

# BUILDING A Quieter Home

Design guidelines

Renovation  
Solutions

Creating a Home  
Theatre Room

The definitive guide to building  
a peaceful and quiet home

  
**GIB**  
Living Solutions®

# Protecting your peace and privacy

Our lifestyles and living habits have undergone incredible change over the past decade. The homes we're building today need to be designed differently to reflect these changes, and especially to cope with the impact unwanted noise can have on health and well-being.

## Why noise is becoming a big issue

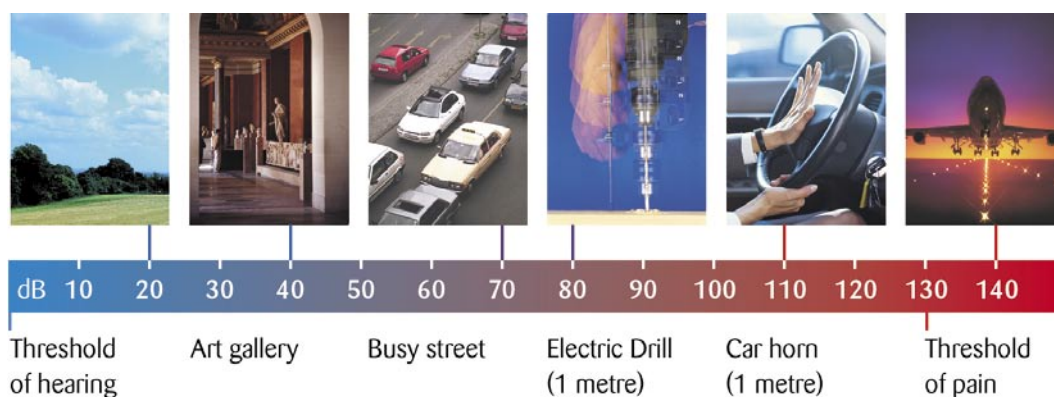
### Interior noise

- Two storey homes are more common
- More conveniences and appliances
- A busier lifestyle
- More people working or studying from home
- Children living at home to an older age
- Multiple entertainment devices – computers, games, home entertainment theatres

### Exterior noise

- In towns and cities, houses are being built closer together
- Traffic has increased dramatically
- New home entertainment equipment is vastly more powerful

It's no wonder more and more people seeking to build a new home rate noise control and privacy issues amongst their biggest concerns.



## Understanding noise

Sound levels are measured in decibels (dB). To get an idea of the decibel range our ears can perceive, 20dB represents a quiet library and 110dB equates to a Boeing 747 jet engine heard from a distance of about 50 metres.

Inside a home, a level of sound that is acceptable at one time may be totally unacceptable at another.

A really loud television (70dB) may be okay in the daytime in a busy living room where there are lots of other noises.

But in a quiet room at night where ambient sound levels are typically 20dB, the TV, at 70dB would be totally unacceptable.

The same applies for traffic noise. Sustained traffic noise at a high pitch in the daytime may be easily tolerated, but the low pitch rumble of an occasional truck is generally a noticeable disturbance.

## The difference between a shout and a thump

In a building, there are two distinct kinds of noises, which spread in different ways – airborne noise and impact noise.

As the name implies, airborne noise travels through the air (e.g. conversation, music), whereas impact noise is a vibration that travels through the structure of the building. Typical examples include thumping feet upstairs, the grinding of a waste disposer, banging of doors etc.

## Planning for Noise Control

Effective noise control starts with the layout of your home. It may not be necessary to spend a lot of money on extra noise control products if you think about possible sources of noise disturbance in your home and plan the layout accordingly.

There are two simple steps you need to work through when thinking about noise control:

### Step 1 – Design

Keep in mind what noise you may have to deal with when planning the layout of your home. Try to keep quiet rooms and noisy rooms apart.

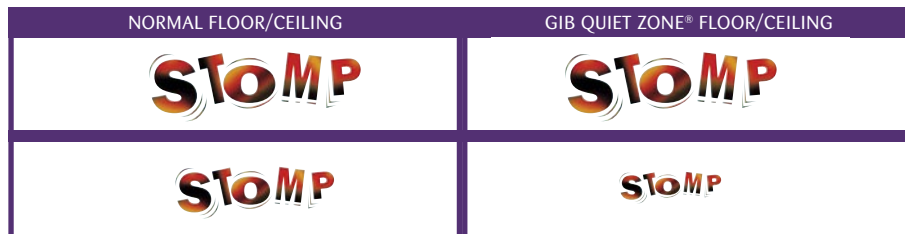
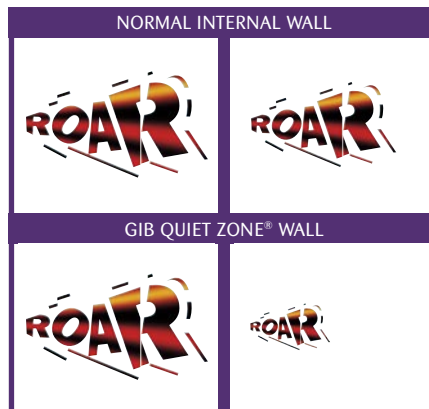
### Step 2 – Install Noise Control systems

There will invariably be areas in your home where the layout results in potential noise problems. Install a GIB Quiet Zone® in these areas.

## How much quieter can I make my home?

With a GIB Quiet Zone® the level of perceived volume will be reduced by approximately half compared to standard construction. This satisfies the majority of homeowner requirements.

These two diagrams are visual examples of the level of noise reduction you can expect from a GIB Quiet Zone® Solution.



## The best time to install noise control is when you build

It is much easier and more cost effective to install GIB® Noise Control when a home is being built. Adding it on afterwards is generally more difficult and expensive. However, if you are planning layout changes in an existing home, GIB® Noise Control Solutions can provide significant improvements if carefully planned and correctly installed.



With careful planning, noisy and quiet activities can be accommodated in the same house.

## Understanding the lingo

For people who are not technically minded, here's what the technical terms mean.

### Decibel (dB)

How sound levels are measured. An increase of 10dB is heard as approximately twice as loud.

### Low frequency

e.g. low bass sounds. Low frequency is easily transmitted over long distance and is usually a source of annoyance.

### High frequency

e.g. high, piercing sound. Higher frequencies are easier to tolerate, as the human ear is less sensitive to them.

### Ambient sound

General sound generated from the environment around you. Over the years the average ambient noise levels have increased due to busier lifestyles.

### Airborne noise

Undesirable sound that travels through the air.

### Impact noise

Undesirable sound and vibration that travels through the structure of the home.

