

### AAAC STAR RATING

When designing apartments and townhouses, consideration must be given to acoustic privacy between separate dwellings.

Information in this Fact Sheet has been sourced from the Association of Australian Acoustical Consultants (AAAC) Star Rating Guide. The acoustic terminology used in this Fact Sheet is explained in *Fact Sheet 11: Acoustic Terminology*.



### Building Code of Australia

The Building Code of Australia (BCA) provides technical requirements for the design and construction of buildings and structures, which includes some minimum acoustic requirements and deemed to satisfy constructions that will achieve these ratings. It should be noted that the current acoustic performance of the BCA requirements are relatively low and are often considered inadequate for residential developments. It is usually suggested that the BCA be regarded as a minimum for any development.

### AAAC Star Rating for Apartments and Townhouses

The Association of Australian Acoustical Consultants (AAAC) have been concerned for some time that there are no building regulations or standards that encompass all aspects of the acoustical qualities of apartments, townhouses and other multi-tenancy dwellings.

The Building Code of Australia (BCA) regulates minimum acceptable construction standards for buildings; however the BCA does not deal with other acoustical issues such as noise intrusion from outside or noise generated by building services. Although the BCA does set minimum standards for privacy, many members of the housing industry have interpreted these as absolute requirements, applicable to all types of dwelling. The result has been that owners of luxury apartments built to BCA standards have been dissatisfied with acoustic performances, which in their view are not appropriate for the price they have paid.



The objectives of the AAAC Star Rating system are to:

- provide guidance in the design process so that all important acoustical attributes are properly addressed;
- encourage consistency between the apparent quality of the design of apartments and the underlying acoustical quality of the structure; and
- allow a vendor or purchaser to apply an acoustical rating to a property for sale.

The rating system will not compete with established statutory or advisory codes such as the Building Code of Australia, AS/NZS Standards or local authority building ordinances. It is intended to be complementary.

The AAAC rating system considers the following aspects that influence the acoustic environment of an apartment/townhouse: external noise intrusion, services noise, sound and impact isolation. After construction is completed each acoustical attribute is separately rated. The overall rating for each of the three classifications is determined by the lowest score awarded to each attribute within that classification. A global acoustical quality rating is the average of the three ratings assigned to each classification. The AAAC standard is not enforceable but gives good guidance to the appropriateness of acoustical standards around Australia.



An AAAC Rating Certificate can only be issued by an AAAC member firm.

#### Wall Separations

Wall and floor separations take into account both airborne noise and structure borne noise. Airborne noise sources include voices, TV sets and hi-fi equipment etc. Structure borne noise sources include wall mounted clothes driers, or operation of a kitchen appliance on a bench connected to a common wall.



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The star rating system measures the actual installed performance of the wall or floor system. The expression for effective sound insulation between two adjacent spaces is  $D_{nT,w}$ . This is the sound level difference, which is adjusted to simulate a typical furnished room. To this value is added an adaptation term  $C_{tr}$  that helps to quantify the low frequency performance of the wall or floor. The  $C_{tr}$  factor is a negative value and is typically in the range  $-5$  to  $-12$ . There is normally a 5 dB difference allowed between what is expected in the field ( $D_{nT,w}$ ) and what is measured under laboratory conditions ( $R_w$ ). The following table presents the wall separation requirements for both airborne and impact noise.

Inter-Tenancy Activities		Star Rating				
		2 Star	3 Star	4 Star	5 Star	6 Star
<b>Airborne Sound Insulation</b> $D_{nT,w} + C_{tr}$	Between separate tenancies	35	40	45	50	55
	Between a lobby/corridor & bedroom	30	40	40	45	50
	Between a lobby/corridor & living area	25	40	40	40	45
	Bedroom walls within a tenancy	25	30	35	40	45
	Corridor, foyer to living space via door(s) $D_{nT,w}$	20	25	30	35	40
<b>Impact isolation of walls</b>	Between tenancies	No	Yes	Yes	Yes	Yes
	Between common areas & tenancies	No	No	No	Yes	Yes

## Floor/Ceiling Separations

Structure borne noise sources that affect floors include footsteps on hard floors, scraping chairs and dropped objects. The AAAC has adopted the measurement called the 'Weighted Normalised Impact Sound Pressure Level'  $L_{nT,w}$ . A reduction in this parameter corresponds to an improvement in impact isolation. The following table presents the floor/ceiling separation requirements for both airborne and impact noise.

