SOUND SOLUTIONS

WINDOW AND DOOR SYSTEMS DELIVERING
IMPROVED SOUND REDUCTION

SOUND INSULATING
WINDOW & DOOR SYSTEMS BY APL WINDOW SOLUTIONS

Your home is your sanctuary

APL Window Solutions is committed to supplying window and door solutions which provide light, ventilation and help to create unique living spaces for New Zealand home and building owners.

Unwanted or harmful sounds have increasingly become part of our suburban landscape causing annoyance and disturbance to our lifestyle.

Through considered innovation, APL offers a dedicated range of windows and doors from the Metro Series and APL Architectural Series ranges, designed to assist architects and designers, builders and homeowners to insulate the building envelope from unwanted noise.

These systems are independently tested by the Acoustics Group of The University of Auckland to ensure the highest level of assurance in their performance integrity.

Find what you're looking for

Understanding sound and noise pollution

Modern day lifestyle and the proximity of our homes and offices to roads, airports and industry has placed an increased level of importance on the ability to control external sounds in our homes and offices.

There is a significant body of evidence supporting the notion that noise pollution can have detrimental impacts on our individual health and wellbeing. The inevitable build-up of stress and lack of sleep caused by noise pollution has been linked to a host of physical and mental health issues.

How can we protect ourselves from noise pollution? City planners and architects are coming up with ways to buffer traffic noise at the source by constructing noise barriers, limiting vehicle speeds, altering roadway surfaces and using different traffic controls that promote a smoother flow of traffic. These methods are fantastic in new developments, but what about noise from airports, construction or even just a loud neighbour?

Windows and doors are among the many building products that can significantly impact the way your home or building envelope is insulated from external sounds.

In order to make the correct product selections for noise reduction, it is important to first understand what sound is.

Sound levels

Sound levels are expressed in decibels (dB). The higher the dB rating, the stronger the sound source. The sound of a whistling bird (50dB) for example, is stronger than the sound of a falling leaf (10dB).

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

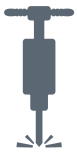
A frequency is expressed in hertz (Hz) and determines the "pitch" of a sound source. Frequencies can be broken into three categories: low tones, mid tones and high tones. The frequency range of urban road traffic is concentrated around the low tones whereas a whistling kettle consists of high tones.

The New Zealand Building Code currently adopts the Sound Transmission Class (STC) method for measuring and comparing building elements performance in terms of sound insulation. The STC method provides a single number rating derived from measured values of transmission loss i.e. a higher number represents a building element with better sound insulation characteristics.

The STC rating very roughly reflects the decibel reduction of noise that a building element can provide e.g. if a jackhammer was generating 100dB outside a building with walls rated to 60 STC, the perceived level of noise from the jackhammer inside the building would be roughly 40dB.

100DB EQUATES TO

NEARBY AIRCRAFT
TAKING OFF



JACKHAMMER
2M AWAY

NEARBY HEAVY
TRAFFIC/HORNS

Although levels of hearing differ significantly and noise can be very subjective, the following table gives an indication of how STC levels impact day-to-day life.

STC Rating	What can be heard through the building element
25	Normal speech can be understood
30	Loud speech can be understood
35	Loud speech audible but not intelligible
40	Loud speech audible as a murmur
45	Loud speech heard but not audible
50	Loud sounds faintly heard
60+	Good soundproofing; most sounds do not disturb neighbouring residents

Windows, doors and sound reduction

By selecting windows or doors for your project which deliver good sound reduction, you will improve the comfort and liveability of your home.

Airborne sound such as traffic or airport noise are major contributors to sound nuisance and can cause a range of physical and psychological concerns for residents.

There is also research to suggest that the resale value of homes which are well insulated against airborne sound is considerably higher than those which are not.

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

The following pages will review some of the common considerations in selecting windows and doors for sound reduction.

Glass selection

Single Glazing

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

Laminated Glass

Laminated glass typically will deliver better sound reduction properties than float or toughened glass. Laminated glass is made up of two glass panes which are joined together by a transparent elastic layer.

In many instances, specialty laminated glass products exist which are designed to deliver improved sound reduction properties. An example of this is the AGP Acoustic Laminate which is a laminated glass that uses a specially developed interlayer to dampen noise, providing enhanced sound reduction performance. This means that thinner and lighter glass can be used for equivalent acoustic performance.