### STC rating

The Sound Transmission Class (STC) rating is the measure of how effectively a wall or ceiling can reduce airborne sound transmission between rooms. A normal wall in a home has a rating of STC36. A GIB Quiet Zone® wall will have a rating of STC45. Further noise control measures for home theatre can achieve up to STC59.

Increasing the STC rating by 10 will reduce perceived noise by approximately half.

### IIC rating

The Impact Insulation Class (IIC) rating is the measure of how effectively a wall or floor/ceiling can reduce impact noise transmission between rooms.

## Your personal sound check

Use these thoughts as a prompt to see how noise may affect the home you're building.

### Location

How close is the home to neighbours and traffic? Infill housing and inner city apartments mean we are living closer together and are therefore more exposed to noise from traffic, shops, cafes etc.

### Design

Is it a 2-storey home? Sections nowadays are much smaller than the quarter acre plots we grew up with. A smaller section often dictates 2-storey design where upstairs noise may interfere with downstairs living.

### Working from home

More people are working from home and require peace and quiet.

### Children

Social trends mean children tend to leave the nest much later in life (and they don't get any quieter!)

### In home entertainment

New technology has seen a huge surge in the variety of in-home entertainment we enjoy (or despise, depending on your mood); home theatre, video and computer games, surround sound etc.

# Fundamentals of Noise Control

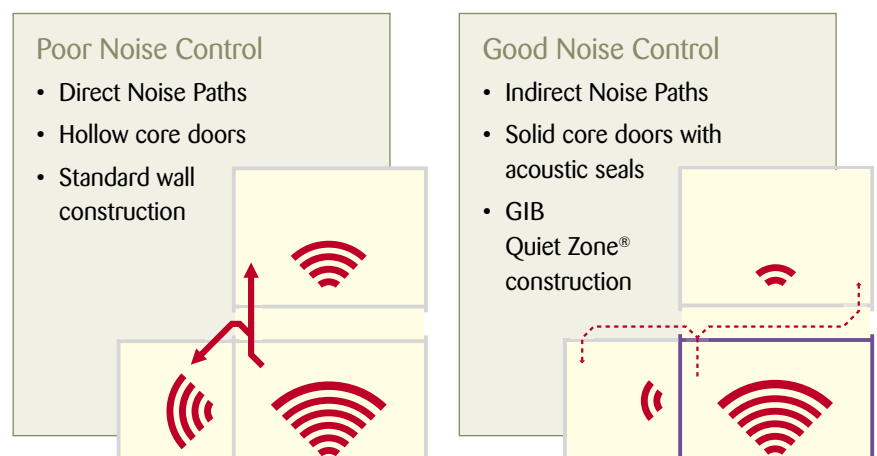
Noise control is a two way street. Sometimes, you want to stop noise from other people and other sources reaching you. Other times, you want to prevent the sound you're making or enjoying from disturbing the rest of the family, or your neighbours.

A modern home should be designed to ensure that certain rooms can be isolated from the intrusion of noise (e.g. master bedroom, studies, and nurseries). Similarly, you'll also want to consider which rooms will be sources of noise that the whole family may not want to hear (e.g. laundry, bathrooms, entertainment rooms) or that your guests may not want to hear (e.g. toilets flushing).

## Good design

First, identify or anticipate the problem as best you can. Is the noise coming from outside? Is it loud music (airborne noise) or children banging around in the next room or upstairs (impact noise)?

- Try and group similar 'use' rooms together:
  - Quiet rooms: e.g. bedrooms and studies
  - Living Rooms: e.g. lounge, dining, home cinema, rumpus
  - Functional rooms: e.g. kitchens, laundries, bathrooms, toilets.
- Position bedrooms as far away from living areas as possible.
- If there is a busy road close by, or other obvious noise sources, make sure bedrooms, living areas and studies are located as far away as possible from these noise sources.
- Use "sound lobbies" to create a buffer zone for noise in your home. Most homes have them in the guise of foyers, corridors or hallways. Check your plans carefully to ensure direct noise pathways are eliminated. Thoughtful placement of doors can make a big difference (see diagram).