Inter-tenancy Activities		Star Rating				
		2 Star	3 Star	4 Star	5 Star	6 Star
<b>Airborne Sound Insulation</b> $D_{nT,w} + C_{tr}$	Between separate tenancies	35	40	45	50	55
<b>Impact isolation of floors</b> $L_{nT,w}$	Between tenancies	65	55	50	45	40
	Between all other spaces & tenancies	65	55	50	45	40

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## Internal Building Services

Internal building services include a range of plant and equipment; all of which have the potential to generate noise within an apartment. These include air conditioning and ventilation systems, lifts, hydraulic waste, water supply systems and car park roller doors etc. These noises can also be intermittent or continuous and may intrude into an apartment by a combination of airborne and structure-borne transmission paths. If the background noise level is made very low, then other sounds normally masked might become audible; this rating system takes this into account. The following table presents the allowable internal noise levels for both continuous and intermittent noise sources.



Courtesy: City of Melbourne

Areas	Type of Noise Source	Star Rating				
		2 Star	3 Star	4 Star	5 Star	6 Star
Bedrooms	Continuous Noises, $L_{Aeq}$	36	35	32	30	27
	Intermittent Noises ave, $L_{Amax}$	45	40	35	30	27
Other habitable rooms including open kitchens	Continuous Noises, $L_{Aeq}$	41	40	35	30	27
	Intermittent Noises ave, $L_{Amax}$	55	45	40	35	32
Wet areas including bathrooms, ensuites and laundries	Continuous Noises, $L_{Aeq}$	55	50	45	42	40
	Intermittent Noises ave, $L_{Amax}$	60	55	48	42	40

## Environmental Noise Intrusion

The AAAC acoustical star rating system also provides criteria for environmental noise intrusion. External noise intrusion is most commonly caused by transportation systems, such as road, rail and air traffic and can be of an intermittent or continuous nature. For this development road traffic noise will be the dominant source. The level of external noise intrusion is given in the following table below.

Areas	Type of Noise Source	Star Rating				
		2 Star	3 Star	4 Star	5 Star	6 Star
Bedrooms	Continuous Noises $L_{Aeq}$	36	35	32	30	27
	Intermittent Noises ave. $L_{Amax}$	50	50	45	40	35
Other habitable rooms including open kitchens	Continuous Noises $L_{Aeq}$	41	40	37	35	32
	Intermittent Noises ave. $L_{Amax}$	55	55	50	45	40

### Comparison of the BCA to the AAAC Star Ratings

The subjective performance of the requirements of the BCA (applicable to South Australia) compared with the AAAC star ratings are shown in the following table. The shaded cells represent comparable criteria between the BCA and the AAAC ratings.

Noise Source	Building Quality				
	AAAC 2 Star and BCA <sup>(1)</sup>	AAAC 3 Star	AAAC 4 Star and BCA <sup>(2)</sup>	AAAC 5 Star	AAAC 6 Star
	Partition Rating - $D_{nT,w} + C_{tr}$				
	40-45	45-50	50 – 55	55-60	60-65
Normal Speech	Audible	Just Audible	Not Audible	Not Audible	Not Audible
Raised Speech	Clearly Audible	Audible	Just Audible	Not Audible	Not Audible
Dinner Party/laughter	Clearly Audible	Audible	Just Audible	Not Audible	Not Audible
Shouting	Clearly Audible	Clearly Audible	Audible	Just Audible	Not Audible
Small TV/Entertainment system	Clearly Audible	Clearly Audible	Audible	Just Audible	Not Audible
Large TV/Entertainment system	Clearly Audible	Clearly Audible	Clearly Audible	Audible	Just Audible
DVD with Surround sound	Clearly Audible	Clearly Audible	Clearly Audible	Audible	Audible
Digital TV with surround sound	Clearly Audible	Clearly Audible	Clearly Audible	Audible	Audible
	Floor Impact Rating - $L_{nT,w}$				
	65	55	50	45	40
Footsteps	Clearly Audible	Audible	Barely Audible	Normally Inaudible	Inaudible

