ACOUSTIC LOGIC CONSULTANCY
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11 May, 2010

Report: 2010343/3004B/R0/HM

Prepared for: Meriton Apartments

PROPOSED RESIDENTIAL DEVELOPMENT

LOTS 101 AND 102, 42 WALKER STREET, RHODES

BCA ACOUSTIC ASSESSMENT

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1. INTRODUCTION

This letter sets out the Building Code of Australia (BCA) acoustic requirements for the proposed residential development at Stage One, Victoria Square with respect to internal sound isolation. Noise transfer from unit to unit will occur via common walls, floors and ceilings and is governed by provisions contained in the BCA. There are also BCA provisions relating to the control of waste pipe noise.

The report discusses the acoustic performance requirements that apply to the development to comply with City of Sydney Council and BCA requirements regarding internal noise transmission and the constructions necessary to achieve them.

2. GENERAL OVERVIEW

The acoustic requirements of the BCA are directed toward the provision of sound isolation between residential units of separate occupancy. The overall objective is to acoustically isolate noise sources in one occupancy and prevent them from intruding upon an adjoining occupancy. As such, the requirements cover the following:

- Sound isolation requirements for party walls.
- Sound isolation through the floor/ceiling of one apartment to apartments located directly above and below.
- Acoustic separation of waste soil pipes, where they pass from one apartment over or through the spaces of any other apartment of separate occupancy.
- Impact sound isolation of wet areas (bathrooms, kitchens) where they adjoin living spaces (bedrooms, living rooms, etc.) of an adjoining apartment.
- Sound separation of apartments from public corridors, plant rooms public stairwells, etc.

Suitable construction systems are outlined below to meet the requirements set out in the BCA and Council requirements.

3. CONSTRUCTIONS TO MEET BCA REQUIREMENTS

3.1 FLOORS

BCA Clause F5.4a: Floors separating sole-occupancy units or a sole occupancy unit from a plant room, lift shaft, stairway, public corridor, public lobby or the like will be required to have a Weighted Sound Reduction Index + Traffic Noise Spectrum Adaptation Term (abbreviated as R_w+C_{tr}) of not less than 50.

- Floors of the building structure constructed from a minimum 170 mm reinforced concrete having a density greater than 2200kg/m^3 would comply with this requirement by having an $R_{w+}C_{tr}$ of 50. See Detail AC001.

3.2 TREATMENT OF HARD FLOORS

BCA Clause F5.4a: Hard floors including floors with a timber or tiled finish) separating sole-occupancy units or a sole occupancy unit from a plant room, lift shaft, stairway, public corridor, public lobby or the like will be required to have an L_{ntw}+C of no more than 62.

The required treatment to comply with the above criteria follows. Note that where a floor is partly located over different rooms, the whole floor should be treated to the higher requirement.

Note: Impact isolation treatment is not required over carparking areas.

3.2.1 Floor Over Habitable Rooms

- Ceramic Tiles:
    - 5mm Acoustic Supplies Vibramat fixed to levelling screed with latex adhesive (acoustic underlay to be installed above the levelling screed).
    - A minimum 170 mm reinforced concrete slab with density greater than 2200kg/m^3. See AC002a
- Engineered Timber Floors:
    - Engineered strip timber flooring adhered Vibramat with flexible latex adhesive;
    - 5mm thick Acoustic Supplies Vibramat fixed to slab with latex adhesive;
    - A minimum 170 mm reinforced concrete with density greater than 2200kg/m^3. See AC002c
- Conventional Timber Flooring
    - Timber flooring adhered to plywood conventionally (do not penetrate through plywood to Vibramat);
    - Two layers of plywood cross laminated offset joints. The lower sheet shall be 12mm in thickness with an additional 7mm sheet above. (In the event that the hard floor finish – e.g. direct stick parquet – is to be adhered, plywood sheeting is not required.);
    - 5mm thick Acoustic Supplies Vibramat fixed to slab with latex adhesive;
    - A minimum 170 mm reinforced concrete with density greater than 2200kg/m^3. See AC002d

3.2.2 Floor Between Wet Areas

- Ceramic Tiles - Install tiles using Parex Davco Ultraflex or equivalent tile adhesive between concrete floor slab and tile floor finish. See detail AC002b.

3.3 WALLS

3.3.1 Inter-tenancy Walls - *BCA Clause F5.5a(i)*

BCA Clause F5.5a(i): Walls separating sole occupancy units will be required to have a Weighted Sound Reduction Index + Traffic Noise Spectrum Adaptation Term (abbreviated as Rw+Ctr) of not less than 50.

- Option A
  - 75mm thick Hebel Power Panel with 13mm Plasterboard direct stick on one side;
  - On the other side, install a separate 64mm steel stud 20mm off the Hebel with 13mm Plasterboard lining and 75mm thick 11kg/m^3 glasswool insulation in the cavity.
  - See Detail AC003a
- Option B
  - Install 2 x 64mm separate studs with minimum 45mm gap between the studs with 13mm fire rated plasterboard on one side and 16mm fire rated plasterboard on the other side, with 110mm thick 11kg/.m^3 soluble fibreglass insulation each side (or one layer 50mm thick and one layer of 165mm thick insulation).

3.3.2 For Stairway, Public Corridor, Public Lobby etc - *BCA Clause F5.5a (ii))*

BCA Clause F5.5a (ii & iii): Walls separating sole occupancy units from a plant room, lift shaft, stairway, public corridor, public lobby or the like will be required to have a Weighted Sound Reduction Index (abbreviated as Rw) of not less than 50. In addition, walls separating sole occupancy units from a plant room or lift shaft are required to be of discontinuous construction.

- Option A
  - 75mm thick Hebel Power Panel with 13mm Plasterboard direct stick on one side;
  - On the other side, install a separate 64mm steel stud 20mm off the Hebel with 13mm Plasterboard lining and 75mm thick 11kg/m^3 glasswool insulation in the cavity.
  - See Detail AC004a
- Option B
  - Install 2 x 13mm plasterboard on one side of a 92mm steel stud with 1x13mm plasterboard on the other side and 75mm thick 11kg/m^3 glasswool insulation in the cavity.
  - See Detail AC004b

3.4 TREATMENT OF ENTRY DOORS

BCA Clause F5.5b: For a door assembly located in a wall that separates a sole-occupancy unit from a stairway, public corridor or the like, will be required to have an R_w of not less than 30. For a door assembly located in a wall that separates 2 dwellings, it will be required to have an R_w+C_{tr} of not less than 50.

- A solid fire door with all gaps minimised should be installed for apartment entry doors to achieve an R_w of 30.

3.5 WASTE, STORMWATER AND DOMESTIC SUPPLY PIPING

BCA Clause F5.6: Ducts, Hot and Cold Domestic Water, Stormwater, Soil and Waste pipes which serves or passes through more than one sole occupancy unit must be separated from habitable rooms (other than a kitchen) in any other sole occupancy units by a Weighted Sound Reduction Index + Traffic Noise Spectrum Adaptation Term (abbreviated as R_w+C_{tr}) of not less than 40 if it is adjacent to a habitable room, and R_w+C_{tr} 25 if it is adjacent to a wet area (bathroom, laundry, etc.) or kitchen.

Note: *the following constructions provide equivalent noise reduction with regard to the noise sources being isolated as that of R_w+C_{tr} 25 and 40 systems*.

3.5.1 Hydraulic, Stormwater & Waste Pipes through Ceiling Space of Wet Areas

All domestic supply piping(hot and cold) serving another occupancy, stormwater, waste soil pipes from one occupancy passing over the wet area or kitchen of a unit of separate occupancy must be separated by a construction having a minimum $R_{w+}C_{tr}$ of 25 or equivalent construction providing the same sound reduction. To comply with this requirement it is required that:

- The ceilings over bathrooms, etc. which contain lagged hydraulics piping serving another occupancy, lagged stormwater and lagged waste piping are to be constructed from one layer of 13mm plasterboard. Refer attached detail AC007.
- All penetrations in the ceilings would need to be acoustically sealed. Any light fittings recessed into the ceiling would need to be acoustically rated to prevent sound passing through ventilation holes, etc. in the fittings. For this reason it is generally preferable to use wall mounted light fittings or ceiling, surface mounted fittings.
- Access panels opening into the wet area ceiling spaces should have an R_w+C_{tr} rating of 25, or construction providing equivalent same sound reduction.
- The use of acoustic flexible ducting and a plenum over the ceiling mounted grilles is required where exhaust air grilles are fitted to the ceilings of wet areas which contain lagged waste pipes. Refer detail AC006.

3.5.2 Hydraulic, Stormwater & Waste Pipes through Ceiling Space of Habitable Areas

All domestic supply piping (hot and cold) serving another occupancy, stormwater, waste soil pipes passing over rooms other than wet areas should be treated as indicated:

- Pipes to be lagged with Acosutic Supplies Vibralag. Ceiling of 13mm plasterboard with 50mm thick 11kg/m^3 glass wool insulation blanket for 500mm either side of the pipe. No direct holes through ceiling under the pipe. Refer attached detail AC007b.

3.5.3 Walls around Bathrooms and Laundries

The walls around bathrooms, laundries, etc. having domestic supply piping (hot and cold) serving another occupancy, stormwater or waste soil pipes running in the ceiling space require the perimeter walls to continue full height, slab-to-slab and be acoustically sealed at the head. Internal walls around bathrooms would need to be rated at R_w+C_{tr} 40 or equivalent construction providing the same sound reduction where the adjoining space is a living space. An option to achieve this is shown in detail AC006.