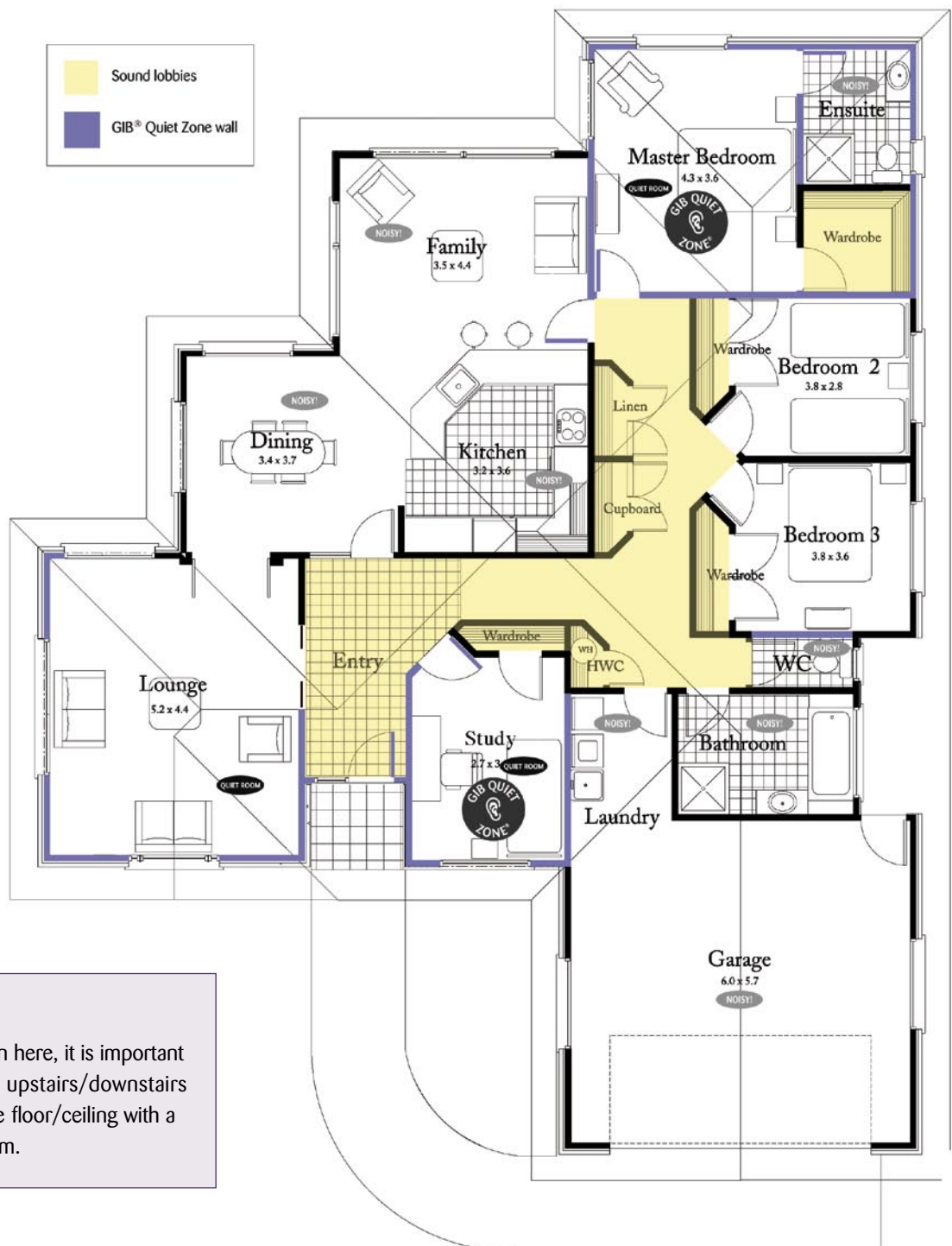
## Incorporating noise control

Because of design constraints and other issues, there will invariably be areas in your home where the layout results in potential noise problems. Install a GIB Quiet Zone® in these areas.

### Specify Noise Control on your plan

- Plan from an early stage
- Decide which areas are likely to be noisy and which areas need to be quiet
- Identify which rooms or walls may need noise control
- Mark these on your plan and talk to your designer/builder

For more detailed specification tips, refer to the “Your New Home Specification Workbook.”



#### Upstairs Noise

Although not shown here, it is important to identify possible upstairs/downstairs noise and treat the floor/ceiling with a noise control system.

# The complete solution

Imagine that the room to be treated for noise control is going to be filled with water. Where would the water leak from the room? Noise will leak into or out of a room in much the same way, so you must address these leaks in order to achieve effective noise

control. When installing a GIB Quiet Zone®, the whole barrier, including walls, floor, ceiling, windows, vents and doors must be treated equally. Any weak point will render the other measures less effective.

## GIB Quiet Zone® Room

### Walls

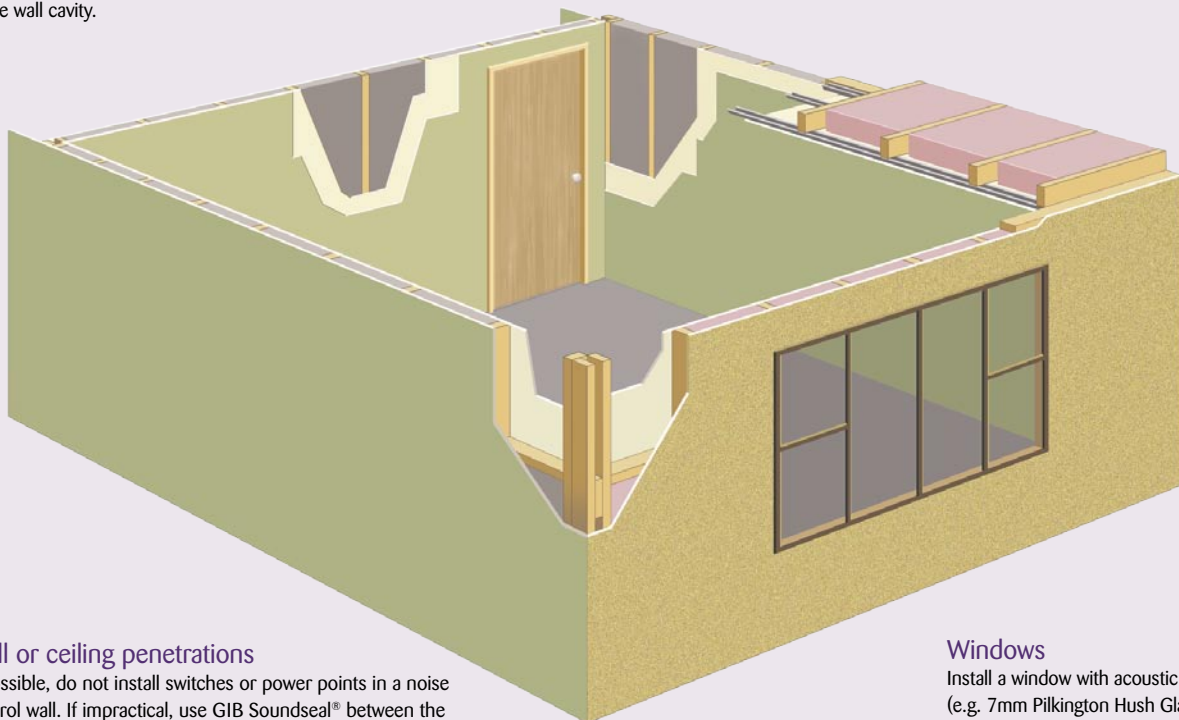
2 layers of 10mm GIB Noiseline® on one side of the wall and 1 layer of 10mm GIB Noiseline® on the other side of the wall with glasswool acoustic insulation (e.g. Pink® Batts® Silencer®) in the wall cavity.

### Doors

Use a solid core door with rubber acoustic seals fitted around the perimeter of the doors and retractable self closing sound floor seal on the base of the door.

### Ceilings

1 layer of 13mm GIB Noiseline® on GIB® Rondo® Metal Ceiling Battens at 600mm centres with glasswool insulation (e.g. Pink® Batts®).



### Wall or ceiling penetrations

If possible, do not install switches or power points in a noise control wall. If impractical, use GIB Soundseal® between the plasterboard and the edge of the flush box and around the hole through which the wires enter the box. Place electrical fittings in different stud bays and not back to back. If you choose to use downlights ensure they are acoustically rated.

### Windows

Install a window with acoustic glass (e.g. 7mm Pilkington Hush Glass®) to reduce external noise.

### GIB Soundseal®

Install this specially formulated acoustic sealant on the following junctions – wall/ceiling, wall/floor, internal corners, window frame/wall frame, door frame/wall frame.

## A combination of measures is required for effective noise control

There is a common misconception that acoustic insulation or acoustic plasterboard by itself will provide sufficient noise control. While these products by themselves will provide some level of sound reduction, it is only part of the solution. A combination of measures is the reason why a GIB Quiet Zone® is so effective.

Note: A GIB Quiet Zone® will reduce noise significantly, but will not completely eliminate it. The key is to reduce noise to an acceptable level.