Notes: (1) The BCA is acoustically equivalent to the floor impact requirements for AAAC 2 Star rating buildings

(2) The BCA is acoustically equivalent to the requirements for partitions for AAAC 4 Star rating buildings

### Acoustic Consultant

If you are considering any sound insulation, it is recommended that you verify any sound insulation specifications with your architect/builder and/or employ the services of an acoustic consultant to ensure the proposed changes provide significant noise reduction.

To contact an acoustic consultant visit the Yellow Pages Directory (under Acoustical Consultants) or for an acoustic consultant who is part of the Association of Australian Acoustical Consultants (AAAC) visit [www.aaac.org.au](http://www.aaac.org.au)



### Other Fact Sheets

A number of other Noise Technical Fact Sheets complement the information in this document. These can be downloaded from the City of Adelaide website: [www.cityofadelaide.com.au/noise](http://www.cityofadelaide.com.au/noise)

*Fact Sheet 1: Sound Insulation Guidelines*

*Fact Sheet 2: Gaps and Flanking Paths*

*Fact Sheet 3: Sound Insulation for Windows*

*Fact Sheet 4: Sound Insulation for Glazed Doors and Standard Doors*

*Fact Sheet 5: Sound Insulation for Exterior Walls and Facade Systems*

*Fact Sheet 6: Ventilation*

*Fact Sheet 7: Sound Insulation for Air Conditioners and Other External Mechanical Plant*

*Fact Sheet 8: Sounds in the City*

*Fact Sheet 9: Adelaide City Road Traffic Noise Map*

*Fact Sheet 10: Noise Ready Reckoner*

*Fact Sheet 11: Acoustic Terminology*

*Fact Sheet 12: Frequently Asked Questions*

*Fact Sheet 13: Sound Insulation for Internal/Common Walls*

*Fact Sheet 14: Sound Insulation of Floors*

*Fact Sheet 15: Mechanical Plant for Commercial Buildings*

*Fact Sheet 16: AAC Star Rating*

### The Building Code of Australia Compliance

The Building Code of Australia (BCA) should be consulted to ensure that any sound insulation upgrades comply with the requirements of the BCA. It should be noted that although the upgrade of a building element may be acoustically beneficial, it may not comply with the requirements of the BCA.

### Australian Building Codes Board

The Noise Technical Fact Sheets contain content sourced from the Building Code of Australia and Guidelines on Sound Insulation, published by the Australian Building Codes Board (ABCB). These documents can be purchased from the ABCB website: [www.abcb.gov.au](http://www.abcb.gov.au)

### Standards

The standards which apply in the Development Plan are:

- Australian/New Zealand Standard 2107:2000 “Acoustics - Recommended design sound levels and reverberation times for building interiors”
- World Health Organisation, Guidelines For Community Noise, Edited by B Berglund et al, 1999) (<http://www.who.int/docstore/peh/noise/guidelines2.html>)
- Recognised liquor licensing noise limits ([www.olgc.sa.gov.au](http://www.olgc.sa.gov.au)). These are modified to apply within bedroom and living areas.

### Contacts / Additional Information

Additional information can be obtained from:

- Australian Association of Acoustic Consultants ([www.aaac.org.au](http://www.aaac.org.au))
- Australian Acoustical Society ([www.acoustics.asn.au](http://www.acoustics.asn.au))
- Office of the Liquor and Gambling Commissioner ([www.olgc.sa.gov.au](http://www.olgc.sa.gov.au))
- South Australian EPA ([www.epa.sa.gov.au/noise.html](http://www.epa.sa.gov.au/noise.html))
- South Australian Police ([www.sapolice.sa.gov.au](http://www.sapolice.sa.gov.au))
- Yellow Pages ([www.yellowpages.com.au](http://www.yellowpages.com.au) search “acoustic”)
- Australian Window Association ([www.awa.org.au](http://www.awa.org.au))

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