3.5.4 Hydraulic, Stormwater & Waste Pipe Risers in Wet Areas

Construction riser from one of the following constructions:

- 3x16mm plasterboard (Ventshaft system) for light weight fire rated riser. See AC009b.
- 1x13mm plasterboard with 75mm thick, 11kg/m^2 insulation within the riser for light weight non fire rated risers. See AC009b.

All constructions will provide an equivalent sound reduction to the stated level of R_w+C_{tr} 25 separation, as required by Clause 5.6.

Panels or doors providing access into pipe risers must not open into any habitable room other than a kitchen. Panels or doors over these access openings should achieve a minimum R_w+C_{tr} of 25. A 9 mm thick compressed fibrous cement sheet with a soft closed cell foam sealing strip around the perimeter would meet this requirement.

3.5.5 Hydraulic, Stormwater & Waste Pipe Risers Outside of Wet Areas

- 110mm rendered brickwork. This construction will provide an equivalent sound reduction to the stated level of R_w+C_{tr} 40 separation required by Clause 5.6. Refer to detail AC013. Alternatively, a lightweight option is provided is AC009a.
- Panels or doors providing access into pipe risers must not open into any habitable room other than a kitchen.

3.6 MECHANICAL SERVICE DUCTING

BCA Clause F5.6: Ducts, Hot and Cold Domestic Water, Stormwater, Soil and Waste pipes which serves or passes through more than one sole occupancy unit must be separated from habitable rooms (other than a kitchen) in any other sole occupancy units by a Weighted Sound Reduction Index + Traffic Noise Spectrum Adaptation Term (abbreviated as R_w+C_{tr}) *of not less than 40 if it is adjacent to a habitable room, and* R_w+C_{tr} *25 if it is adjacent to a wet area (bathroom, laundry, etc.) or kitchen.*

Note: *the following constructions provide equivalent noise reduction with regard to the noise sources being isolated as that of* R_w+C_{tr} *25 and 40 systems.*

3.6.1 Fire Rated Mechanical Service Risers in Wet Areas

Mechanical service (ducts) risers in wet areas may be constructed from:

- 3x16mm plasterboard (ventshaft system) for light weight fire rated riser. See AC009b
- 1x13mm plasterboard with 75mm thick, 11kg/m^2 insulation within the riser for light weight non fire rated risers. See AC009b.

All constructions will provide an equivalent sound reduction to the stated level of R_w+C_{tr} 25 separation, as required by Clause 5.6.

3.6.2 Fire Rated Mechanical Service Risers Outside of Wet Areas

Mechanical service (ducts) risers outside of wet areas may be constructed from:

- 110mm brickwork with render. This construction will provide an equivalent sound reduction to the stated level of R_w+C_{tr} 40 separation required by Clause 5.6. Refer to detail AC013. Alternatively, a lightweight option is provided is AC009a.

Providing access into duct risers must not open into any habitable room other than a kitchen.

3.7 ACOUSTIC TREATMENT OF WALL JUNCTIONS, PENETRATIONS AND DUCTING

Wall/wall junctions and wall/column junctions should be sealed by leaving a 10-15 mm wide gap and caulking to a 15 mm depth using 100% polyurethane flexible sealant plus foam backing rod. The heads of non-load bearing walls and all acoustically rated plasterboard walls should be sealed with 15mm deep flexible, fire-rated 100% polyurethane mastic applied into a 10-15 mm gap on both sides of the wall.

Seal penetrations for electrical conduits with fire rated 100% polyurethane sealant. Penetrations for mechanical services piping should be sealed with a flexible mastic sealant or an intumescent foam sleeve.

Ventilation ducting passing through walls should not reduce the acoustic isolation provided by the walls to below that required by the BCA. The only ventilation ducts proposed for the apartments will serve the bathrooms. The prevention of cross talk via these ducts will require:

- The use of separate duct branches serving adjacent bathrooms.
- The inclusion of a number of unlined duct elbows in the duct run between grilles serving adjacent apartments.
- The use of internally lined rigid ducting.
- The use of acoustic flexible ducting and an internally lined plenum over the ceiling mounted grille.

3.8 SOUND ISOLATION OF PUMPS

BCA Clause F5.7: For all pumps a flexible coupling must be used at the point of connection between the service pipes in a building and any circulating pumps or other pump.

Flexible coupling will be fixed between pumps and piping connected to them. Or an alternative acceptable treatment would be vibration isolate the piping attached to the pump from the building schedule.

4. CLOSURE

This report sets out the internal acoustic requirements of the Building Code of Australia (BCA) applying to residential developments and typical treatments to comply with these requirements. It also presents additional treatments which are recommended due to the quality of the development for the amenity of future residents.

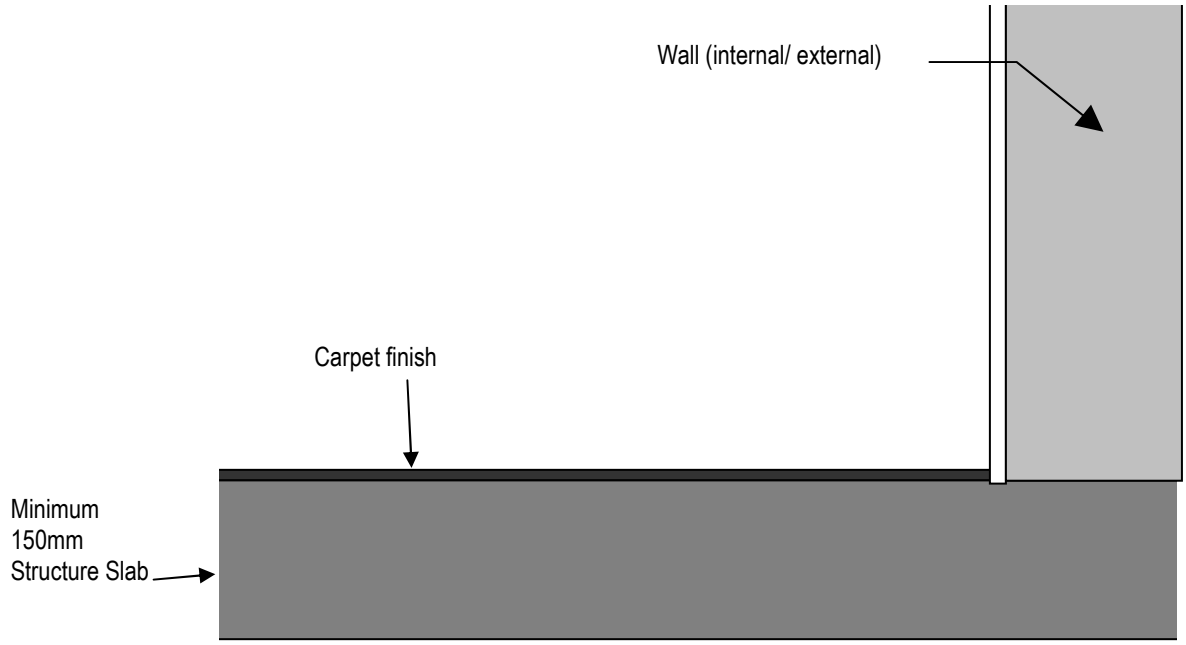
We trust this information is satisfactory. Please contact us should you have any further queries.

Report prepared by

ACOUSTIC LOGIC CONSULTANCY PTY LTD
Hilary McClure

APPENDIX 1

CONSTRUCTION DETAILS FOR BCA COMPLIANCE



HABITABLE ROOM

CEILING ELEVATION SHOWING ABOVE HABITABLE AREAS WITH CARPET FINISHES Lntw+C1 ≤ 62 / FSTC ≥ 50, IIC 50

Acoustic Logic Consultancy Pty Ltd
9 Sarah Street, Mascot 2020
Tel: 8338 9888 Fax: 8338 8399