# Choosing the right level of noise control

A normal internal wall will have a Sound Transmission Class rating of STC36 (remember, STC rates the ability of a wall or ceiling to reduce airborne sound transmission between rooms).

Following extensive testing and experience with new homes built over the last decade, the consensus is that a noise control wall with a rating of STC45 is ideal for most residential situations.

If higher levels of noise control are required, refer to the GIB® Noise Control Systems technical literature, call 0800 442 4663 or go to [www.gib.co.nz](http://www.gib.co.nz)

An example of such a higher-rated system is shown later in this book (see noise control for home theatre, page 15).



**Standard timber frame internal wall**  
A standard internal timber frame wall construction provides minimal sound control between rooms, making it easy to hear loud speech and going on in the next room. It has an STC rating of 36.



**GIB Quiet Zone® internal wall**  
Bulking up the wall by increasing the mass is an effective way of reducing noise (especially low frequency noise). Using two layers of GIB Noiseline® on one side, and one layer the other side (with Pink® Batts® Silencer® glasswool acoustic insulation) increases the STC rating to above 45.

## Three key steps to effective noise control

Block	Bulk	Isolate
Block all gaps that sound can potentially leak through – e.g. around doors, windows and wall perimeters with acoustic sealants and door seals etc.	Increase the sound reducing ability of the walls, ceilings, windows and doors by increasing their density. Bulk up the wall with two layers of GIB Noiseline® and by installing Pink® Batts® Silencer® in the cavity. Install solid core doors with acoustic seals and Pilkington Hush Glass® in windows.	Isolate different parts of the house structure from each other to cut off the path that sound vibrations can travel through.

# Renovating for peace and quiet

Many older homes were built in an era when ambient noise levels were much lower than today.

For example, the first owners of a classic Kiwi villa may not have had a neighbour for miles. Certainly, they wouldn't have had the noise disturbances we face today, such as blaring tv's and stereos, traffic noise from motorways, helicopters, planes...

Controlling noise in an older home requires a very careful, methodical approach. The key is to correctly identify the specific noise problem or problems you want to deal with.

What sort of noise problem do you have? Interior or Exterior? Airborne or structural? Is it a constant noise source, periodic or random?

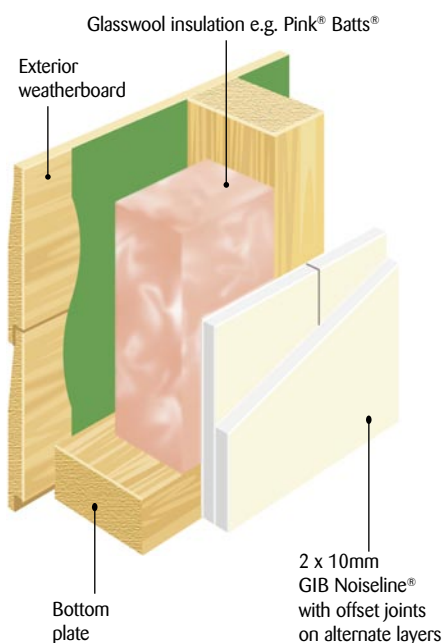
## Exterior noise

If your home was built before the late 1970s, chances are it is not insulated. If it has a weatherboard type exterior or an iron roof, it may have very poor noise reducing properties.

Installing insulation in your ceiling and blocking all gaps where sound can leak through will not only help reduce exterior noise, it will also help keep your house warmer and eliminate draughts.

If further noise control is required, you may have to consider removing your interior linings, adding insulation and relining with GIB Noiseline® taking care to seal all joints with GIB Soundseal®.

### GIB Quiet Zone® exterior wall



### Creaking floors

Many houses have floors that creak in certain areas. This is generally caused by movement between the flooring material and the floor joists. This movement can be the result of poor installation, timber movement, shrinkage or loose fasteners in floor or framing.

Where creaking is a problem, refixing the floor with screws may help.

### Plumbing noise

Plumbing noise is often a problem in older homes with the sound of water often disturbing the peace at night. Secure and insulate all plumbing lines where possible to avoid vibrations in the structure.

### Reverberation noise

Many old homes are made of hard woods with polished timber floors and high ceilings with large open spaces. Noise generated within these homes can be amplified and reverberate through the home more readily. Soft furnishings, wall hangings, carpets and rugs can help reduce the reverberation.



## Interior noise

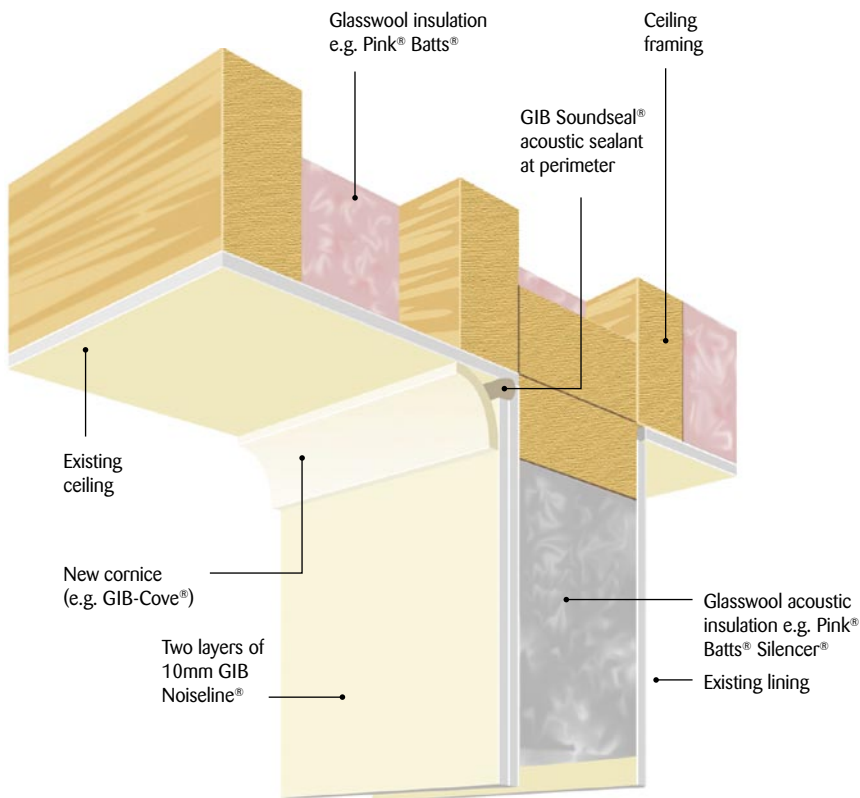
Interior noise issues may be caused by a number of things. It could be thin walls, reverberation or flanking paths. It may take some time to identify which of these problems you have to deal to.

