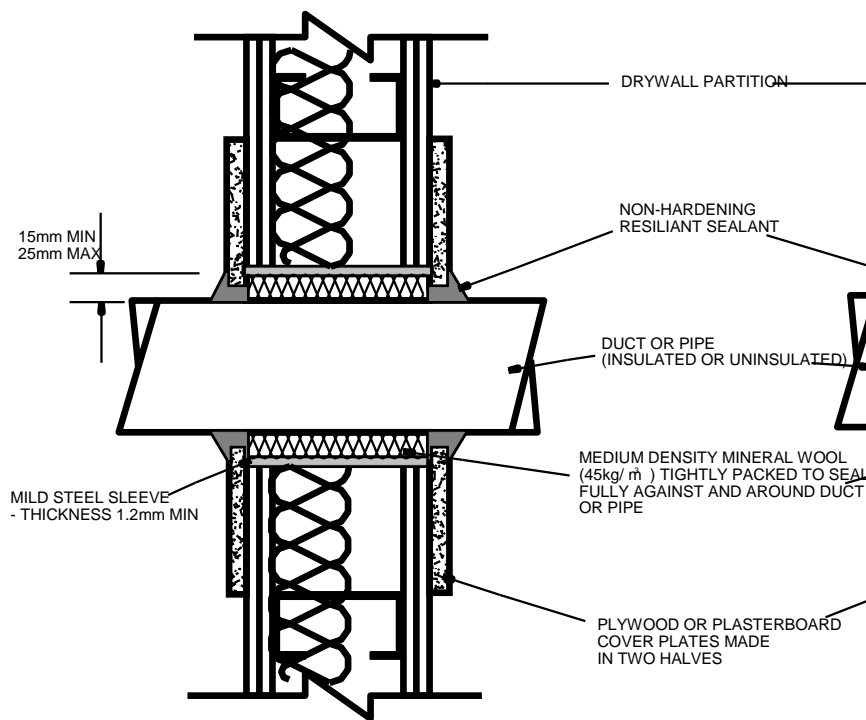
### Internal Wall Types

Type	Guidance	Example	
<p><b>Type A:</b> <i>Timber or metal frames with plasterboard linings on each side of frame</i></p>	<p>Each lining to be two or more layers of plasterboard, each sheet of minimum mass per unit area 10kg/m<sup>2</sup></p> <p>Linings fixed to timber frame with a minimum distance between linings of 75mm, or metal frame with a minimum distance between linings of 45mm</p> <p>All joints well sealed</p>	<p>12.5mm plasterboard 12.5mm plasterboard 48mm timber/metal stud 12.5mm plasterboard <u>12.5mm</u> plasterboard <u>98mm</u> overall</p> <p>Laboratory rating R<sub>w</sub> 42dB</p>	
<p><b>Type B:</b> <i>Timber or metal frames with plasterboard lining on each side of frame and absorbent material</i></p>	<p>Single layer of plasterboard of minimum mass per unit area 10kg/m<sup>2</sup></p> <p>Linings fixed to timber frame with a minimum distance between linings of 75mm, or metal frame with a minimum distance between linings of 45mm</p> <p>Absorbent material to be unfaced mineral wool batts or quilt (which may be wire reinforced), density at least 10kg/m<sup>3</sup>, minimum thickness of absorbent material 25mm, suspended in the cavity</p> <p>All joints well sealed</p>	<p>12.5mm plasterboard 48mm timber/metal stud 25mm mineral wool <u>12.5mm</u> plasterboard <u>73mm</u> overall</p> <p>Laboratory rating R<sub>w</sub> 40dB</p>	
<p><b>Type C:</b> <i>Concrete block wall, plaster or plasterboard finish on both sides</i></p>	<p>Concrete block wall, plaster or plasterboard finish on both sides</p> <p>Minimum mass per unit area, excluding finish 120kg/m<sup>2</sup></p> <p>All joints well sealed</p>	<p>13mm plaster 100mm block (1200kg/m<sup>3</sup>) <u>13mm</u> plaster <u>126mm</u> overall</p> <p>13mm plasterboard 100mm block (1200kg/m<sup>3</sup>) <u>13mm</u> plasterboard <u>126mm</u> overall</p> <p>Laboratory rating ~ R<sub>w</sub> 45dB</p>	

