Boral CinemaZone™ Fact Sheet

Design

Windows

Like doorways, windows can be a significant source of sound leakage. For maximum isolation, windows should either be removed or built over internally - leaving the house facade unaffected. If natural lighting is required then consider fitting a secondary 10mm glazed window to the internal wall. Thick wool curtains are good for acoustic absorption but not for preventing sound transmission.

Ventilation

Air movement in a CinemaZone™ room is almost reduced to nil because of the acoustic sealing that makes a room virtually airtight. Some form of mechanical ventilation will be required to improve airflow.

Boral recommends fitting a CinemaZone™ room with at least one fan-assisted inlet vent and one exhaust vent. The inlet vent should draw air from an adjoining habitable room or from the outside. It should not draw air from a kitchen, bathroom, toilet or laundry or from a room that CinemaZone™ air is being exhausted into.

The exhaust ventilation duct, similar to the inlet duct illustrated in the 'Construction Fact Sheet' (fan optional), may also be fitted to the ceiling.

Boral suggests home cinemas achieve at least six air changes per hour, however, this will depend on the volume of the room and the number of people intended to use it. Larger installations may require the advice of an air-conditioning professional.

Lighting

Light fittings need to be carefully considered as any lining penetration will seriously compromise sound isolation. Recessed downlights should be avoided due to acoustic leakage. Track mounted light fittings fitted to the surface are an effective alternative.

An emergency light is a sensible inclusion and may help to overcome a Building Surveyor's objections if it is proposed to remove or build over a window.

Acoustic sealants

All gaps and floor, wall, ceiling, door, window, vent and service junctions should be sealed with an acoustic filler such as FireSound™.

Sound absorptive panels

Sound absorptive panels are made from high quality acoustic absorption materials that improve the listening experience when selectively positioned around the home cinema. They are typically manufactured from compressed fibreglass or foam and can be covered in a wide variety of fabrics, colours and textures. Refer to TecASSIST for retail outlets or construction details.

Floor coverings

Thick wool carpet over felt underlay is considerably more effective at absorbing sound than thin or synthetic carpets. Polished timber floors and tiles don't perform nearly as well, as they are highly reflective, increase reverberation and have a detrimental affect on sound quality.

The vision

Home cinemas can include conventional television or powerful projection systems. In both cases, it is important to utilize darker colours such as matt black to obtain the maximum visual contrast and avoid screen reflection.
It is often necessary to black out windows, particularly if the cinema is to be used during the day, and consideration should be given to the location and direction of ambient lighting.

Boral CinemaZone™ Fact Sheet

Design

Recommended room proportions

	Height(m)	Width(m)	Depth(m)
Option 1 ratio	1.00	1.14	1.39
Option 2 ratio	1.00	1.28	1.54
Option 3 ratio	1.00	1.60	2.33

As an example, if your ceiling height is 2.7m, using the 'Option 1' ratio above, the width of the room should be 3.1m (1.14 x 2.7m) and the depth should be 3.8m (1.39 x 2.7m).

From Sepmeyer L.W. Computed frequency and angular distribution of the normal modes of vibration in rectangular room, Journal of the Acoustic Society of America, Volume 37, Number 3 (March 1965) Pages 413-423 and extracted from Widescreen Review June/July 1994 pg 65.

For more information on CinemaZone™ or to request the other free fact sheets in this series, call Boral Plasterboard TecASSIST on 1800 811 222 for a fax or email copy or visit the website: www.boral.com.au/cinemazone

Performance

Sound advice
- How Boral CinemaZone™ works
- Sound and Noise levels
  - * Who it affects
  - * How to control it
- The 'Sweet Spot'

Construct

New, extension or conversion
- how to build a Boral CinemaZone™ System
- Walls
- Floors
- Windows
- Ventilation
- Ceiling
- Doors
- Lighting

BORAL CinemaZone™

Boral CinemaZone™ Fact Sheet

Design

The home cinema experience

Ask yourself…

- Do I live in a quiet neighbourhood?
- Do I live in a noisy neighbourhood?
- Do I have quiet zones in my house?
- Do I use my sound system late at night?
- Do I like it loud?
- Do I live in a high rainfall area?
- Do I have to comply with local noise restrictions?