Lots 101-102, 42 Walker Street, Rhodes

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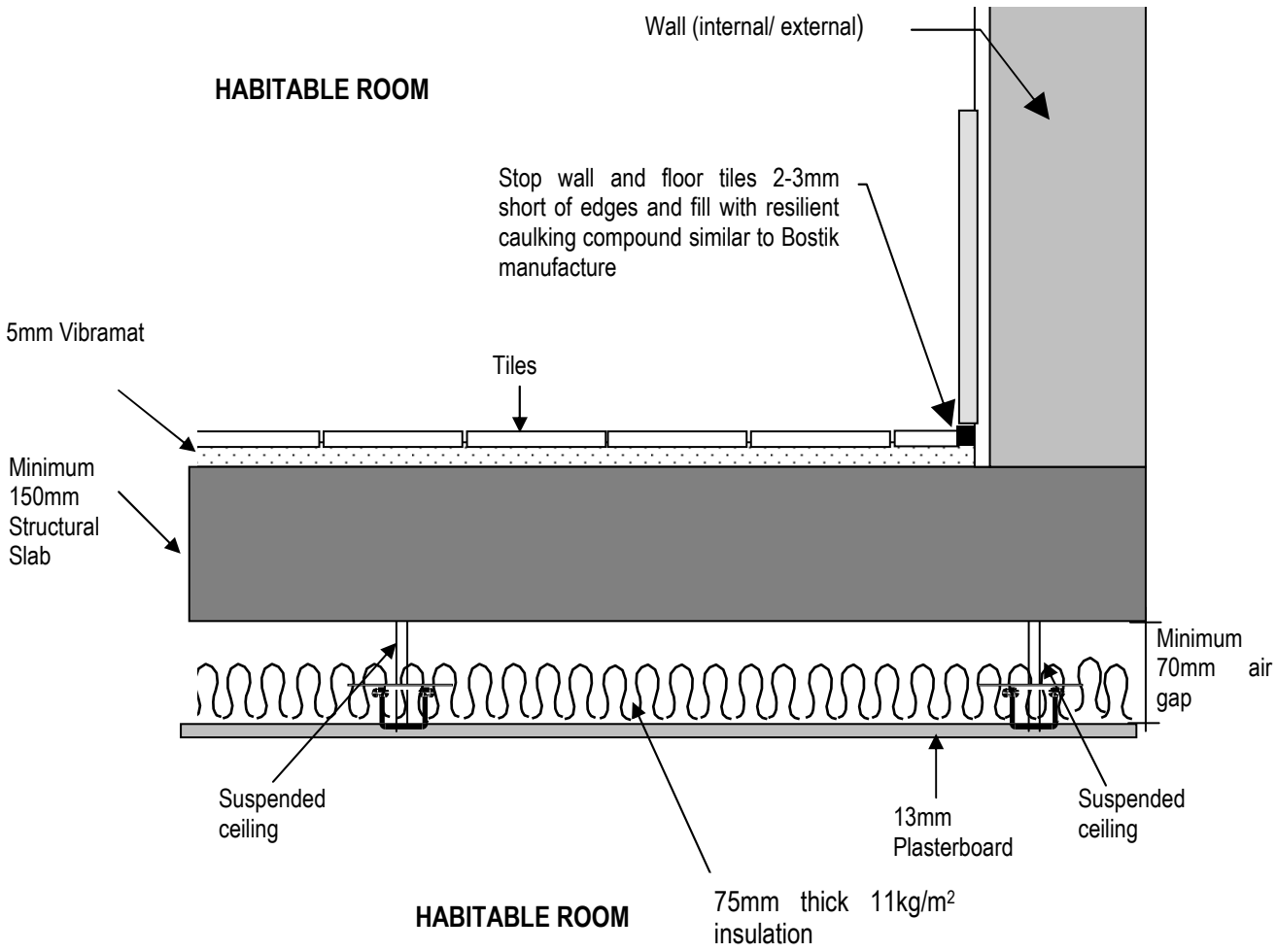

CEILING ELEVATION SHOWING HABITABLE ROOMS WITH TILED FLOOR FINISHES AND SUSPENDED CEILINGS

Lntw+C1 ≤ 62 / FSTC ≥ 50, IIC 50

Acoustic Logic Consultancy Pty Ltd
9 Sarah Street, Mascot 2020
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Lots 101-102, 42 Walker Street, Rhodes

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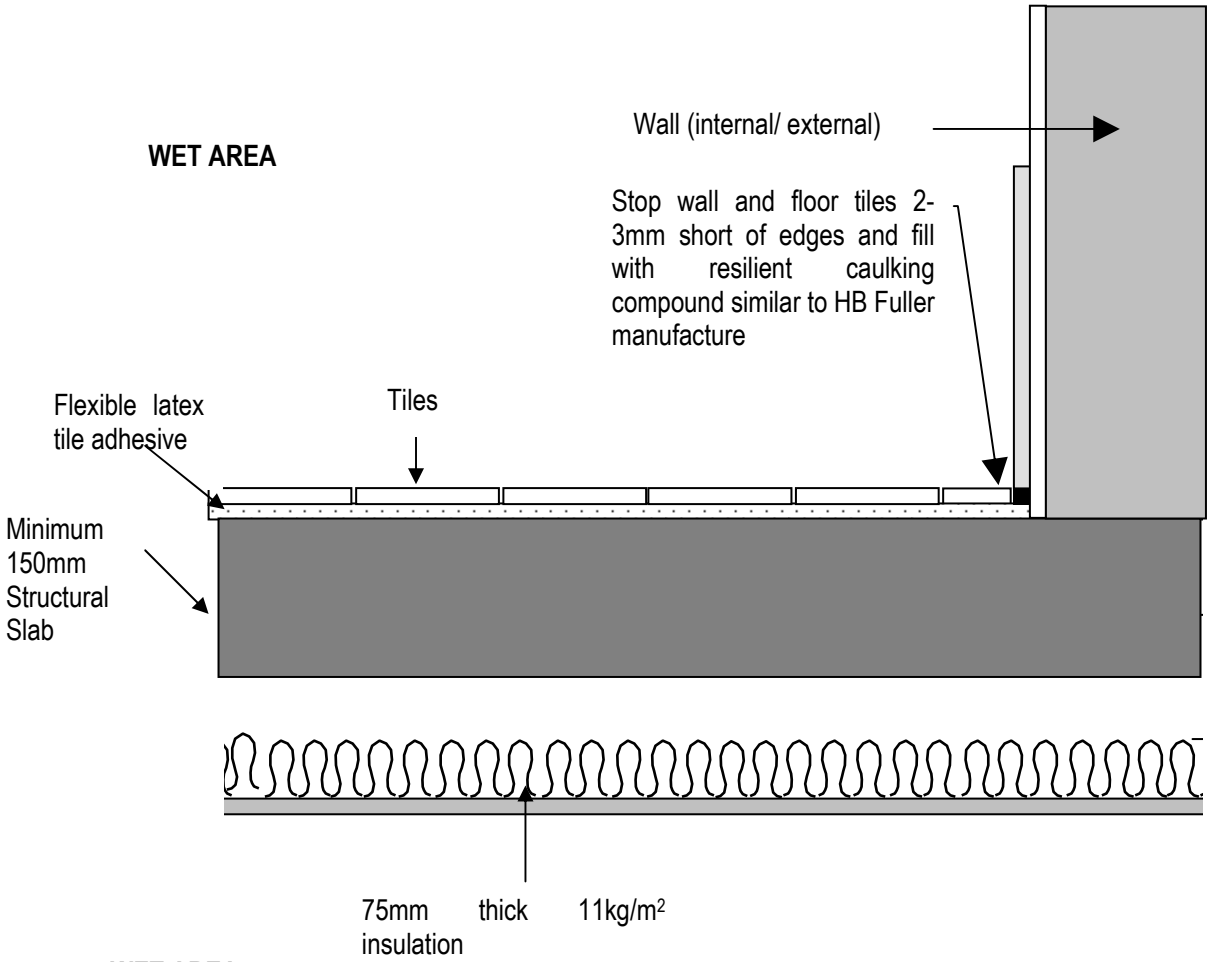

CEILING ELEVATION FROM WET AREA TO WET AREA WITH TILED FLOOR FINISHES

Lntw+C1 ≤62 / FSTC ≥ 55

Acoustic Logic Consultancy Pty Ltd
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Lots 101-102, 42 Walker Street, Rhodes

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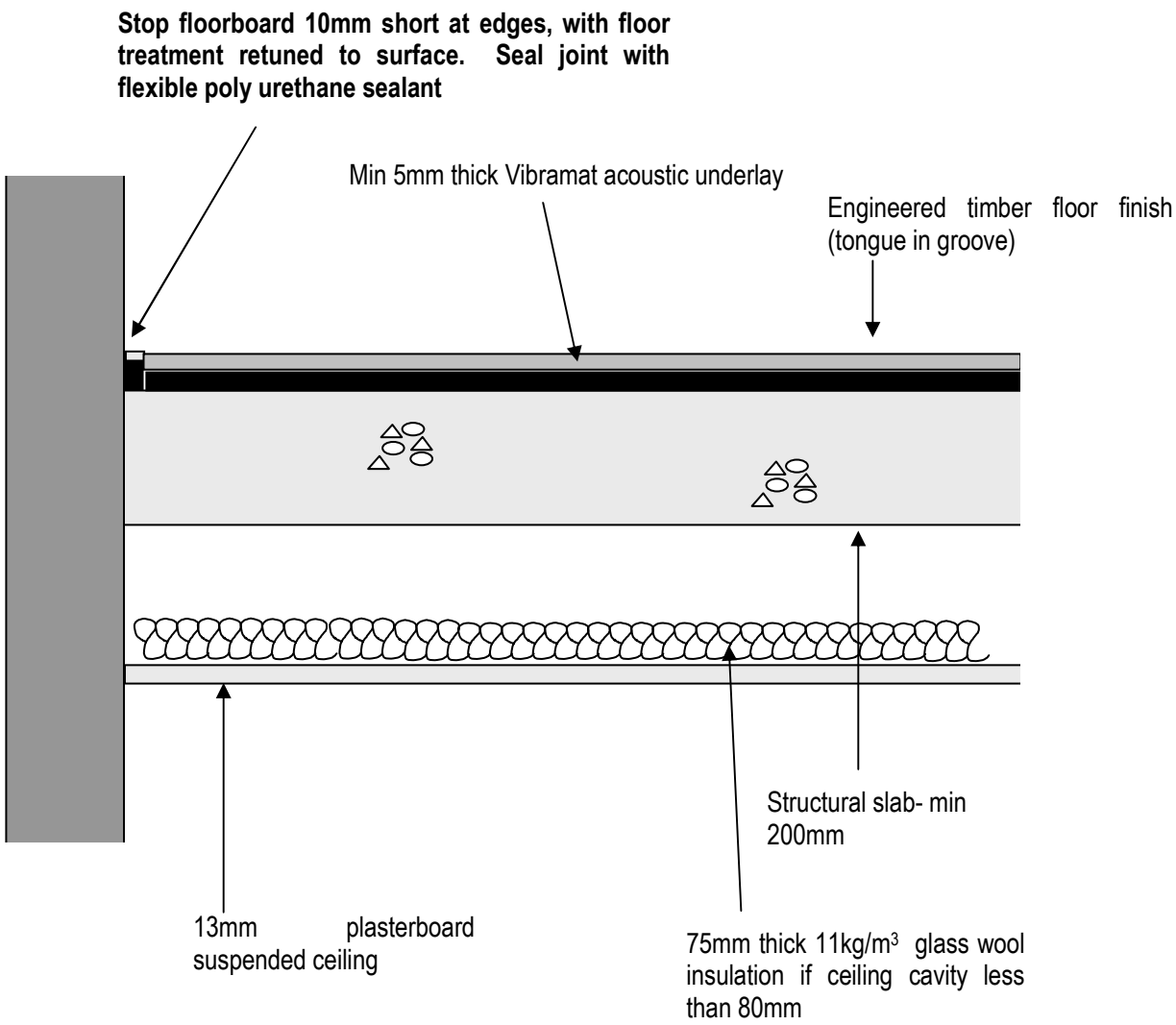

