

GAPS AND FLANKING PATHS

Sound can enter your residence in unexpected ways, such as through gaps and cracks around the edges of building elements. These noise paths are commonly referred to as flanking paths and are often a cause of poor sound reduction in residences.

The acoustic terminology used in this fact sheet is explained in *Fact Sheet 11: Acoustic Terminology*.

Key Issues and Considerations

When designing or building the façade of a residence the work must comply with the Building Code of Australia and consideration should be given to the desired reduction of outside noise. If you are concerned about noise where you live, or are planning to renovate or purchase a house or apartment, you should firstly consider gaps and flanking paths around building elements (such as doors, windows and ceilings) in your residence.

An important feature of a well constructed facade is properly sealed junctions, which aid in the reduction of noise transferred via flanking paths. Even a sound-rated system may not perform adequately, if joints and junctions are not properly sealed.

Flanking is the transfer of noise through paths around a building element, rather than through the building element directly. Flanking paths occur through:

- gaps and cracks in a building element;
- incorrectly sealed junctions between two materials;
- noise passing through gaps and weaknesses around building elements; and
- penetrations in building elements from building services.

Incorrectly installed acoustic control measures can provide flanking paths that will reduce the success of noise reduction techniques. Older buildings can develop acoustic problems as they age due to the likelihood of gaps and cracks in building elements increasing in size and sealed elements failing thus increasing the size and number of flanking paths and subsequently increasing the likelihood of significant noise problems.

As flanking paths are the simplest problem to rectify when attempting to reduce external noise ingress, it should be the first consideration.

Noise and Insulation

The wide range of activity in the inner city generates higher levels of external noise than in suburban areas. Noise from activity such as traffic, people on the street, operational commercial sites and waste collection can adversely affect the amenity of those living in the City. As low frequency noise is particularly invasive, reducing the impact of noise from truck engines, buses, music etc. may need to be considered. To effectively reduce external noise and maintain the amenity of an inner city residence, all gaps and flanking paths should be well sealed.



Testing For Gaps and Flanking Paths

- Before upgrading windows, doors or external walls, consider fixing or installing seals on your existing windows and doors and sealing all gaps air tight. This could achieve the noise reduction you want.
- Seal any gaps around windows or doors with plasticine, or an equivalent malleable, but weighty substance.
- Consider the improvements for several days and nights.
- If improvements are sufficient, sealing devices can be fitted to the windows and doors which will maximise noise reduction when closed, or the gaps can be sealed air tight with a flexible caulking compound. *Note: the tighter a door or openable window can close the better the sound insulation performance.

*Note: sound can be transferred through gaps between windows / doors and their frames and also between the frames and the building structure.

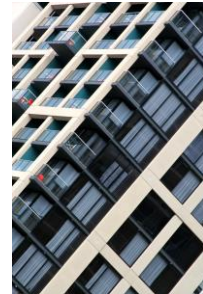
Window and Door Seals

Flanking paths are of particular concern for openable windows and doors. Even windows and doors with good weather stripping can have compromised noise reduction due to air leakage.

All windows and doors should have perimeter acoustic seals to reduce flanking. However, acoustic seals only provide suitable performance if they are properly fitted. Seals should be selected on their performance and simplicity of use, and they should be low maintenance and have a long life. Solid seals are more effective acoustically than brush type seals in sealing any gaps around the window perimeter airtight.

Windows

With fixed glazing, the noise transfer via flanking paths around the pane should be minimised with high quality perimeter seals, however for openable windows perimeter seals do not work as well. Where openable windows are required by the Building Code of Australia, awning windows with opening sashes are preferable over sliding or pivoting windows as when they are closed they achieve a positive compression seal against the window frame.



Doors

Glazed and standard hinged doors are preferable to sliding doors as they are able to achieve a positive compression seal against the door frame when fitted with acoustic seals. Consideration should be given to other seal performance requirements such as vermin-proofing, and resistance to fire, smoke, chemicals, weather and dust when selecting appropriate perimeter seals.

External Walls and Roof-Ceiling Systems

An important feature of well constructed external walls and roof-ceiling systems is properly sealed junctions, which aid in the reduction of noise transferred via flanking paths (gaps at the edge of building elements that allow sound to travel through). Even a sound-rated system may not perform adequately, if joints and junctions are not properly sealed.

