ACOUSTICS TESTED
WINDOWS & DOORS
AWS SOUND INSULATING WINDOW SYSTEMS

AWS is committed to offering window and door solutions that not only provide light and ventilation but help to create unique living spaces protected from harsh environmental elements.

Unwanted or harmful noise has increasingly become part of our urban environment causing annoyance and disturbance to our lifestyle.

Through considered innovation, AWS offers a of windows and doors from the Elevate, Vantage and ThermalHEART brands to assist in insulating the building envelope from unwanted noise - making it easier to create beautiful living spaces which meet contemporary aspirations for efficiency and comfort.

These systems are tested by the National Acoustic Laboratories to provide the highest level of assurance in their performance integrity.

BACKGROUND

Our expectation for comfort and efficiency in our built environment is changing. Urban in-fill development, busier transportation routes and changes in the ways we use our homes are increasing our focus on achieving "acoustic comfort".

In recent years the problem of unwanted or harmful noise has become a pressing issue throughout Australia. Local governments have introduced regulations to address the problem, in some instances local municipalities have their own regulations or guidelines regarding noise abatement. It is likely that over the next few years regulations to address intrusive external noise will strengthen.

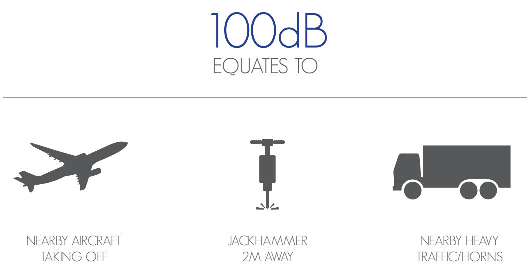
The correct selection of window and door systems can have a significant effect on the internal acoustic comfort of a building.

AWS
ARCHITECTURAL WINDOW SYSTEMS

SOUND LEVELS

Sound levels are expressed in decibels (dB). The higher the dB rating, the stronger the sound source – this is a measure of the Sound Pressure Level (SPL). SPL is a measure of the power of the sound source.Generally, we refer to this as “loudness”. Technically speaking, “loudness” is really a combination of the SPL and the duration of the sound.

The higher the dB rating, the stronger the sound. For example, the sound of a whistling bird (50dB) is stronger than the sound of a falling leaf (10dB).



Sound can occur as a single frequency (e.g. a single musical note) or can be made up of various frequencies (e.g. traffic noise).

A frequency is expressed in hertz (Hz). Generally when we refer to “high” or “low” pitched sound we are talking about sound frequency. Frequencies can be broken in to three categories, low tones, mid tones and high tones, The frequency range of urban road traffic is concentrated around the low tones whereas a whistling tea kettle consists of high tones.

The loudness (dB) and pitch (Hz) of a sound taken together determine their impact on our acoustic comfort and how to manage it.

WORLD HEALTH ORGANIZATION (WHO) COMMUNITY NOISE GUIDELINES

The Guidelines for Community Noise developed by the WHO seek to consolidate scientific knowledge on the health impacts of community noise.

The report provides guidelines to environmental health authorities and professionals trying to protect people from the harmful effects of noise in non-industrial environments and establish criteria to protect the majority of the population from illeffects based on the research findings.

These illeffects might typically be reducing the quality of sleep – which can have long term impacts on our general physiological health and well being.

WINDOWS AND SOUND REDUCTION

Sound reduction is the reduction in decibels of sounds that pass through the air (e.g. air or traffic noise). The ability of a window to offer sound reduction is determined by the difference between the sound level in the environment in which the sound source is present and the sound level in the room screened by the window from the external source.

Sound travels through the air in waves – sound waves. A simple way of thinking about this process is to think about the effect that dropping a pebble into a pond has. The waves move away from the middle of the pond outwards in all directions, and decrease in intensity the further they get away from the source.