If you can answer Y E S to any of the above then you need Boral CinemaZone™.

Successful Design

While home cinema can be enjoyed in the family lounge room, for many people a purpose-designed space will be desired. Successful home cinema design is not a matter of chance but instead relies upon scientific data for choosing the correct room proportions and acoustic treatment. In order to achieve the high level of acoustic performance needed for your new home cinema, the following areas need to be addressed:

- Room Proportions
  Most rooms are often too small to provide smooth sound, particularly at low frequencies. A room greater than 50m^3 volume is recommended to ensure the best reproduction of bass frequencies. Ideally, the width-to-length and width-to-height room ratios should also be considered. The choice of room size has been simplified thanks to the research of L.W. Sepmeyer who established a direct relationship between the room proportions and acoustic performance. His recommendations (published in the Journal of the Acoustic Society of America) are included at the end of this publication.
- Sound Isolation
  CinemaZone™ wall and ceiling systems are required to prevent sound transmission out of and into a home cinema room. CinemaZone™ ceiling systems also minimise the noise created in the room by heavy rain on the roof.
- Sound Reverberation
  Sound reverberation in a room is also an important factor and this can be controlled by applying an acoustic absorber to approximately 30% of the wall surface area.
- Sound Leakage
  All door, window, vent and service openings need to be sealed to minimise sound leakage.

Control your Reverberation

If your intended CinemaZone™ room:

- has an exposed timber floor
- has large window areas
- does not have wool curtains
- does not have heavy cloth-covered sound absorbent furniture

then you need to consider ways of minimising potentially excessive reverberation.
Reverberation refers to the persistence of sound in a room after the source of sound has stopped. This persistence is a result of repeated reflections of sound waves that behave like an echo. Long reverberation times produce fuzzy, unclear sounds while short reverberation times result in dead, flat sounds.

The ideal reverberation time of 0.3 to 0.4 seconds for a home cinema can be achieved by using sound absorption panels (living rooms typically range from 0.5 -1 second). Some experimentation with panel placement will be required and the final positioning will depend on the speaker and seating locations.

Experience has shown that seating is best situated at a distance of about 3 or 4 times the screen height, away from the screen.

Boral CinemaZone™ Fact Sheet

Design

Council requirements

The home cinema is still classified as a habitable room and subject to the usual building regulations, however, due to its special design requirements, consideration should be given to the following:

- an exemption from natural lighting may be obtained if it can be demonstrated that the room will only be used as a home cinema
- mechanically assisted ventilation will be required in what is essentially an airtight room
- the minimum ceiling height of 2400mm may be able to be reduced in certain circumstances
- exit lighting with battery backup is an important safety feature, especially if there's no natural lighting
- a smoke alarm
- the noise impact objectives of the 'ResCode Standard B24' aim to contain noise that may affect other dwellings in multi-unit developments.

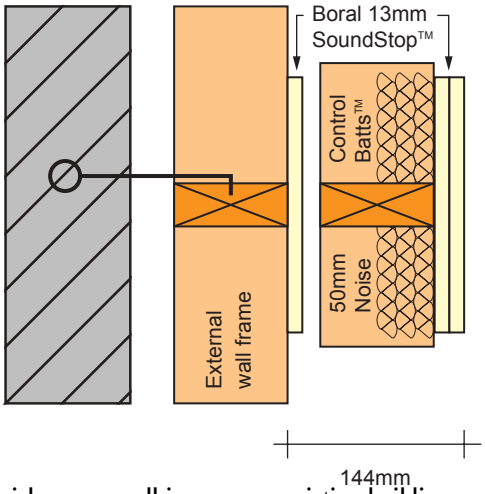
Boral Plasterboard recommends contacting a building surveyor regarding regulations and possible concessions before starting construction.

