AGGA TECHNICAL FACT SHEET
ACOUSTICS IN GLASS AND GLAZING FOR CONSUMERS

Introduction
This fact sheet is designed to assist consumers to understand the relationship between sound and glazing materials to maximise the acoustic benefit for our homes.

Noise is any unwanted sound, such as dogs barking, neighbours playing loud music, lawn mowers, road traffic or aircraft noise. It can be anything from quiet but annoying to loud and harmful sounds.

Sound
Airborne sound is produced when an object vibrates, for example, the moving parts of a jet engine vibrate creating a disturbance in the air which spreads out in all directions. This air pressure disturbance sets off a chain reaction of a sequence of air pressure changes (high and low pressure) and is known as a sound wave.

The changes caused by the sound wave are known as a sound pressure level and indicate how loud a sound is. Sound pressure level is measured in decibels (*dB*) and shown below is the level for some common sounds.

Source	*Sound Pressure level—dB*
Threshold of audibility	0
Virtual silence	10
Quiet room	20
Quiet whisper (1M)	30
Bedroom	40
Quiet Street	50
Conversation (1M)	50 - 60
Car (15M)	70
Vacuum Clear (3M)	70
Busy Residential Road	80
Jackhammer (15M)	80
Bulldozer (15M)	80
Noisy Factory	90
Large Jet (150M over head)	110
Chainsaw (1M)	117
Threshold of pain	120

Human Aspect
It is well documented that exposure to too much noise over time can be damaging to the health. This can include sleep disorders, raised blood pressure, increased risk of heart attack and mental disorders.

Windows and Noise
External solid wall elements such as brick or masonry usually provide a good level of noise insulation. However windows may not perform as well, therefore it is important that the windows are glazed with an appropriate glass to reduce the impact of any noise. Reducing the noise by:

- 3db is just noticeable
- 5db is clearly detectable
- 10 db has a 50% decrease in noise level
- 20 db has a 75% decrease in noise level

Improving sound installation
The glazing options for windows and doors in residential homes include:

- single glazing (a single layer of glass)
- laminated glass (two sheets of glass laminated together with an interlayer). Laminated glass is commonly used in car windscreens.
- Double glazing – two pieces of glass separated by an airspace. This is usually in a sealed unit.

In simple terms the thicker the product, the better the sound insulation or acoustic performance.

Single glazing
Standard windows in residential houses usually comprise single glazing in a thickness of 3 or 4mm.

Increasing the glass thickness will improve the window's acoustic performance, however most standard residential window systems are limited on the glass thickness the frame can accommodate. Therefore due to these frame constraints, single glazed glass may not be thick enough to provide any significant acoustic benefit.

Laminated Glass
One of the properties of interlayer used in laminated glass is its sound damping qualities. Therefore laminated glass offers better sound insulation when compared to single glazing of the same thickness.

Acoustic performance can be enhanced even further with the use of specifically developed acoustic dampening interlayers. The use of laminate glass with a standard or acoustic interlayer will generally provide the best noise control for a given thickness in most standard window and door framing systems.

Double glazing
The energy efficiency of double glazing is well known however the acoustic benefits of double glazing is often misunderstood.

In simple terms, the cavity or airspace between the two panes of glass helps reduce the level of sound vibration to the outer pane transferring to the inner glass resulting in reduced sound transmission through the whole unit. Therefore the wider the airspace the better the acoustic performance, however in most residential applications the airspace in a double glazed unit is usually not wide enough to provide any useful acoustic benefit. In certain configurations it can actually perform worse than one of the single glazed panes used in the unit.

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Also if the airspace between the panes of glass is greater than 25mm, its energy efficiency properties are greatly reduced.

If the window and door frame can accommodate a wide airspace double glazed unit, using laminated glass for one or both panes will provide significant acoustic performance.

Other factors

As well as glass types, other factors that can influence the acoustic properties of a window or door include the type of frame, how it opens (sliding or hinged), how well it seals and the surrounding structure. A gap as small as small as 1% of total window area will result in 10 decibel decrease in acoustic performance.

Importantly, when addressing the task of reducing unwanted sound transmission, the whole of the building must be considered, not just the windows and doors. Any openings, such as gaps around frames, air bricks and insulation of roof space (if any), will have an effect on the amount of noise reduction achieved by reglazing with a suitable product.

Further Info

Acoustics in Glass & Glazing (Industry version) Technical Fact Sheet
Ref: TFS-ACOUS-05122013v01, Published: December 2013

This document published: October 2014
Ref: TFS-ACOUSCON-23092014v01

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