The path and intensity of these waves can be modified by placing objects in their way. Imagine the rock at the edge of the pond is an acoustic window; the waves are deflected and weakened by having to move around the object.

On a very simplistic level, this is what an acoustic window can help to do; modify the path of the sound waves, reflecting them away and reducing their impact.

MEASURING THE ACOUSTIC PERFORMANCE OF A WINDOW

Sound or acoustic performance of a window is measured by the weighted sound reduction index or Rw value. Rw values are determined by measuring the reduction in dB achieved where a window is used to insulate against a sound source.

The Rw value will increase as the acoustic performance of a window improves, so that a window with an Rw value of 41 has a significantly improved acoustic performance over a window with an Rw value of 30. Every improvement in Rw value equates to a reduction in decibels of 1.

80dB	-	Rw41	=	39dB
EXTERNAL NOISE		GLAZING UNIT		INTERNAL SOUND

RW CORRECTION VALUES

Rw values represent aggregated data showing the average performance of a window across a broad spectrum of sounds.

One of the limitations of using this as measure of performance is that the response of the human ear to differentials in sound level is logarithmic, not linear.

What this means is that we are very sensitive to small changes in sound level, up or down, and that we perceive this change as being much greater or smaller depending on how loud the sound was in the first place.

Normal, casual conversation happens around the 60dB mark. We are most sensitive to changes around the mid frequency levels – 70dB (a dog barking) to 100dB (a lawnmower). Note that the sound levels we find annoying represent relatively small increases in the sound level (10dB to 40dB) but we would perceive these changes as more than doubling the impact of conversation level noise in the room in the first place.

To provide a more accurate description of a window's performance when subjected to different types of sound, we use correction values – these values are shown in brackets beside the Rw value, for example, Rw41 (-1.1). These values are designed to balance the complex considerations of "loudness" (dB), "pitch" (Hz) and the intended use of the room.

The first value is the "C" value which represents mid and high tone noises (e.g. people talking). The second "C" value represents sound dominated by low and mid tones (e.g. road traffic noise). By applying these values to the defined Rw value you achieve a more reliable interpretation of a window's performance when subjected to specific noise sources.

If required, AWS can supply more specific information on the performance of our tested systems.

type of noise source	adaptation term
• living activities (talking, music, radio, tv) • children playing • railway traffic at medium and high speed • highway road traffic >80km/h • jet aircraft, short distance • factories emitting mainly medium and high frequency noise	C
• urban raad traffic • railway traffic at low speeds • aircraft, propeller driven • jet aircraft, large distance • amplified music • factories emitting mainly low and medium frequency noise	C_{tr}

WINDOW SELECTION CONSIDERATIONS

Correct specification and installation of windows for a project will help to ensure a building envelope achieves desired outcomes for reduction of unwanted sound. Sounds such as traffic or airport noise are major contributors to sound nuisance and can cause a range of physical and psychological concerns of residents. The ability for a window or door to provide good sound reduction is dependent upon a number of factors:

- Glass selection
- Quality of gaskets and seals
- Window style
- Correct installation

GLASS SELECTION

Single Glazing

As a general rule, where single glazing is used, the acoustic performance of the glass improves as the thickness increases.

Laminated Glass

Laminated glass will typically deliver better sound reduction properties than float or toughened glass. Laminated glass is made up of two panes of glass pressed together with a polyvinyl butyral interlayer. This layer is typically only .38mm in thickness but helps to absorb some vibrations, therefore performing better for sound reduction.

Special products have been designed to further improve the performance of laminated glass for sound reduction. Viridian VLam Hush™ uses a unique interlayerwhich is designed to dampen sound transmission over critical frequencies. This means that thinner and lighter glass can be used for equivalent acoustic performance of a thicker and heavier glass panel.

Double Glazing

Whilst double glazed door and window systems perform well in terms of sound reduction, double glazing may not necessarily deliver better acoustic performance than single glazing – particularly when compared with specially laminated glass.