ENGINEERED TIMBER FLOOR TREATMENTS AREAS OVER ANOTHER APARTMENT Lntw+C1 ≤ 62 / FSTC ≥ 50, IIC 50

Acoustic Logic Consultancy Pty Ltd
9 Sarah Street, Mascot
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Lots 101-102, 42 Walker Street, Rhodes

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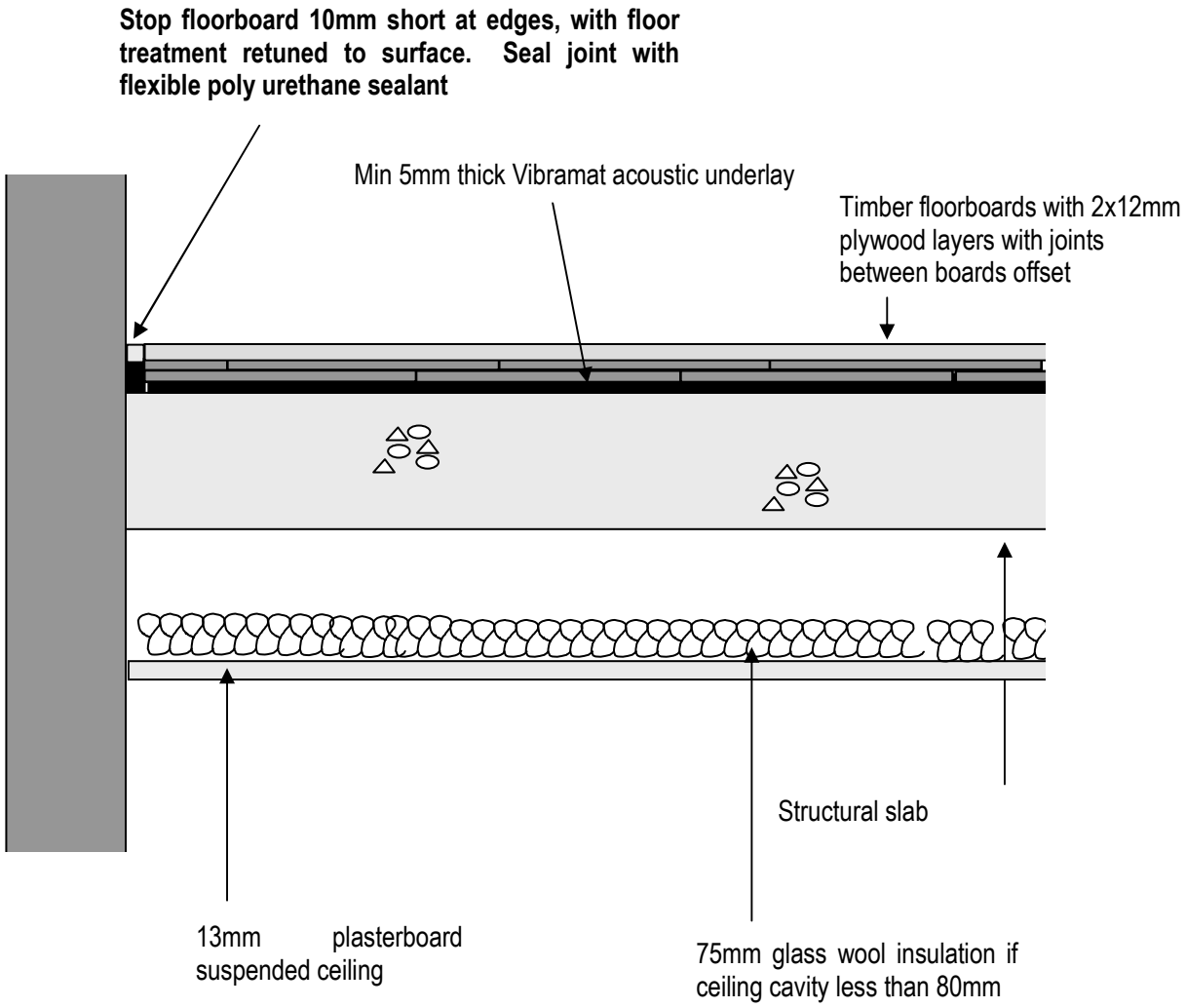

TIMBER FLOORBOARD TREATMENTS AREAS OVER ANOTHER APARTMENT Lntw+C1 ≤ 62 / FSTC ≥ 50, IIC 50

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Lots 101-102, 42 Walker Street, Rhodes

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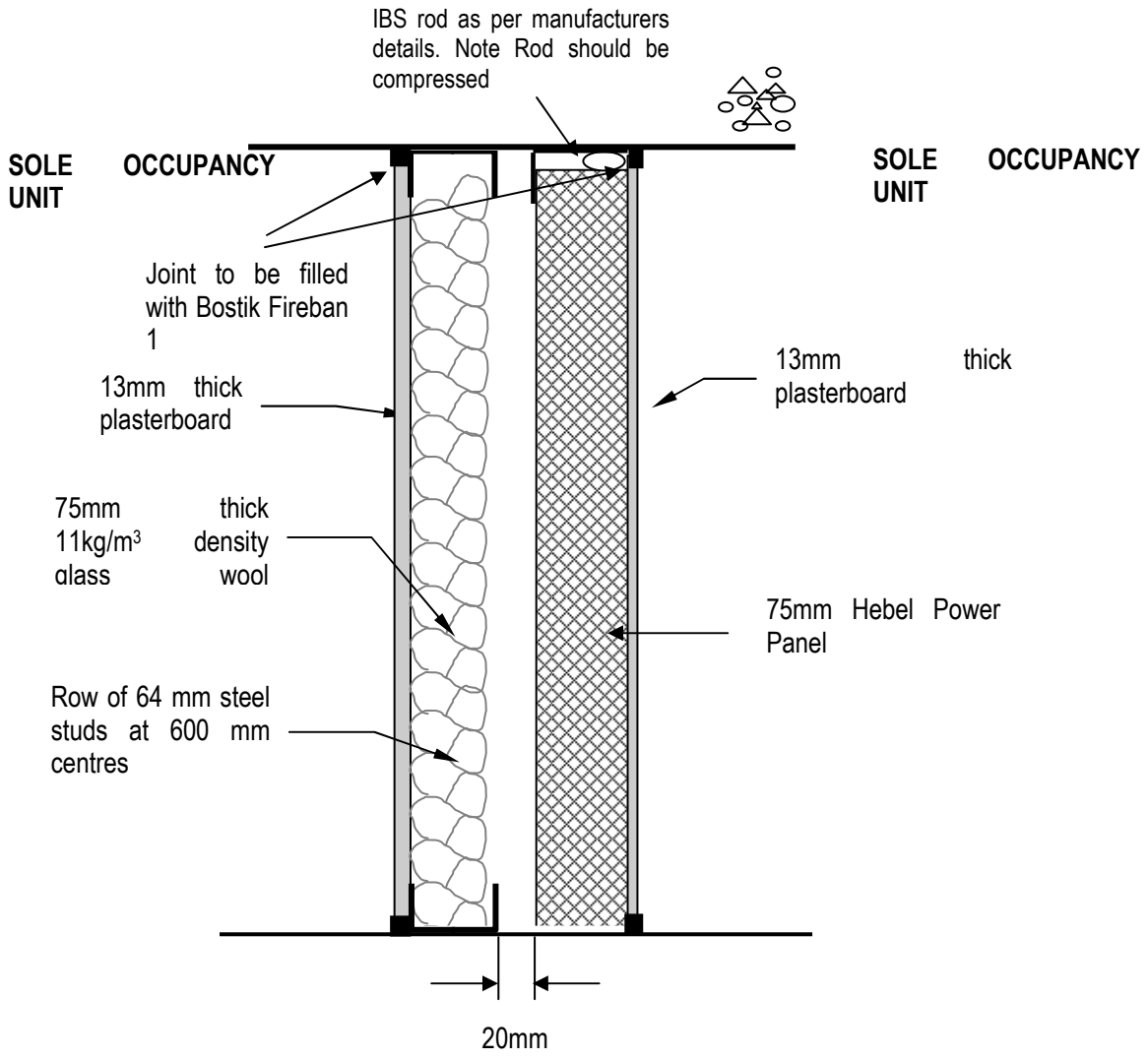

SECTIONAL ELEVATION INTERTENANCY WALL

$R_w + C_{tr}$ 50 + / FSTC ≥ 55

OPTION A

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Lots 101-102, 42 Walker Street, Rhodes