Interior noise moving from room to room may be travelling along a flanking path through ceiling and floor construction. Before you take down any linings, try insulating your ceiling space and check if you can hear any improvement.

If noise is still a problem, it is recommended to remove and reline with 2 layers of 10mm GIB Noiseline®.

Remember to seal all perimeter joints and penetrations with GIB Soundseal®.

### GIB Quiet Zone® internal wall



### Floor/ceiling noise

Floor/ceiling noise is often very difficult to control and may involve complications if the noise is being transmitted through a load bearing wall. If you are unsure of the extent of noise control you require, you should contact an acoustic consultant for advice.

#### Additions

When creating a new living space under an existing home, e.g. a granny flat etc, an inter-tenancy floor/ceiling may need to be built in accordance with NZ Building Code requirements. For more information refer to the GIB® Project Support Team 0800 442 4663 or visit [www.consumerbuild.org.nz](http://www.consumerbuild.org.nz)

## A step by step approach

### Internal noise

- 1 Use soft furnishings, carpet etc to reduce noise reverberating through the house.
- 2 Doors are often the weak point, so increase the performance by installing acoustic seals around and under doors.
- 3 Insulate ceiling space to reduce noise travelling across the ceiling space and into adjacent rooms.
- 4 Remove wall linings and install a GIB Quiet Zone®.

### Exterior noise

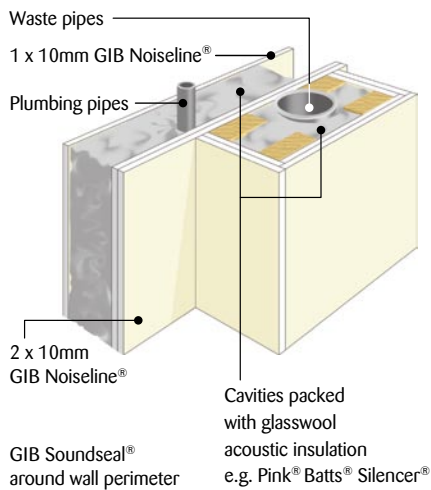
- 1 Check joinery for gaps and seal around all windows. Use acoustic door seals on external doors.
- 2 Use heavy drapery on windows to block out noise.
- 3 An external barrier such as a fence or hedge helps control traffic noise.
- 4 Install insulation in ceiling space to reduce noise coming in through the roof space.
- 5 Install Pilkington Hush Glass® in windows.
- 6 Remove internal linings, install insulation and reline with 2 layers of GIB Noiseline®.

### Upstairs/downstairs noise

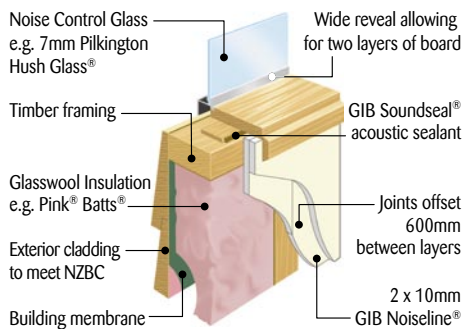
- 1 Identify the problem.
- 2 Is it coming directly through the ceiling or structurally along the floor, through the wall?
- 3 Address creaking by removing floor covering and securing any loose floorboards to the joists.
- 4 Footsteps can be hushed by installing a thick carpet and underlay.
- 5 Remove downstairs ceiling and install a GIB Quiet Zone® floor/ceiling.