Double glazing will perform better acoustically when the thickness of the two panes is increased and one of the panes is different in thickness to the other, known as asymmetric double glazing.

Asymmetric Glazing

This involves placing two panes of differing thickness into one sealed unit e.g. a 6mm outer pane and a 4mm inner pane. This leads to a perceptible difference in performance compared to normal double glazing with two panes of the same thickness.

INSTALLATION

Regardless of how a window is specified or constructed, if it is poorly installed it will not deliver its maximum sound reduction properties. Vantage, Elevate™ and ThermalHEART™ windows and doors must always be installed by a licensed builder or installer in accordance with correct installation guidelines.

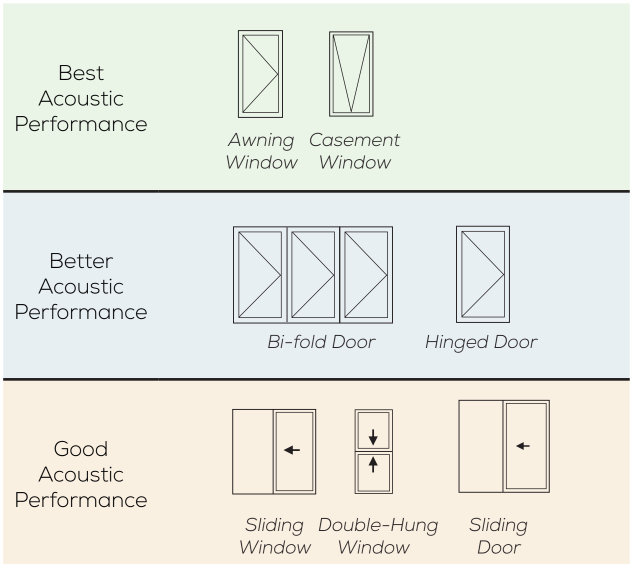
WINDOW STYLE

The design, or format of a window or door will impact on its ability to deliver sound insulation.

By design, some windows and door styles "seal" better than others. For example, an awning window or casement window is designed so that the operable sash physically compresses the window seals when it closes, and as such will provide a much better performance than a sliding window which brushes past the sealing component (typically a mohair brush seal).

In the same way that water can leak into a poorly sealed structure, sound can leak or seep through a poorly sealed or poorly installed window.

Comparison of acoustic performance by window style



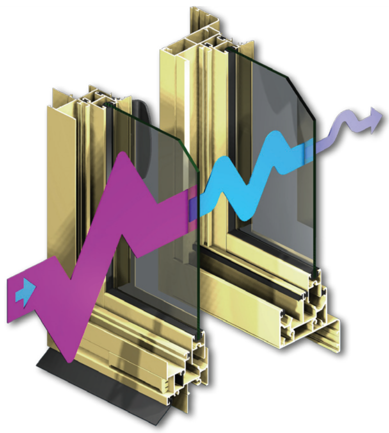
SOUNDOUT™ WINDOWS

The best acoustic performance for windows comes when an air gap between 20mm and 150mm can be produced. This air gap is much larger than can be produced using typical hermetically sealed double glazed units. Instead a secondary window is installed 100mm behind the usual window (also known as secondary glazing).

AWS offers a number of SoundOUT™ secondary glazing solutions including:

- Series 531 SoundOUT™ Sliding Window
- Series 532 SoundOUT™ Casement Window
- Series 533 SoundOUT™ Sliding Door

SoundOUT™ products can be installed behind existing windows or doors to achieve increased sound insulation for the building envelope.



SoundOUT™ secondary glazing system

ACOUSTIC TESTED SYSTEMS

AWS has tested the acoustic performance of a number of glass and frame combinations. All AWS windows and doors which have been acoustics tested are identified by the Acoustics Tested symbol illustrated below.