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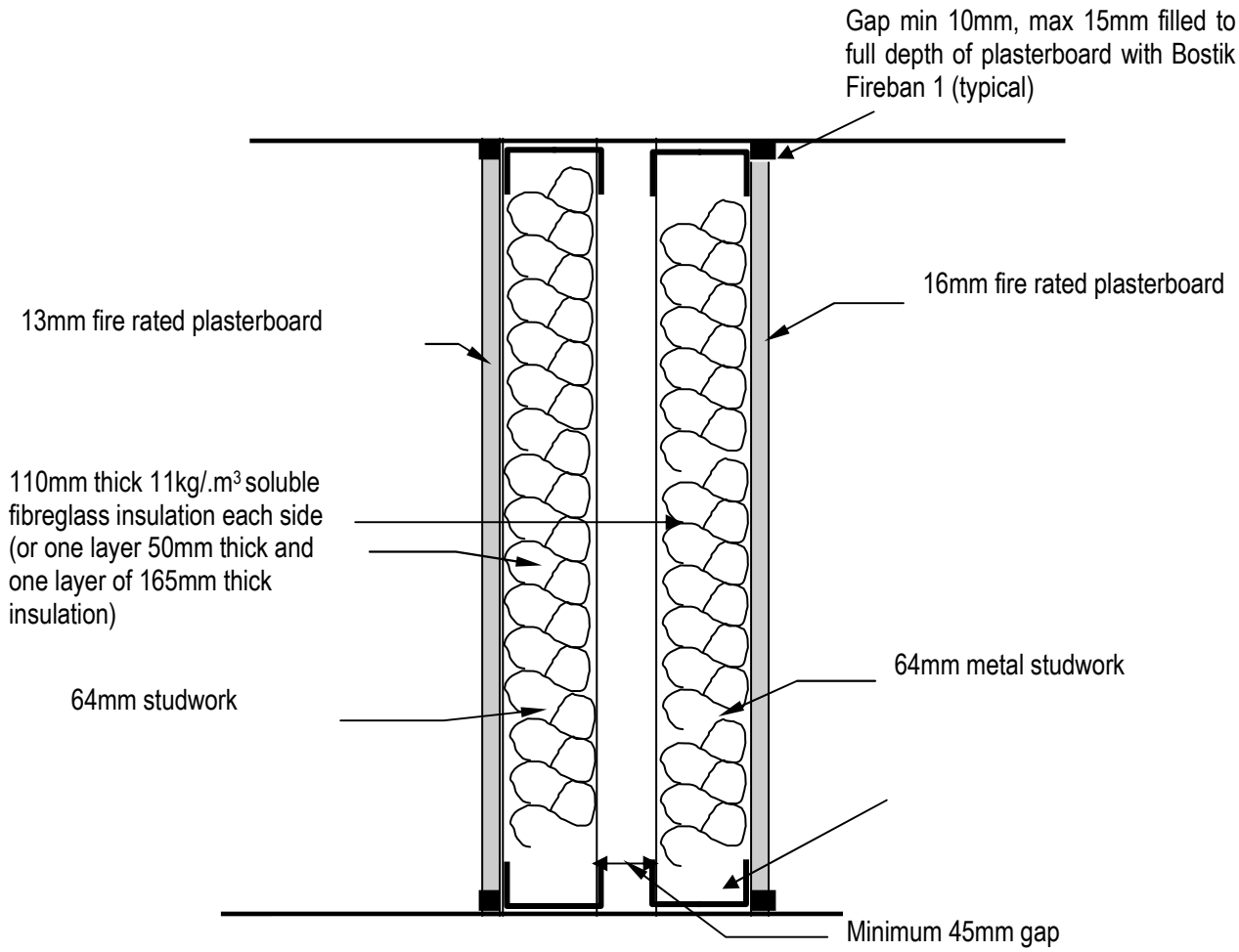

Note - 1. Any waste pipes or storm water pipes located with the party wall cavity must be wrapped with 5kg/m^2 lagging (Acoustic Supplies Vibralag or equal). Overlap all joints 50mm taped airtight aluminium tape.
2. Penetrations for GPO's must not be back to back – offset by 500mm, otherwise acoustic box is required behind the GPO.
3. Noggings not to bridge separate or staggered studwork.
4. Joints in plasterboard sheets to be backed by framing or noggin infill

SECTIONAL ELEVATION
INTERTENANCY WALL
$R_w + C_{tr}$ 50 / FSTC ≥ 55

OPTION B

Acoustic Logic Consultancy Pty Ltd
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Lots 101-102, 42 Walker Street, Rhodes

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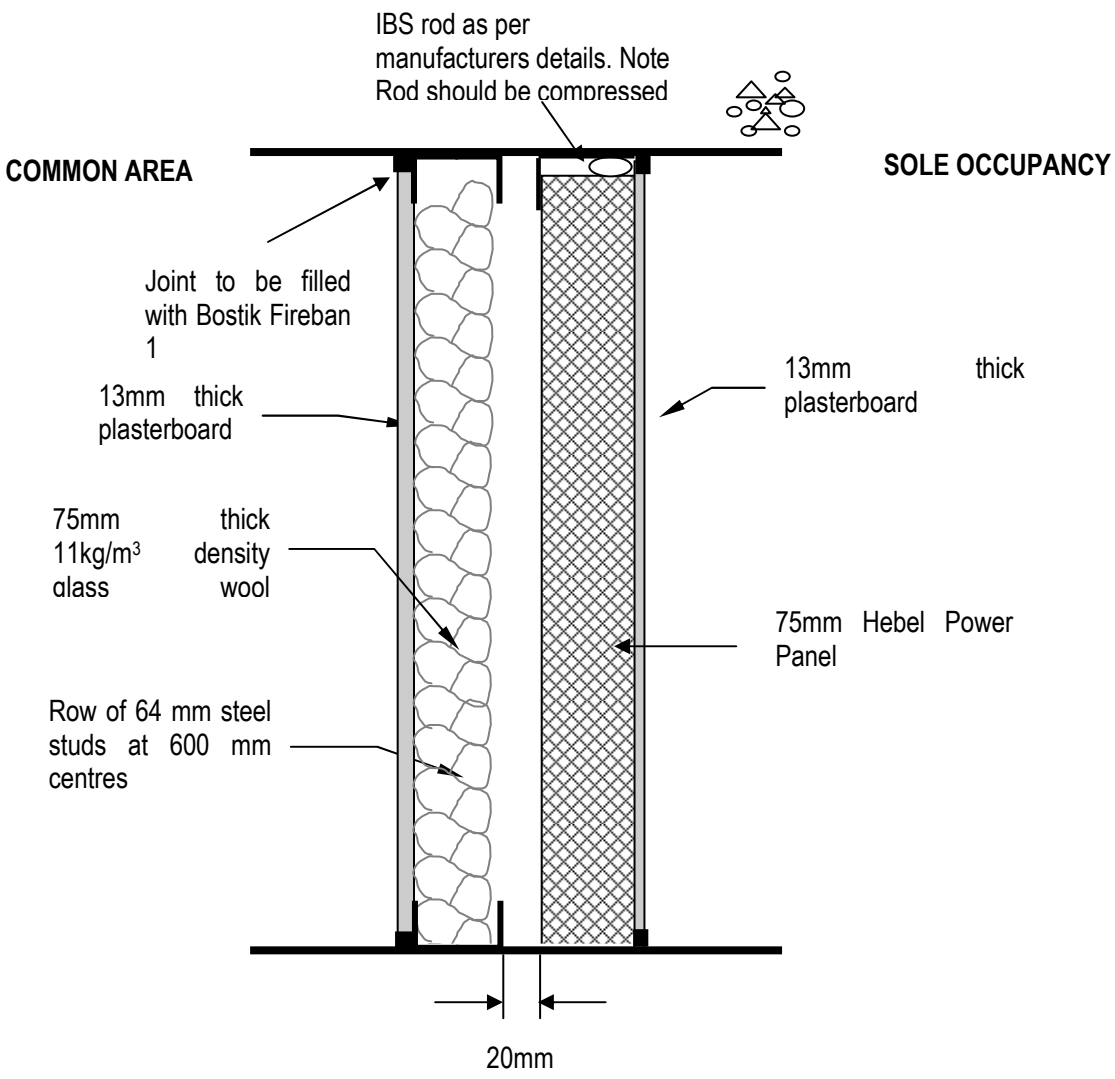

SECTIONAL ELEVATION
WALL SEPARATING UNITS AND STAIRWAYS, PUBLIC CORRIDORS, PUBLIC LOBBIES OR THE LIKE R_W 50

Option A

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Lots 101-102, 42 Walker Street, Rhodes