# GIB Quiet Zone<sup>®</sup> specifications

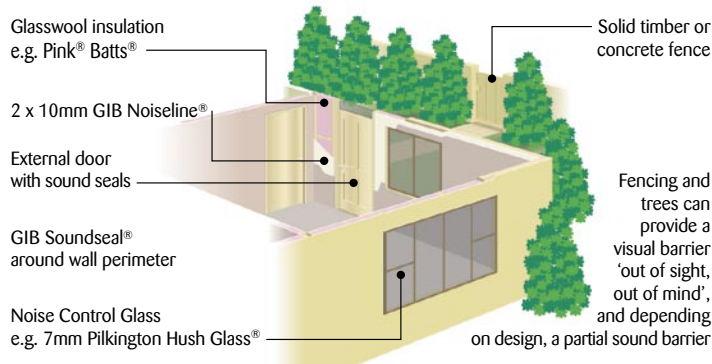
## Dealing with plumbing noise



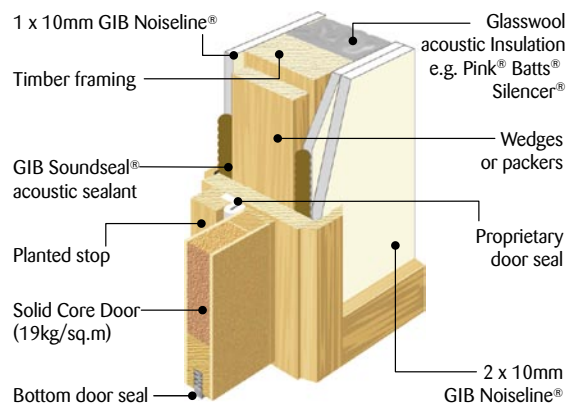
## Window detail



## Exterior noise

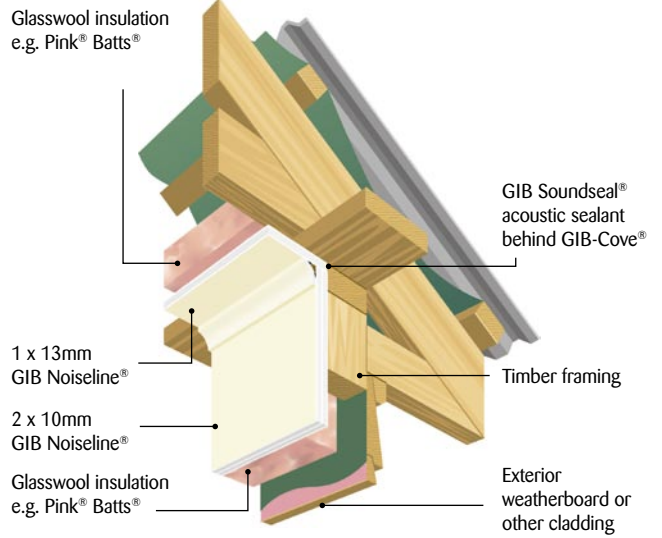


## GIB Quiet Zone<sup>®</sup> door system

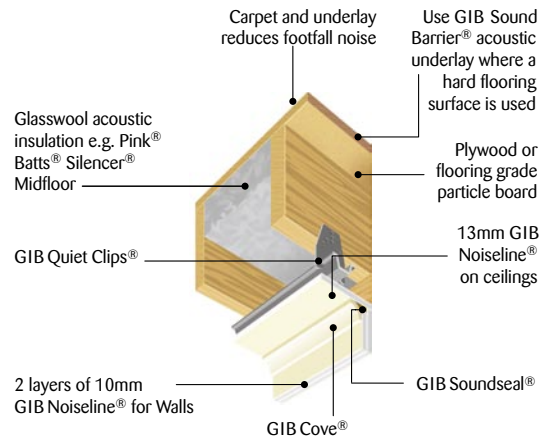




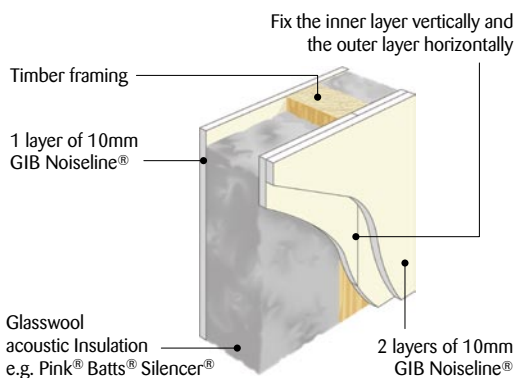
**Ceiling and roof sound insulation detail**



**GIB Quiet Zone® floor/ceiling**

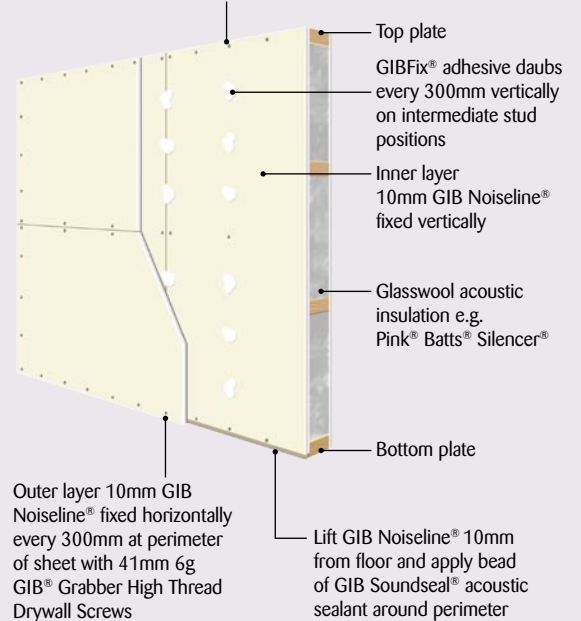


**GIB Quiet Zone® wall**



**Installing a GIB Quiet Zone®**

Fix inner layer of GIB Noiseline® at sheet perimeter and intermediate studs with 32mm 6g GIB® Grabber® High Thread Drywall Screws at 300mm centres



# GIB Quiet Zone<sup>®</sup> specifications cont'd

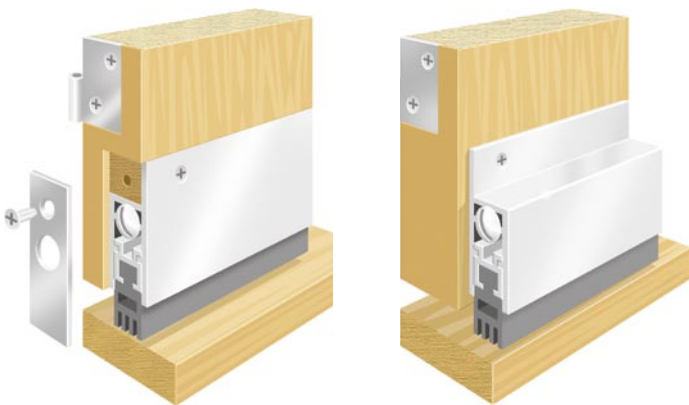
## Windows and doors

Often, doors and windows are the limiting factor of any wall system; internal or external. That is why it is important to treat these elements as part of a GIB Quiet Zone<sup>®</sup>.

Thickness and density are the main factors that will improve the noise control performance of a door, but layout and placement are often just as important.

A solid core door with acoustic seals can perform up to 9 STC points better than a standard hollow core door. This difference reduces the perceived loudness by half.

Generally, for residential purposes a well sealed solid core door with a bottom seal will be sufficient to maintain noise control effectiveness.



Bottom door seals can be installed within the panels of a new door (left), or as a retrofit to an existing door (right).

With regards to windows we recommend noise control glazing, such as 7mm Pilkington Hush Glass<sup>®</sup>, which reduces perceived loudness by approximately 40%.

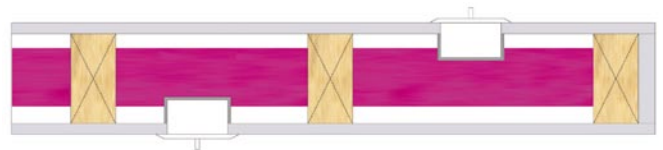
If the area of glazing on the noise control wall exceeds 20% of the total wall area, 11mm Hush Glass is recommended.

Ranch sliders are not recommended as an external opening for a GIB Quiet Zone<sup>®</sup> as it is difficult to get them appropriately sealed for noise control.

## Electrical services

When positioned back to back, electrical power outlets can reduce the STC rating of the wall by up to 6 points.

Avoid positioning power outlets back to back. Talk to your electrician about staggering light switch and power outlet sockets.



Try to avoid back to back power points by planning in staggered placement of flushboxes as shown above

## Downlights and ventilation

It is not ideal to have penetrations (holes) in a GIB Quiet Zone<sup>®</sup> wall or ceiling. However there are some options available if you wish to install downlights for aesthetic consistency.

- Install downlights in a false ceiling or bulkhead.
- Ensure the downlights are acoustically rated.

Most electrical distributors have a range of downlights which are acoustically rated up to STC 55, when installed to the manufacturers specification and sealed with GIB Soundseal<sup>®</sup>.

It may be necessary to install mechanical ventilation in a GIB Quiet Zone<sup>®</sup>. Choose a system which remains relatively quiet while operating. Ensure that the inlet and outlet penetrations are not back to back and if necessary insulate any ducting.

# Noise Control for home theatres

With modern technology, more homeowners are opting for dedicated home theatre rooms.

The sheer power and clarity of sound that some systems produce can create an authentic cinema atmosphere in your home.