ACOUSTICS
TESTED - CERTIFIED

AWS PRODUCT SOLUTIONS

AWS has tested a number of systems for acoustic performance. The table below provides a summary of all tested systems.

Series	Description	Glass	Rw (C;C_{tr})	Test Report
400	CentreGLAZE™	6.5 Vlam Hush™	34 (0;-3)	4867-5 REV A
400	CentreGLAZE™	10.5 Vlam Hush™	37 (0;-3)	4867-6 REV A
400	CentreGLAZE™	10.38 Lam	34 (-1;-2)	4867-7 REV A
400	CentreGLAZE™	6.38 Lam	32 (-2;-3)	4867-8 REV A
411	Top-Hung Bifold Door	6.38 Lam	28 (0;-2)	4867-22
411	Top-Hung Bifold Door	8.38 lam	31 (-1,-2)	4867-23
424	CentreGLAZE™	8.5 Vlam Hush™/10mm Air/6.5 Vlam Hush™	39 (-2;-6)	4867-1
424	CentreGLAZE™	6.5 Vlam Hush™/12mm Air/6mm Tgh	36 (-1;-5)	4867-2
466	Commercial Awning Window	6.5mm Vlam Hush™/10mmAir/8.5 Vlam Hush™	41 (-1;-5)	4867-10
466	Commercial Awning Window	6mm Tgh/12mmAir/6.5 Vlam Hush™	40 (-1;-5)	4867-11
466	Commercial Awning Window	6.5mm Vlam Hush™	35 (-1;-4)	4867-9
471	Apartment Sliding Door	6.5 Vlam Hush™	32 (-1,-3)	4867-19
471	Apartment Sliding Door	10.5 Vlam Hush™	33 (0,-2)	4867-20
471	Apartment Sliding Door	6.5VLam Hush™ / 8Air / 5Toughened	33 (-1;-2)	4867-21
504	Sliding Window	3mm float	STC22	ATF283
504	Sliding Window	6.38mm Lam	32 (-1;-2)	ATF813
504	Sliding Window	7.52mm Lam	32 (-1;-2)	ATF814
514	Double-Hung Window	7.52mm Lam	30 (-2;-3)	AFT785
514	Double-Hung Window	5mm float	28 (-2;-3)	ATF783
514	Double-Hung Window	6.38mm Lam	29 (-3;-4)	ATF784
514	Double-Hung Window	7.52mm Lam	30 (-2;-3)	ATF785
516	Awning Window	6.38mm Lam	34 (-1; -2)	ATF1195
516	Awning Window	3mm	STC30	ATF262
516	Awning Window	10.38mm Lam	STC36	ATF265
531	SoundOUT™ Sliding Window with primary 504 Awning window (3mm float) and 100mm air gap	6.38mm Lam	STC38	ATF284
531	SoundOUT™ Sliding Window with primary 504 Sliding window (3mm float) and 100mm air gap	7.52mm Lam	41 (-2; -8)	ATF816
531	SoundOUT™ Sliding Window with primary 504 Sliding window (3mm float) and 100mm air gap	6.38mm Lam	41 (-2; -7)	ATF817
532	SoundOUT™ Sliding Window with primary 516 Awning window (3mm float) and 100mm air gap	6.38mm Lam	STC45	ATF263
532	SoundOUT™ Sliding Window with primary 516 Awning window (3mm float) and 100mm air gap	10.38mm Lam	STC50	ATF264
533	SoundOUT™ Sliding Door with primary 541 Sliding Door (4mm Tgh) and 100mm air gap	6.38mm Lam	42 (-1;-6)	ATF798
533	SoundOUT™ Sliding Door with primary 541 Sliding Door (4mm Tgh) and 100mm air gap	6.38mm Lam	42 (-1;-6)	ATF799
533	SoundOUT™ Sliding Door with primary 541 Sliding Door (4mm Tgh) and 100mm air gap	4mm Tgh	41 (-2;-7)	ATF800
533	SoundOUT™ Sliding Door	6.38mm Lam	30 (1;-1)	ATF801

AWS PRODUCT SOLUTIONS

AWS has tested a number of systems for acoustic performance. The table below provides a summary of all tested systems.