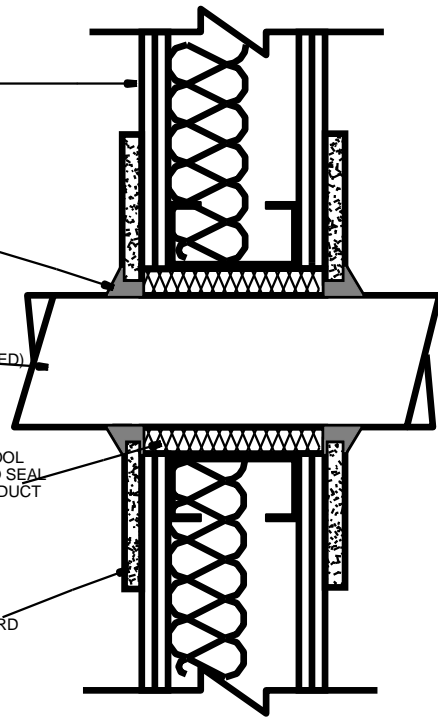
<p><b>Type D:</b> <i>Aircrete blockwall, plaster or plasterboard finish on both sides</i></p>	<p>Plaster finish – minimum mass per unit area including finish 90kg/m<sup>2</sup></p> <p>Plasterboard finish – minimum mass per unit area including finish 75kg/m<sup>2</sup></p> <p>All joints well sealed</p> <p>Should only be used where there is no minimum requirement and should not be used as load bearing or be rigidly connected to separating floors</p>	<p>13mm plaster 100mm aircrete block <u>13mm</u> plaster <u>126mm</u> overall</p> <p>Laboratory Rating ~ R<sub>w</sub> 43dB</p> <p>13mm plasterboard 100mm aircrete block <u>13mm</u> plasterboard <u>126mm</u> overall</p> <p>Laboratory Rating ~ R<sub>w</sub> 45dB</p>	
<p><b>Type E:</b> <i>Timber or metal frames with plasterboard linings on each side of frame and absorbent material</i></p> <p>(HTA suggested construction only)</p>	<p>Two layers of plasterboard of minimum mass per unit area 10kg/m<sup>2</sup></p> <p>Linings fixed to timber frame with a minimum distance between linings of 75mm, or metal frame with a minimum distance between linings of 45mm</p> <p>Absorbent material to be unfaced mineral wool batts or quilt (which may be wire reinforced), density at least 10kg/m<sup>3</sup>, minimum thickness of absorbent material 25mm, suspended in the cavity</p> <p>All joints well sealed</p>	<p>12.5mm plasterboard 12.5mm plasterboard 48mm metal stud 25mm mineral wool 12.5mm plasterboard <u>12.5mm</u> plasterboard <u>98mm</u> overall</p> <p>Laboratory rating ~ R<sub>w</sub> 49dB</p>	
<p><b>Type F:</b> <i>Staggered metal frames with plasterboard linings on each side of frame and absorbent material</i></p> <p>(HTA suggested construction only)</p>	<p>Two layers of plasterboard of minimum mass per unit area 10kg/m<sup>2</sup></p> <p>Linings fixed to metal 60/72 staggered stud</p> <p>Absorbent material to be unfaced mineral wool batts or quilt (which may be wire reinforced), density at least 10kg/m<sup>3</sup>, minimum thickness of absorbent material 25mm, suspended in the cavity</p> <p>All joints well sealed</p>	<p>12.5mm plasterboard 12.5mm plasterboard 60/72mm staggered stud 12.5mm plasterboard <u>12.5mm</u> plasterboard <u>122mm</u> overall</p> <p>Laboratory rating ~ R<sub>w</sub> 57dB</p>	

Note: These are based on meeting the minimum requirements of ADE 2003. For quality developments, upgrading the above should be considered.