Date:	Drawn:	Checked:	Project No:	Drawing No:
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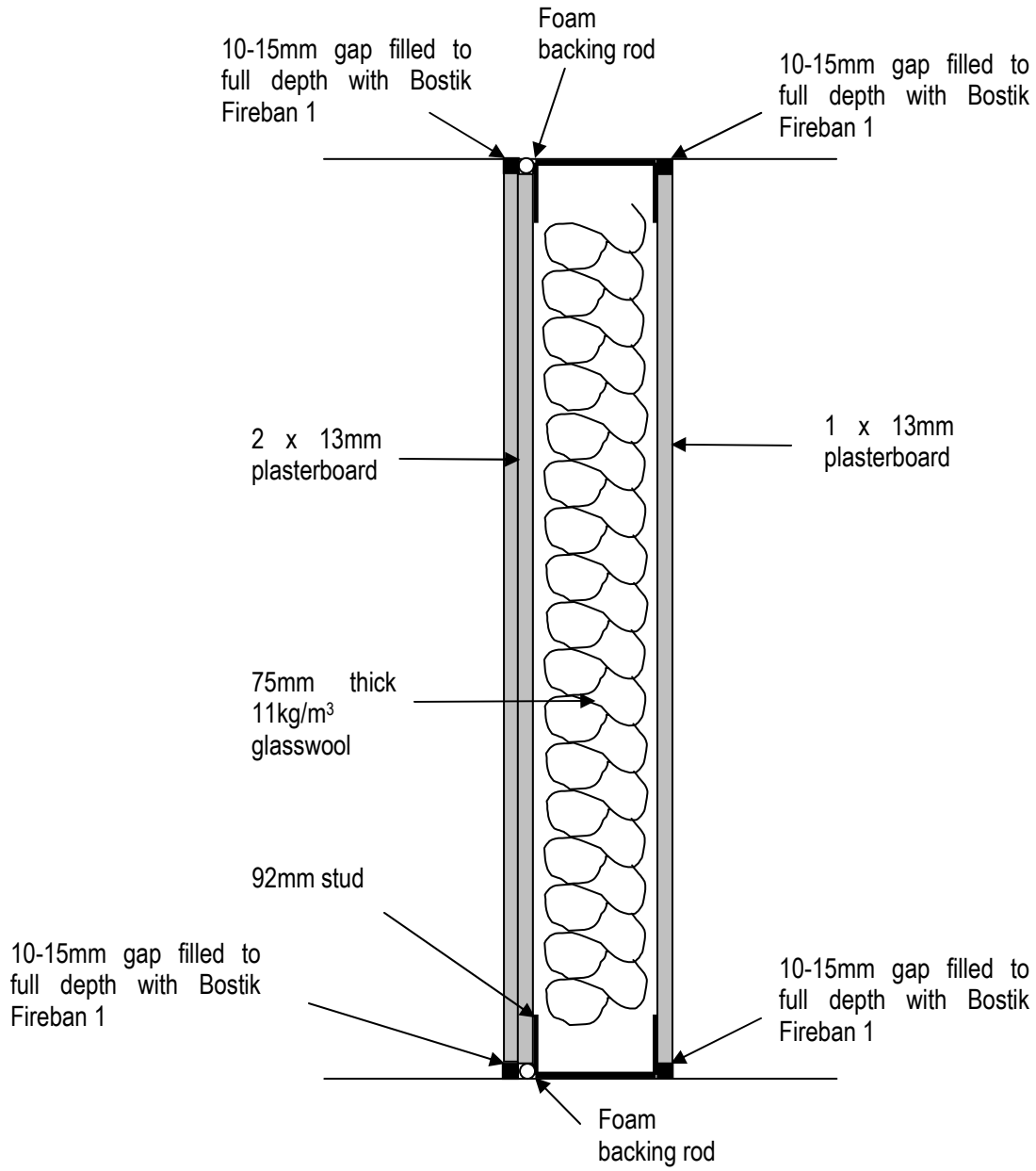

SECTIONAL ELEVATION
WALL SEPARATING UNITS AND STAIRWAYS, PUBLIC CORRIDORS, PUBLIC LOBBIES OR THE LIKE R_W 50

Acoustic Logic Consultancy Pty Ltd
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Lots 101-102, 42 Walker Street, Rhodes

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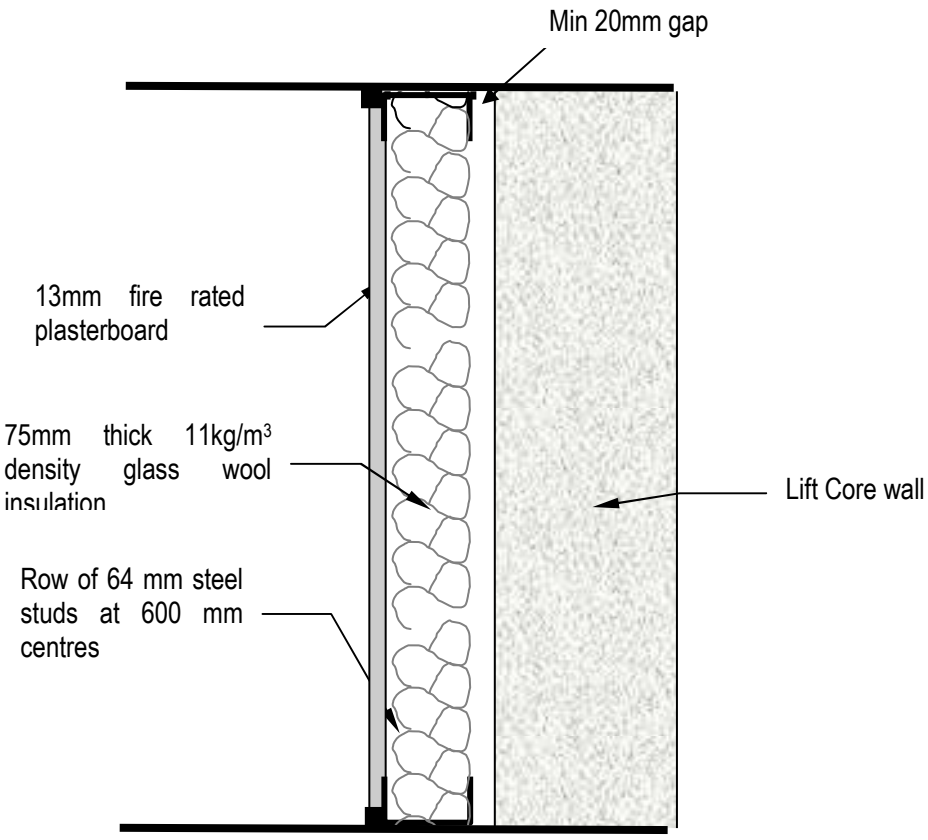

Note: Resilient ties (or no ties at all) between brickwork and lift core wall.

LIFT CORE WALL	**Acoustic Logic Consultancy Pty Ltd** 9 Sarah Street, Mascot Tel: 8338 9888 Fax: 8338 8399
	Lots 101-102, 42 Walker Street, Rhodes

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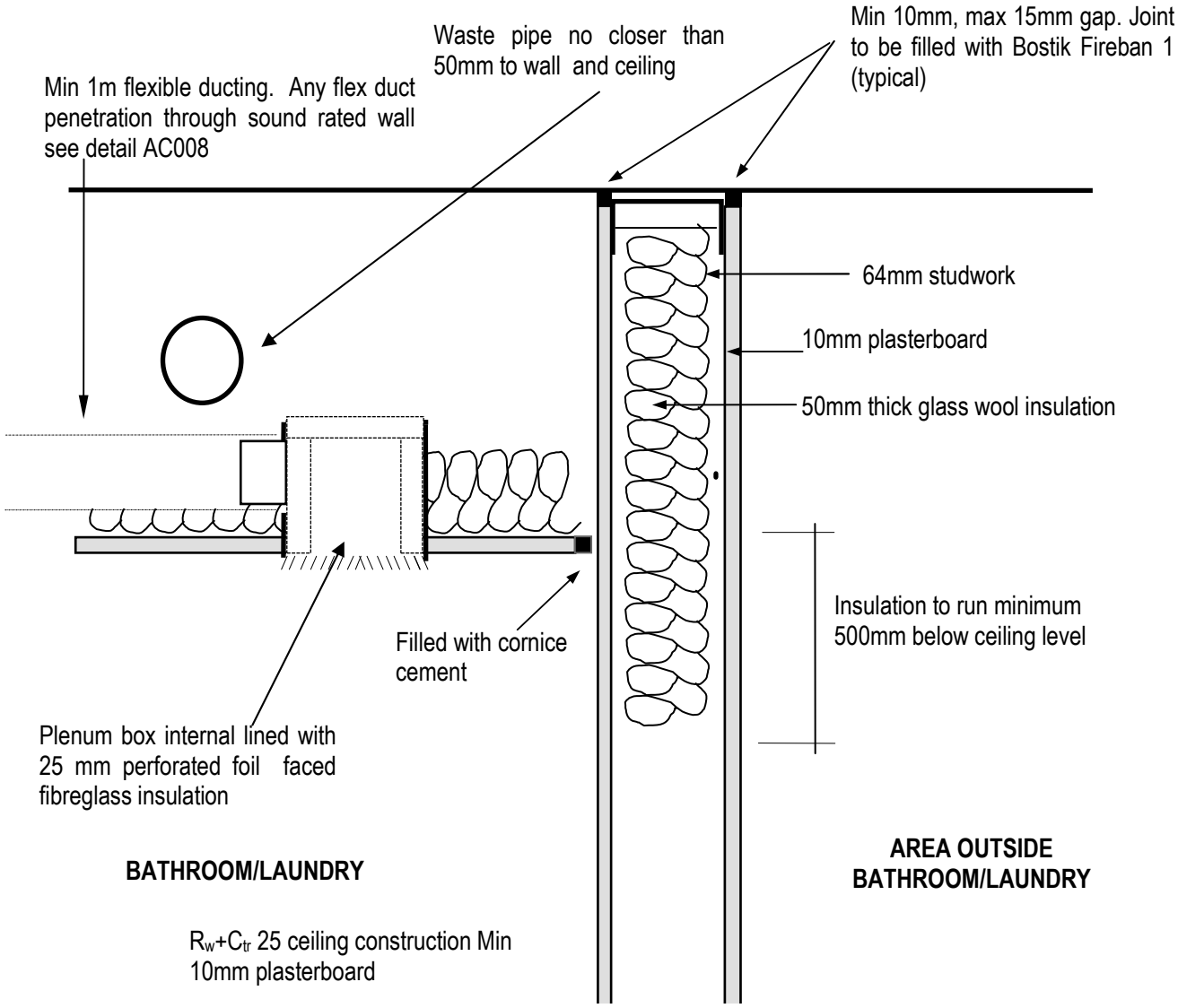

STANDARAD PVC PIPE (NOT WRAPPED)

SECTIONAL ELEVATION OF WALL/ CEILING REQUIREMENTS FOR WET AREA PERIMETER WALL

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Lots 101-102, 42 Walker Street, Rhodes