Series	Description	Glass	Rw ($C;C_{tr}$)	Test Report
533	SoundOUT™ Sliding Door	7.52mm Lam	31 (1;-1)	ATF802
541	Sliding Door	6.38mm Lam	30 (-3;-4)	ATF792
541	Sliding Door	6.38mm Lam	32 (-1;-2)	ATF793
541	Sliding Door	10.38mm Lam	35 (-2;-3)	ATF794
541	Sliding Door	7.52mm Lam	32 (0;-1)	ATF795
541	Sliding Door	5mm Tgh/9mm Air/5mm Tgh	33 (-1;-3)	ATF796
541	Sliding Door	4mm Tgh	28 (-1;-2)	ATF797
547	French Door System Outward Opening	5mm Tgh/9mm Air/5mm Tgh	33 (-2; -4)	ATF803
547	French Door System Outward Opening	6.38mm Lam	32 (-2; -3)	ATF804
601	Sliding Window	4mm Float	31 (-1;-2)	ATF1198
601	Sliding Window	10.38mm Lam	35 (0;-1)	ATF1199
601	Sliding Window	6.38mm Lam	33 (0;-1)	ATF1200
601	Sliding Window	4mm float/8mm Air/4mm Float	32 (0;-2)	ATF1201
613	Double-Hung Window	6.38mm Lam	30 (0;-1)	ATF1320
614	Sashless Double Hung	6mm float	26 (0;0)	ATF1202
616	Awning Window	4mm float	32 (-2;-3)	ATF1210
616	Awning Window	6.38mm Lam	34 (-1;-2)	ATF1211
616	Awning Window	10.38mm Lam	36 (-1;-2)	ATF1212
616	Awning Window	6mm/12mm Air/6mm	35 (-1;-3)	ATF1213
618	MAGNUM™ Sliding Door	6.38mm Vlam Hush™	32 (0;-2)	4867-16
618	MAGNUM™ Sliding Door	10.5mm Vlam Hush™	34 (0;-2)	4867-17
618	MAGNUM™ Sliding Door	6.5VLam Hush™ / 8Air / 5Toughened	35 (-1;-4)	4867-18
704	SlideMASTER™ Sliding Door	6.38mm Lam	30 (0;-1)	ALA10-080
704	SlideMASTER™ Sliding Door	10.38mm Lam	31 (-1;-1)	ALA10-080
704	SlideMASTER™ Sliding Door	10.5 Vlam Hush™	33 (0;-2)	ALA10-080
726	Thermally Broken Awning Window	8.5 Vlam Hush™/10mm Air/6.5 Vlam Hush™	41 (-1;-5)	4867-12
726	Thermally Broken Awning Window	6.5 Vlam Hush™/12mm Air/6mm Tgh	40 (-1;-5)	4867-13
731	Thermally Broken Sliding Door	8.5 Vlam Hush/10mm Air/6.5 Vlam Hush™	37 (-1,-3)	4867-14
731	Thermally Broken Sliding Door	6mm Tgh/12mmAir/6.5 Vlam Hush™	37 (-1,-4)	4867-15
804	Thermally Broken CentreGLAZE™	8.5 Vlam Hush™/10mm Air/6.5 Vlam Hush™	39 (-1;-6)	4867-3
804	Thermally Broken CentreGLAZE™	6.5 Vlam Hush™/12mm Air/6mm Tgh	37 (-1;-5)	4867-4
	Sliding Window	3mm/13mm Air/3mm	30 (-1;-3)	ATF815
	Sliding Window	6.38mm Lam	31 (0;-1)	ATF818
	Sliding Window	7.52mm Lam	31 (0;-1)	ATF819