Floors

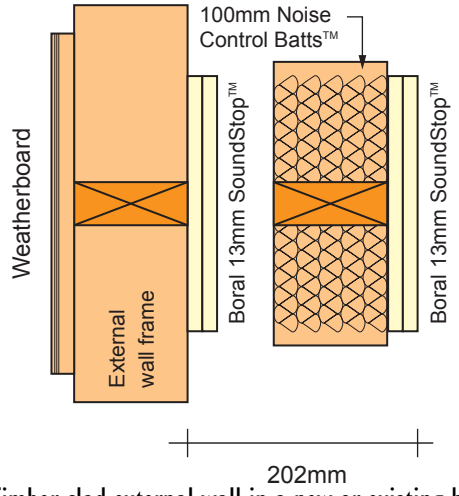
It is anticipated that most home cinemas will be constructed at ground-floor level. Houses built on a ground slab have a distinct advantage as the combination of concrete and earth is a good sound insulator. Houses built with a timber floor require additional treatment to prevent a condition known as flanking, where sound travels down through the floor, under a wall and up into an adjacent room.

Timber and upper-floor home cinema installations should be referred to the Boral Plasterboard TecASSIST help line on 1800 811 222.

CinemaZone™ External Walls



Brick veneer wall in a new or existing building



Timber clad external wall in a new or existing building

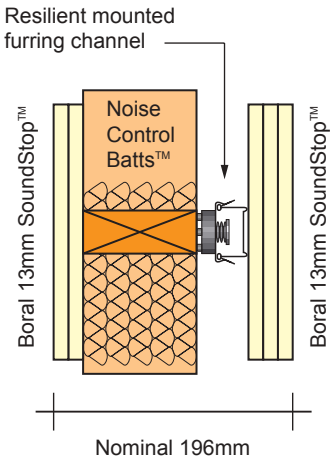
BORAL CinemaZone™

Boral CinemaZone™ Fact Sheet

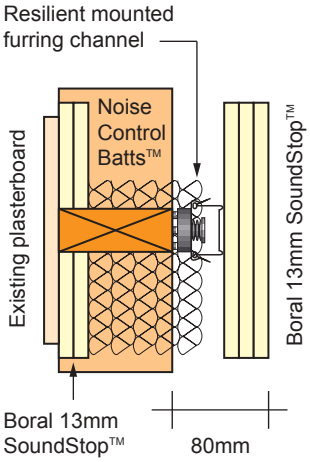
Design

CinemaZone™ Internal Walls

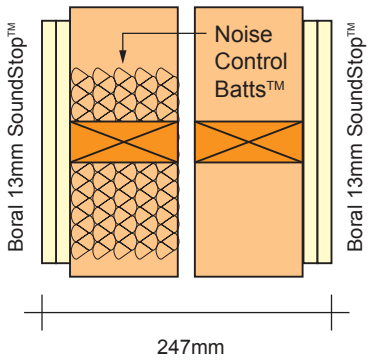
CinemaZone™ internal walls can be built in both single or double stud configurations with your choice largely dependent on the available space and construction preferences.



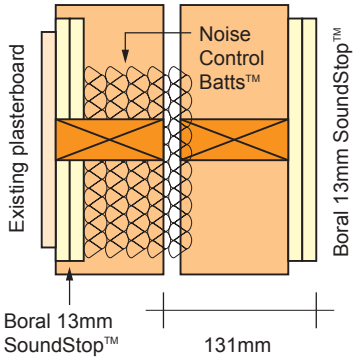
Single stud wall in a new building



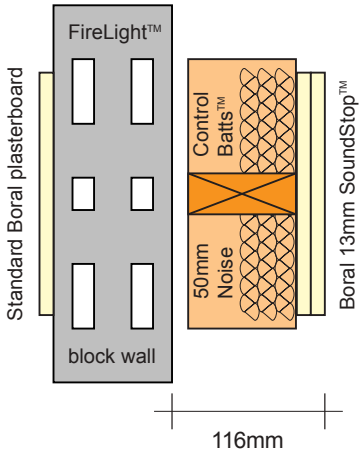
Single stud wall in an existing building