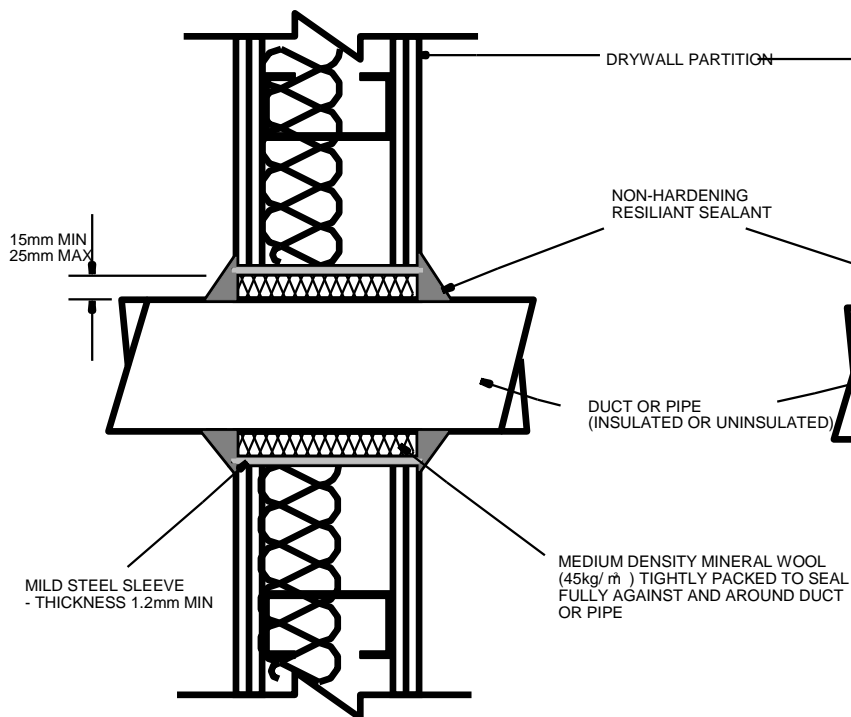
METHOD A



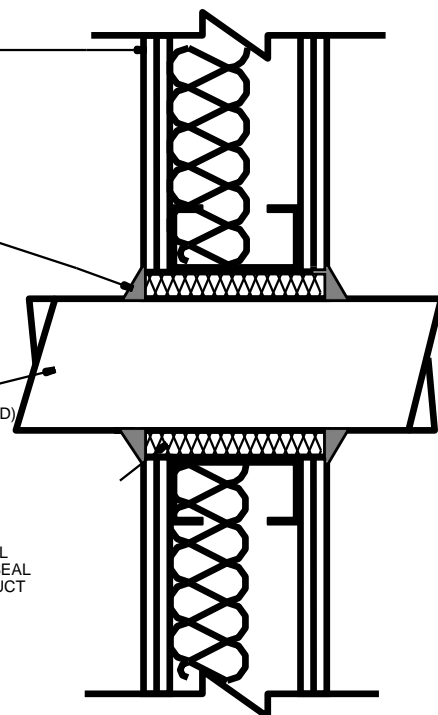
METHOD B



METHOD C



METHOD D



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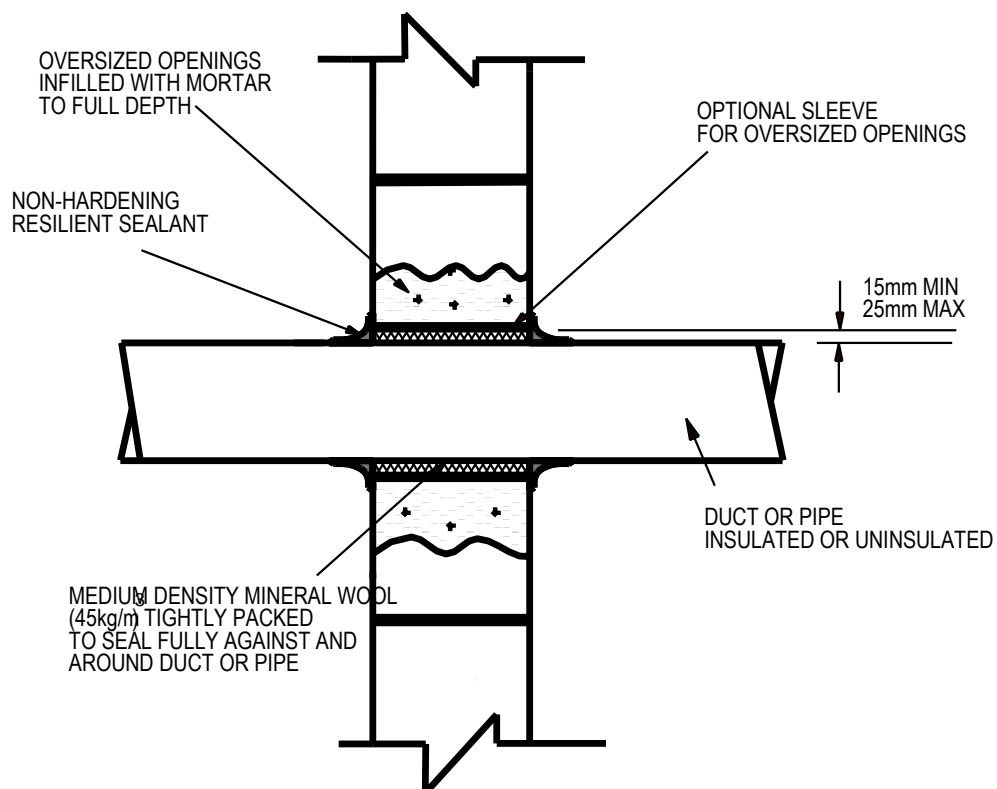
Title : **Methods of Sealing Service Penetrations  
Through Drywall Partition**

Project :  
**277A Gray's Inn Road**

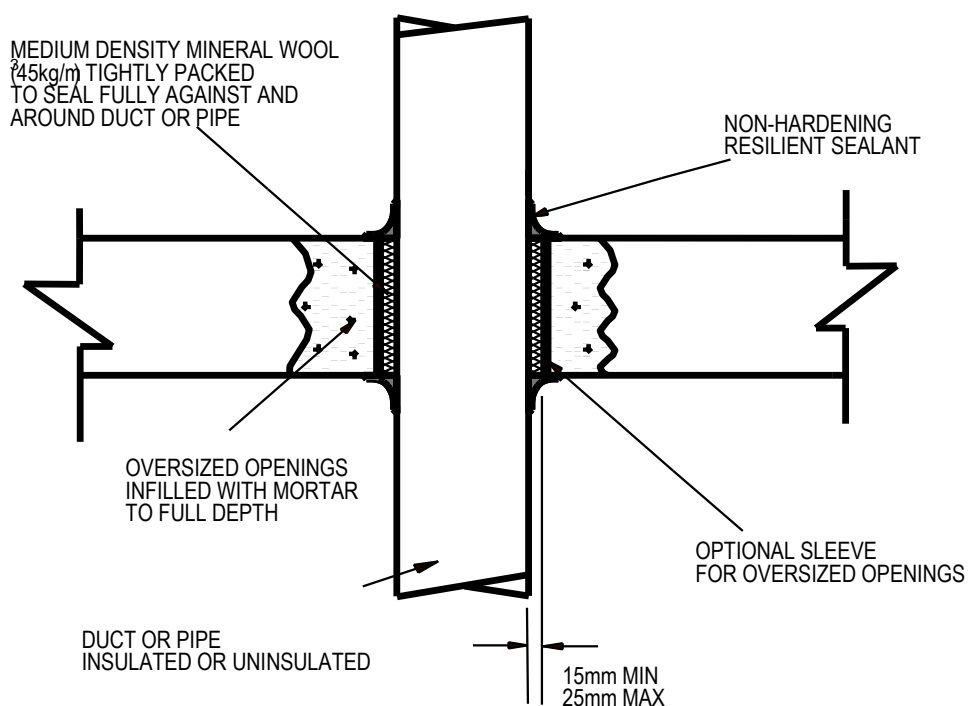
Day:  
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Scale :  
**N.T.S.**

Figure :  
**20890/DP1**

## WALL DETAIL



## FLOOR DETAIL



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Title : **Method of Sealing Service Penetrations  
Through Masonry Constructions**

Project : **277A Gray's Inn Road**

Date : **20/01/15**

Scale : **N.T.S.**

Figure : **20890/MP1**