Commercial cinema rooms are carefully sound contained and acoustically treated to screen out external noise and keep sound within the room.

The same principles apply to home theatre.

“It pays to consider the location and design of your home theatre room first, before planning the rest of your home”

## How sound pollution can affect your home theatre experience

Noise from within the house can intrude into the home theatre – think of footsteps across the ceiling, teenagers playing musical equipment, or toilets flushing in adjacent rooms.

Noise from the external environment like the street and neighbourhood (cars, lawn mowers, etc) is often an issue.

Sound from inside the home theatre can also spill out into the rest of the house and neighbourhood, waking sleeping children and causing disputes with neighbours.

The first and most essential step to good noise control is good design and layout. This is even more crucial for a home theatre situation. Retracing your steps and attempting to fix problems after you have built is not only expensive and time consuming, but may be futile as the location of the room could be the primary problem.

## Movie lovers follow their dreams

Despite an overwhelming passion for cinema, Martin and Fiona Fenwick have given up going out to the movies. They'd much rather stay at home.

“What we have here is much better than what the public cinemas can offer,” says Martin.

“A fantastic image, superior sound quality and best of all, we don't have to put up with annoying chatter or people's cellphones going off”.

Avid movie goers for most of their lives, Martin and Fiona recently moved into their new home where the main feature is a state-of-the-art home theatre.

Explains Martin: “When Fiona and I met, our big thing was going to movies and when we decided to build, we became quite fixated on home cinema.

It was our dream. We decided that you only do it once, so we might as well do it properly”.

Designed like a mini cinema right down to the décor, the room features extensive use of GIB® Noise Control systems and a number of measures to enhance acoustics.

The consultant who supervised the job, Matthew Hall of Living Systems NZ, compliments Martin and Fiona on their planning and thoroughness.



“Clients usually focus on the audio visual equipment and other technological components and the room itself is not thought about much.”

While it is specifically set up as a home cinema, the room has a multitude of other uses.

“It's a great place for me to practice guitar”, says Martin “because I can wind it up really loud without disturbing anyone.

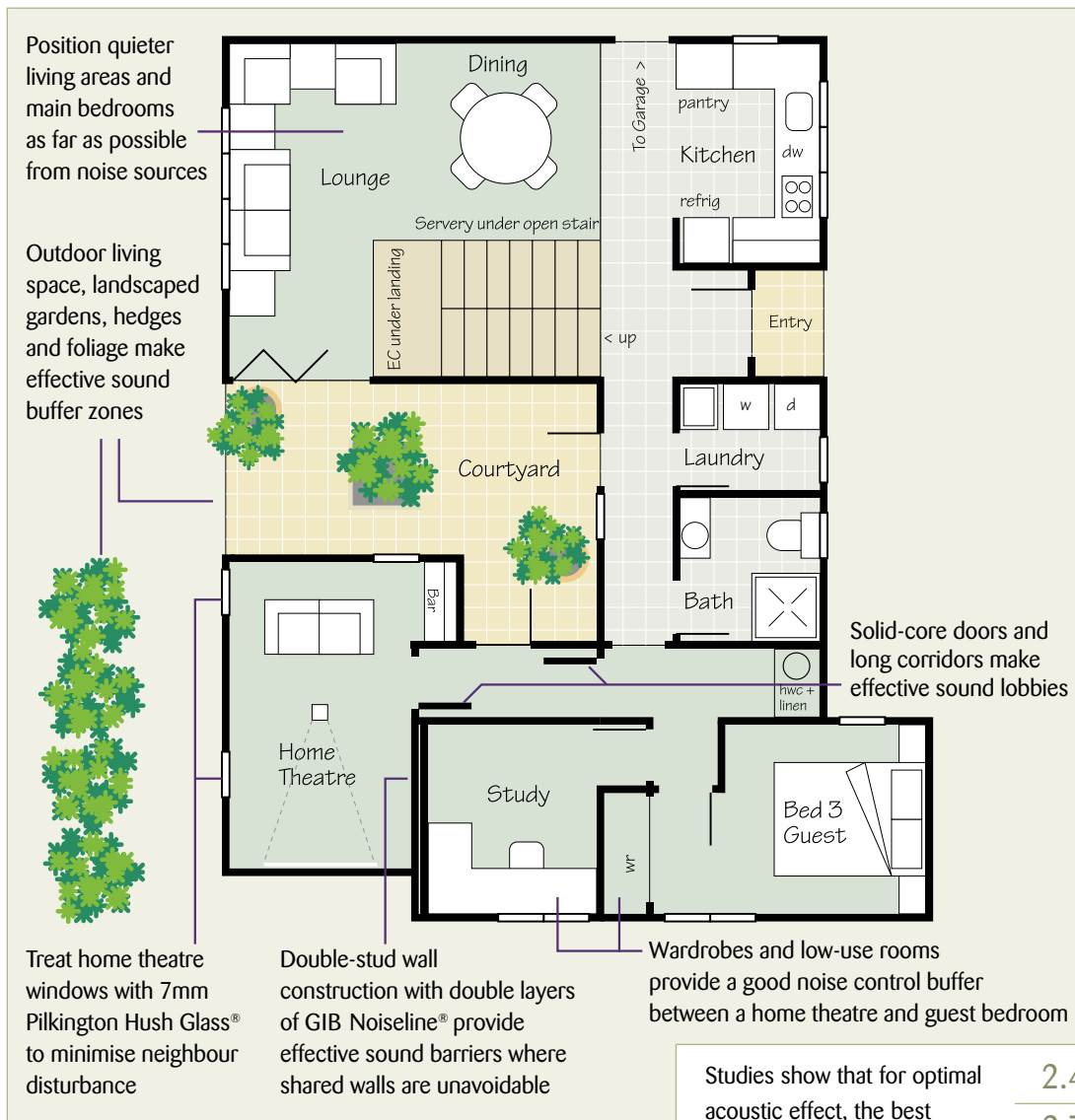
“It's the same for the kids. Playstation® games, Singstar (like Karaoke)...they have a ball and can be as rowdy as they like”.

Martin and Fiona's home cinema has everything going for it. Including a happy ending.

“We're thrilled”, says Martin. “It's even better than we dreamed”.

# Home theatre design and layout tips

- If possible, create discontinuity between the home theatre room and adjacent living areas with different ceiling heights.
- Consider the weakest links in noise control, such as direct sound passages from window-to-window and door-to-door – if possible, reposition doors and windows to create indirect sound passages.
- Seal edges of doors and windows against noise transmission with acoustic seals.
- Try not to position the home theatre directly above or below bedrooms, and isolate it as much as possible from quiet living areas.
- Thick woollen rugs or carpet over heavy-duty felt underlay is superior to thin or synthetic floor coverings for reducing reverberation.