- Full-mortar joints should be used when a sound-rated masonry wall system is used.
- The depth of flexible caulking compound in joints should be sufficient to maintain the acoustic rating of the construction. Typically, the depth should be equal to or greater than the width of the joint. Suitable backing rods are generally required.
- Joints in dissimilar materials may open up if there is building movement. It is important that the acoustic seal in joints accommodates building movement.

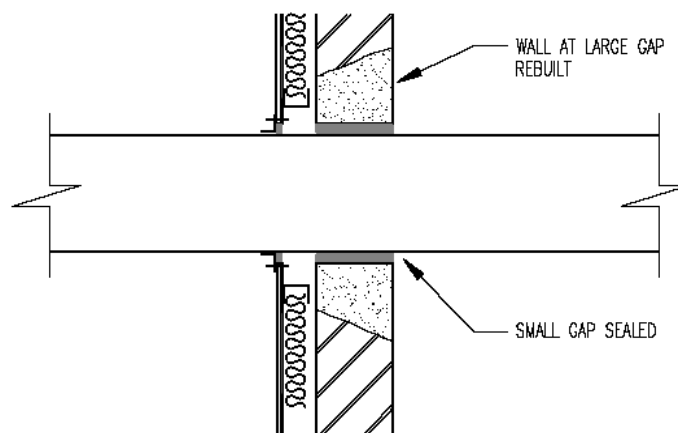
Services and Penetrations

To reduce noise transfer via flanking paths it should be ensured that all penetrations, joints and junctions are sealed airtight with a flexible caulking compound. To save time and money, these issues should be considered in the initial design or during renovation.

The design of a wall or roof - ceiling system should consider services and penetrations from other building elements. Penetrations in a system can compromise its acoustic performance and will require extra consideration. For external walls it is also important not to chase services into masonry or concrete walls.

- All penetrations in sound-rated building elements should be neatly cut or drilled. Avoid excessively sized penetrations.
- The wall around any large penetration should be rebuilt with the same material. Small residual gaps at penetrations can be sealed with suitable mastic.

- The normal tolerance in building construction should be considered when installing penetrations, and at wall/floor junctions. Revised detailing is needed where residual gaps are too large to allow effective sealing with mastic.
- Gaps around all penetrations in sound-rated walls or ceilings should be treated and sealed to maintain acoustic ratings.
- Sealing should be effective, resilient, resistant to the surrounding environment, and designed to last for the life of the building.



Treatment of Gaps and Penetrations
Source: ABCB Document: Guideline on Sound Insulation

Best Practice

- If you have a noise problem, achieving a useful improvement in sound insulation requires a decrease of at least five decibels (dB), preferably 10 to 15 dB. An improvement of less than 5 dB is normally not worth the additional expense as the change will only be just perceptible.
- If you are comparing quotations for sound insulation, look at the noise reduction performance of different options. Remember that most products perform better in laboratory conditions than in final installation. Ensure the specified noise reduction of the treatment is presented in decibels or a suitable acoustic measurement.

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

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

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: AAAC 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

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

Acknowledgements

This project has been developed by the City of Adelaide in partnership with Bassett Acoustics.

The Fact Sheet contains content sourced directly from the City of Melbourne's City Sounds 2 Noise Fact Sheets, which can be viewed at www.melbourne.vic.gov.au/noise and copyright in this material remains the property of the City of Melbourne. City of Adelaide gratefully acknowledges the assistance of the City of Melbourne in the use of this material in the preparation of the Fact Sheets.

Contact Us

For further information call City of Adelaide on (08) 8203 7203 or email city@cityofadelaide.com.au

Disclaimer:

While reasonable effort has been taken to ensure the accuracy of information in this document, the City of Adelaide make no representation, express or implied, as to the accuracy, currency, reliability or suitability of the information and data in this document.

The use of the information and data provided is at your sole risk. The City of Adelaide expressly disclaim responsibility for any damages that may be caused by the contents of this document. If you rely on the information in this document you are responsible for ensuring by independent verification its accuracy, currency or completeness.

The information and data in this document is subject to change without notice.

Copyright of this document is owned by the City of Adelaide. The copyright in the material appearing at linked sites vests in the author of those materials, or the author's licensee of those materials, subject to the provisions in the Copyright Act 1968. No licence to publish, communicate, modify, commercialise or alter this document is granted.