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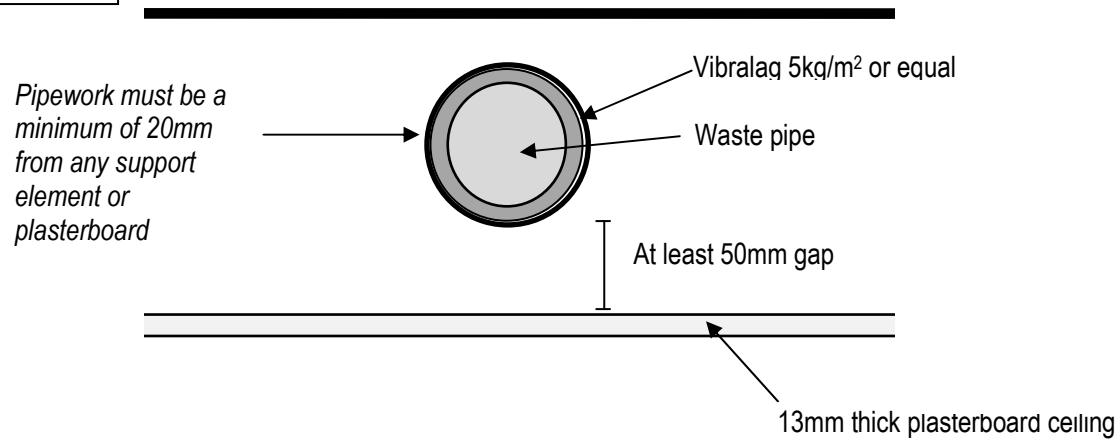
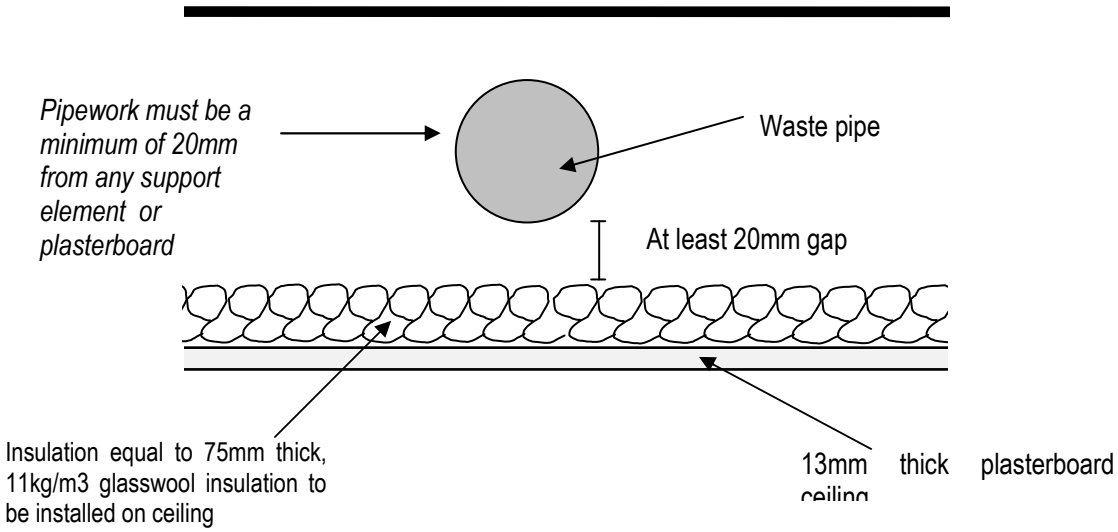
OPTION A



OPTION B



WASTE PIPE TREATMENT ABOVE WET AREAS PERFORMANCE EQUAL TO Rw + Ctr 25

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9 Sarah Street, Mascot 2020
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Lots 101-102, 42 Walker Street, Rhodes

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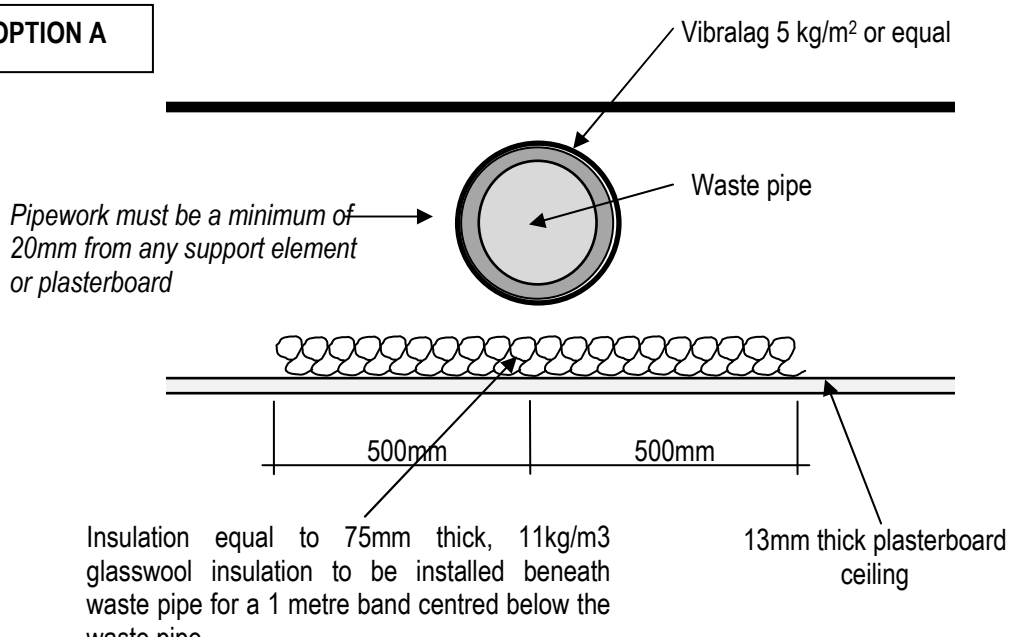
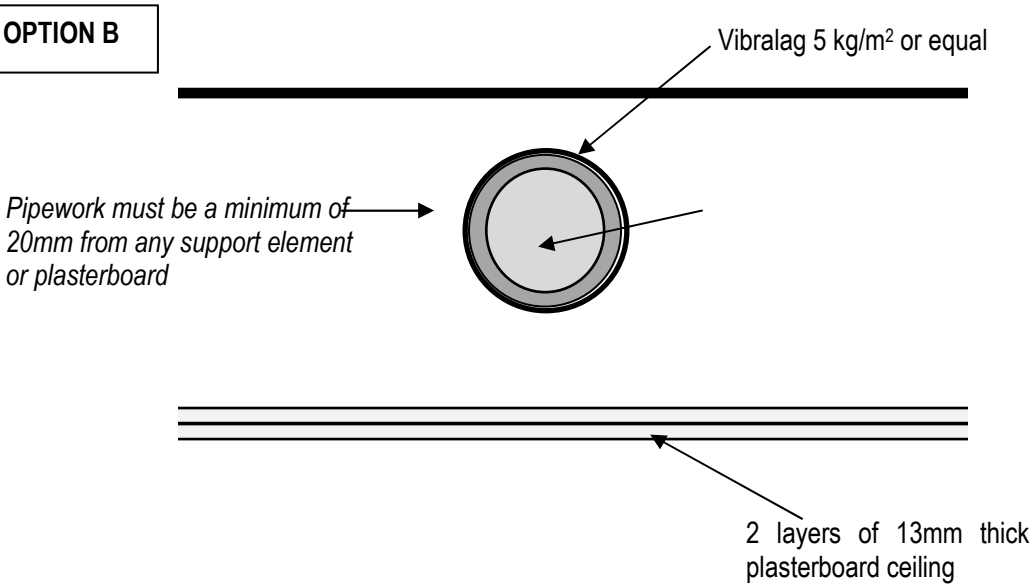
OPTION A



OPTION B



WASTE PIPE TREATMENT ABOVE HABITABLE AREAS PERFORMANCE EQUAL TO Rw + Ctr 40	**Acoustic Logic Consultancy Pty Ltd** 9 Sarah Street, Mascot 2020 Tel: 8338 9888 Fax: 8338 8399
	Lots 101-102, 42 Walker Street, Rhodes

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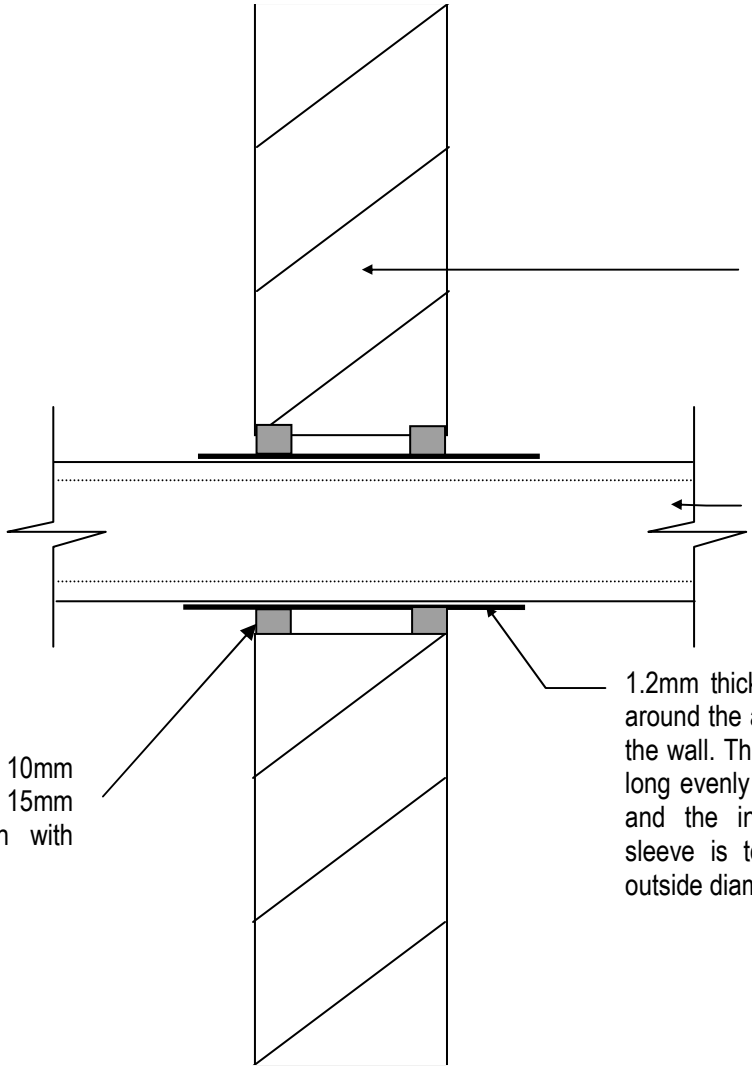