Studies show that for optimal acoustic effect, the best dimensions for a media room with a stud height of:	<b>2.4m</b> is 3.8m x 5.6m
	<b>2.7m</b> is 4.3m x 6.3m
	<b>3.0m</b> is 4.8m x 7.0m

REFERENCE: SEPMAYER ROOM RATIOS

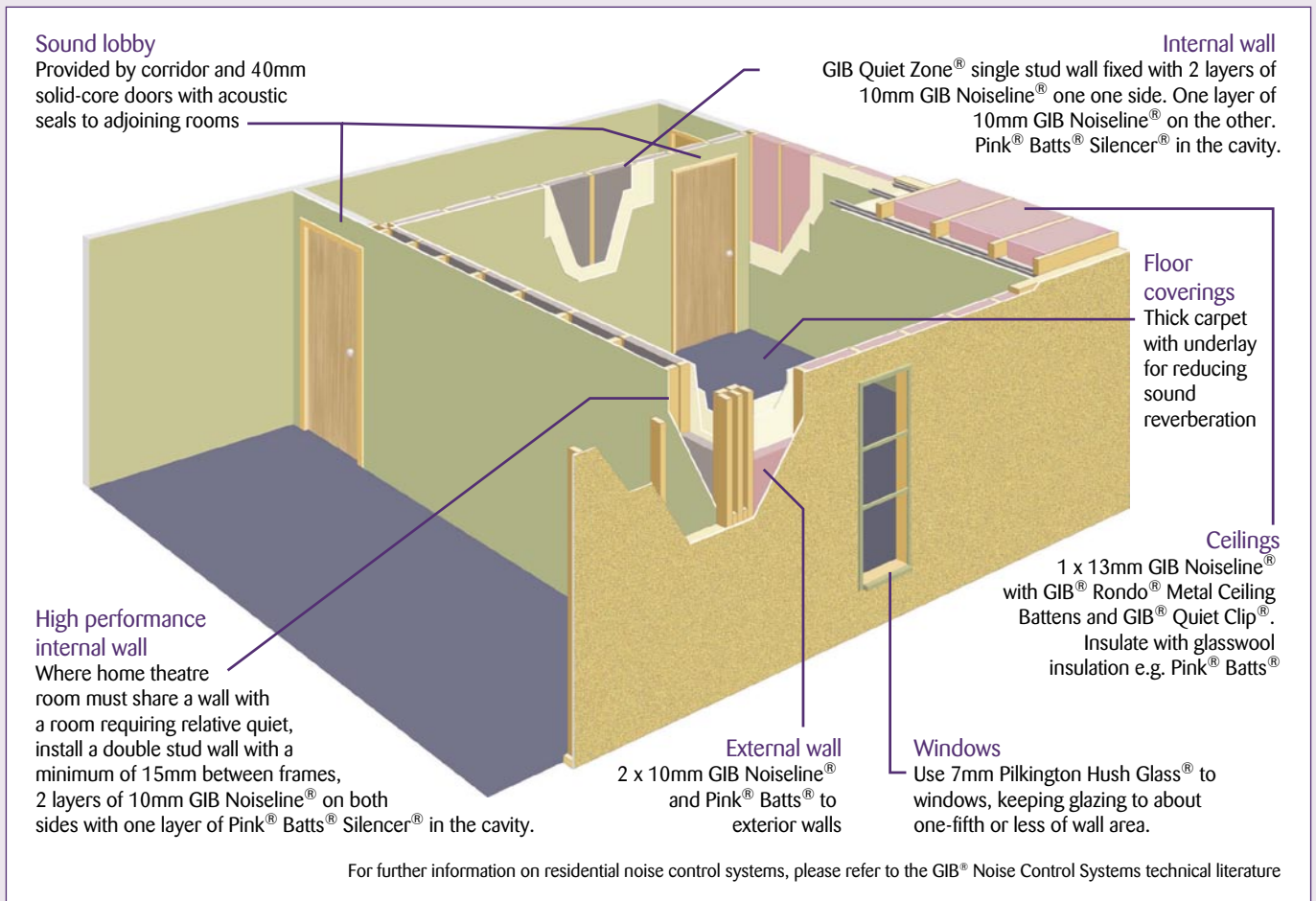
NOTE: Sliding doors and windows are very difficult to seal off properly and may not be the best option acoustically. We recommend latched windows with 7mm Pilkington Hush Glass® and restricting the amount of glazing to up to 20% of the wall area. If a greater area of glazing is required we recommend 11mm Pilkington Hush Glass® for up to 50% of the wall area.

Some form of mechanical ventilation may be required to

improve airflow. We recommend fitting your home theatre with a small, quiet air-conditioning unit to maintain a comfortable environment.

For more information on performance and installation specification of higher performing systems, please refer to the GIB® Noise Control Systems technical literature.

# Recommended home theatre solution



## Essential tips

### Doors

These can often be the weak link of the system. Special acoustic doors are available. Where there are two doors separating the room from other living areas, creating a sound lobby and installing two solid core doors may be necessary to achieve the best results.

### Insulation

For the roof space, installing 110mm thick Pink® Batts® with an R value of 2.6 or higher will provide better thermal insulation as well as acoustic performance.

### Windows

It is recommended that home theatre windows should be made of 7mm Pilkington Hush Glass®. Laminated or double glazed windows with thick fabric curtains to reduce reverberation. This will also help to keep light from reflecting off the screen.

### Lighting

There are many alternatives to recessed lighting, such as track-mounted lighting. Some will create a soft ambient lighting effect to enhance the viewing experience. Installing a night light near the door will allow guests to enter and leave without disrupting the film. Place lights carefully so that they do not reflect off the screen or shine in people's eyes. Some lighting fixtures and controllers emit a buzzing noise that will interfere with home theatre equipment. Work with a lighting/electrical consultant to prevent such problems.

### Acoustics

Control reverberation by avoiding exposed timber floors and large window areas. Use upholstered furniture and other soft furnishings to help absorb sound within the room. Some experimentation may be necessary to reduce reverberation. Extreme cases like bare masonry walls may require acoustic panels for the desired effect for some home theatres.

**NOTE** Specialist AV installers have the necessary expertise to customise your equipment to the layout of the room. Screen placement, furniture arrangement, automated lighting, drapery, etc. all vary according to the individual's taste, requirements and budget. Getting expert advice is the best way to ensure all your requirements for a top-class home entertainment room are met.



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