Double stud wall in a new building



Double stud wall in an existing building



Internal masonry wall using Boral FireLight™ bricks in a new or existing building*

*N.B. WA customers should contact Midland Brick for the appropriate product from their 'Special Performance' brick range.

BORAL

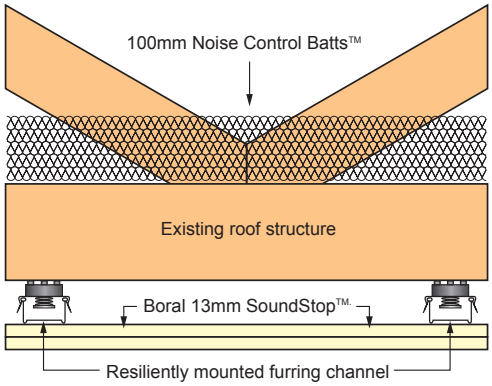
CinemaZone™

Boral CinemaZone™ Fact Sheet

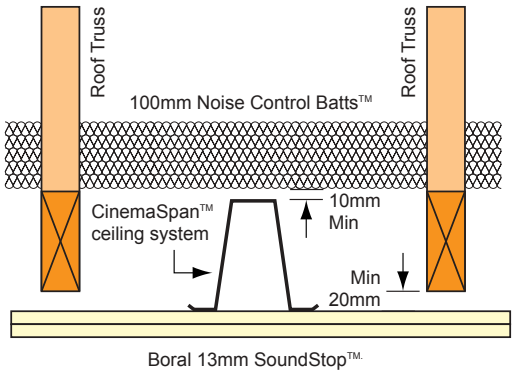
Design

CinemaZone™ Ceilings

The structural capacity of an existing ceiling needs to be evaluated before specifying a home cinema installation. Conventional timber pitched roof/ceilings will generally be capable of carrying an additional ceiling load. However, many truss roofs have been designed close to their load-bearing capacity and may need a separate ceiling support system such as the CinemaSpan™ ceiling system.



Resilient mounted ceiling



CinemaSpan™ ceiling system

BHP 120 Topspan 0.9mm BMT

Max height of roof space above CinemaZone™ ceiling	Maximum span (mm) of CinemaSpan™ joist when spaced at	
	450mm centres	600mm centres
Less than 1.2m	4210	4070
Greater than 1.2m	3620	3540

CinemaSpan™ is the subject of a patent application and should not be used with other than Boral Plasterboard™ products without the express written permission of Boral Plasterboard.

The CinemaSpan™ ceiling system utilizes BHP 120 Topspan 0.9mm BMT sections. CinemaSpan™ joists are to be fixed on to top plates within 50mm of a wall stud or an appropriately sized lintel.

For CinemaZone™ installations intended to be positioned below another floor, additional information is available from TecASSIST on 1800 811 222.

Doors

A door left untreated can seriously compromise the acoustic isolation of a home cinema space.

This can be avoided by:

- forming a sound lock between the cinema room and the rest of the house.
- fitting the cinema with 40mm solid core doors.
- fitting cinema doors with acoustic seals such as Raven RP94Si to the top and sides and Raven RP8 to the bottom.

A sound lock can be created by fitting a door to both sides of a door jamb. The void formed between the door faces and door stops becomes the soundlock. If this method is adopted, the door jamb will need to be split through the middle of the door stops and a 15mm gap formed. This gap, after filling with an acoustic sealant, will prevent sound being transmitted through the frame.