FLEX DUCT PENETRATION THROUGH A WET AREA PERIMETER WALLS

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Lots 101-102, 42 Walker Street, Rhodes

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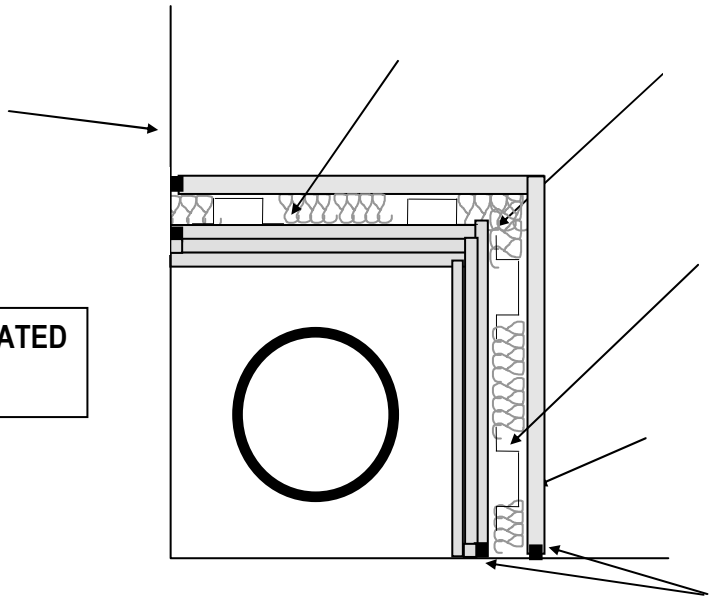
	NTS			

FIRE RATED OPTION



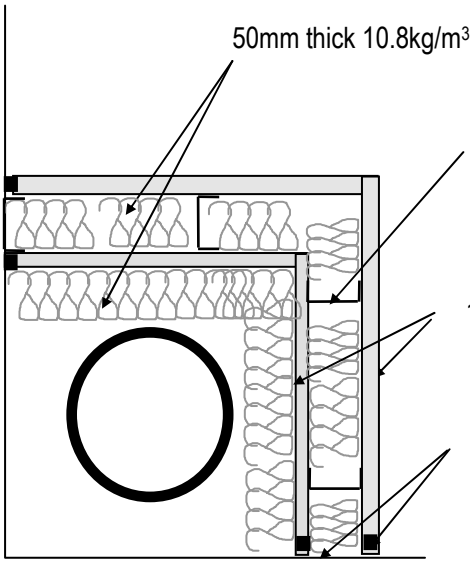
NON-FIRE RATED OPTION

Line of wall. Sheets to be sealed to wall.

50mm thick 10.8kg/m^3 glass wool insulation

10mm plasterboard

Gap min 10mm, max 15mm filled to depth of 1 sheet of plasterboard with Bostik Fireban 1 with backing rod behind where required (typical).



Note – No access panels in riser walls outside of wet areas

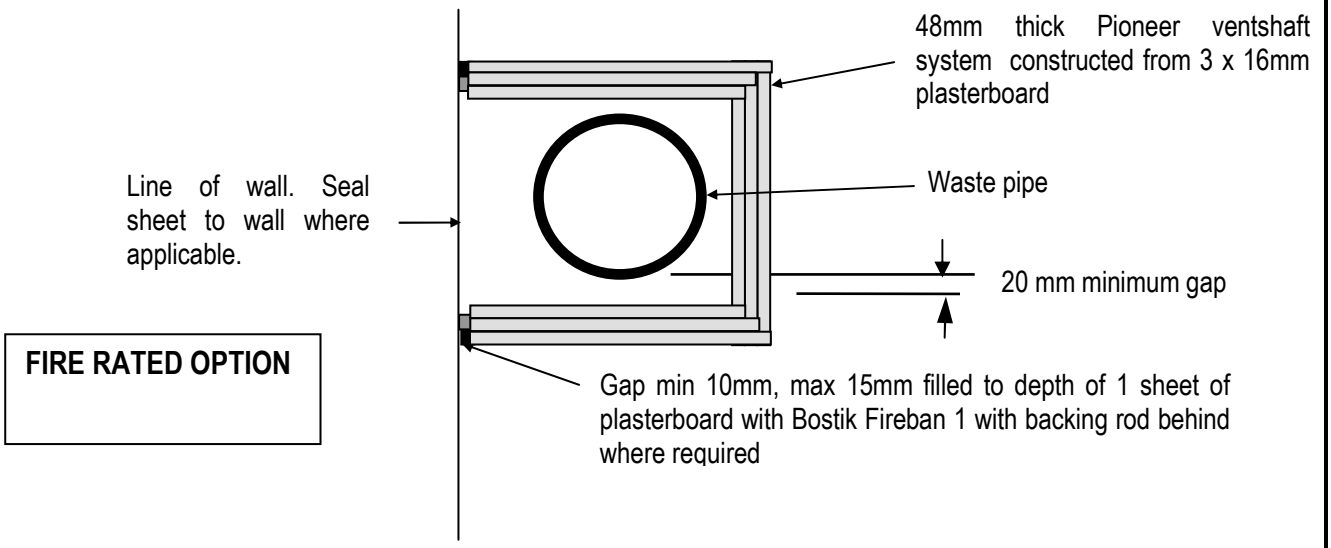
RISER TREATMENT OUTSIDE WET AREAS

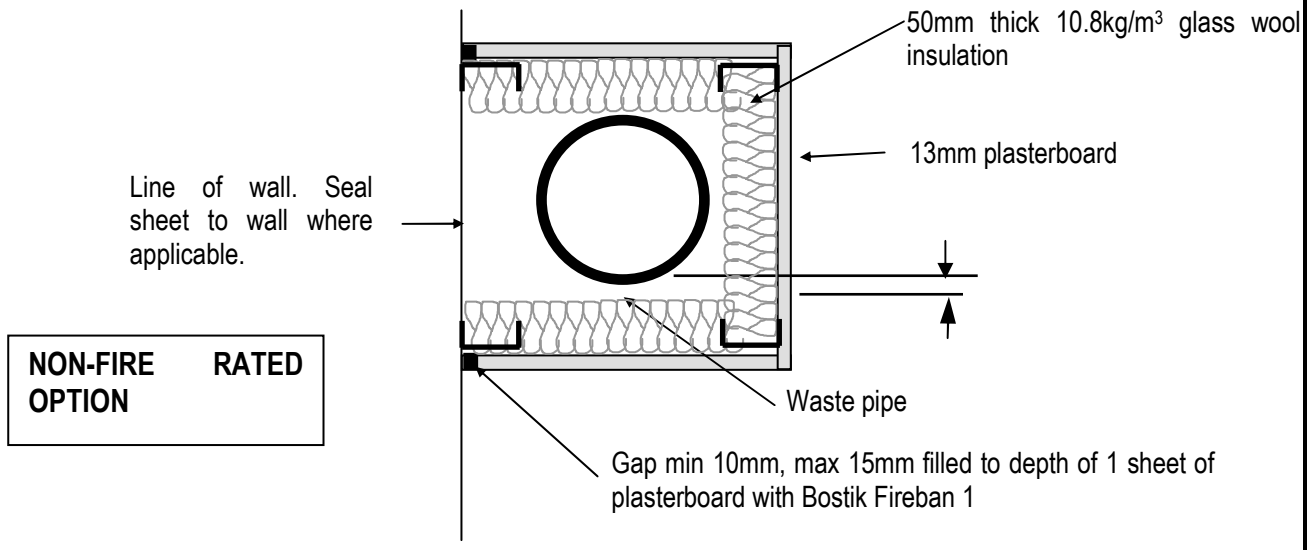
PERFORMANCE EQUAL TO R_w + Ctr 40

Acoustic Logic Consultancy Pty Ltd
9 Sarah Street, Mascot
Tel: 8338 9888 Fax: 8338 8399

Lots 101-102, 42 Walker Street, Rhodes

Date:	Drawn:	Checked:	Project No:	Drawing No:
APR 2010	HM		2010343	AC09a
Issue	**Scale:**	**Approved**		
	NTS			





RISER TREATMENT FOR BATHROOMS AND LAUNDRIES

PERFORMANCE EQUAL TO R_w + Ctr 25

Acoustic Logic Consultancy Pty Ltd
9 Sarah Street, Mascot
Tel: 8338 9888 Fax: 8338 8399

Lots 101-102, 42 Walker Street, Rhodes

Date:	Drawn:	Checked:	Project No:	Drawing No:
APR 2010	HM		2010343	AC09b
Issue	**Scale:**	**Approved**		
	NTS			