Thermal Double Glazing

Double glazing should be selected for a window or door where there is an objective to improve the thermal performance of the system or deliver high thermal insulation properties to a building.

Double glazing tends to perform better acoustically when the thickness of the individual glass panes are increased and the air gap between glass panes is expanded. Alternatively, where there is a desire to balance thermal and acoustic performance, double glazing incorporating a specialty acoustic glass such as such as AGP Acoustic Laminate, may provide a good solution.

Asymmetric Glazing

Asymmetric glazing is used to deliver improved acoustic performance. It involves combining two pieces of glass of differing thickness in a double-glazing unit. These asymmetric glazing units leads to a perceptible difference compared to standard double glazing with the same total glass thickness.

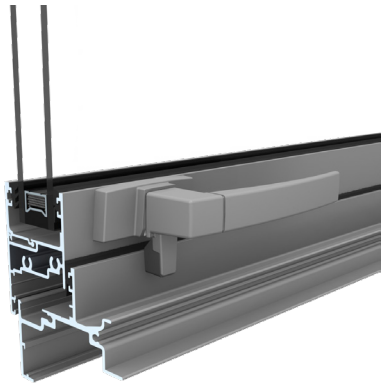
Gaskets & Seals

Metro Series and APL Architectural Series windows and doors are manufactured using high quality, controlled Santoprene seals.

There is a direct relationship between the ability of a window or door to offer sound reduction and its airtightness.

To achieve good acoustic performance, windows must close tightly with all gaps securely filled. If air can pass through the joints or openings in a window then so can sound.

Metro Series and APL Architectural Series windows and doors are designed to minimise air infiltration which facilitates good sound reduction.



Window sash must seal tightly against frame

Window Style

The design of a window or door will impact upon the ability of the system to deliver sound insulation.

By design, some windows and door styles “seal” better than others. For example, a sliding window does not seal as well as an awning or casement window and therefore (all other factors remaining equal) an awning or casement window is likely to deliver better sound insulation than a sliding window in the same installation.

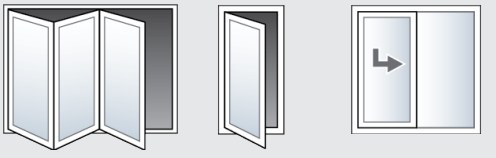
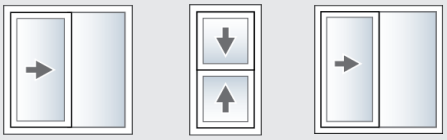
The selection of window style must be balanced based on acoustic performance, lifestyle and usage factors.

Installation

Regardless of how a window is specified or constructed, if it is poorly installed it will not deliver its maximum sound reduction properties.

Metro Series and APL Architectural Series windows and doors must always be installed by a licensed building practitioner in accordance with correct installation guidelines. If acoustic performance is paramount, it is recommended a sealant with high acoustic performance is used.

Comparison of acoustic performance by window style

Best Acoustic Performance	 Casement Window, Awning Window
Better Acoustic Performance	 Bi-fold door, Hinged Door, Compression Slider
Good Acoustic Performance	 Sliding Window, Double-Hung Window, Sliding Door

Measuring acoustic performance in windows and doors

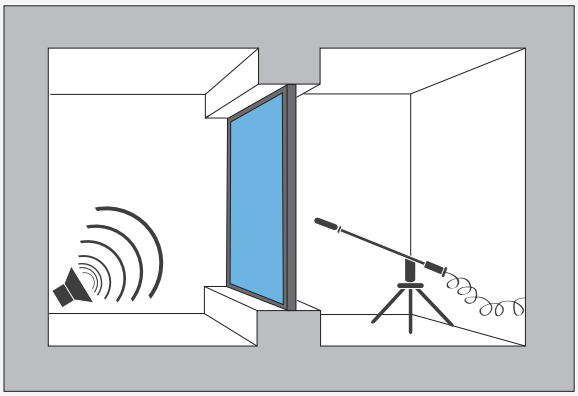
Whilst the individual elements of glass, seals and design have their own impact on window and door performance, it is essential to evaluate the ability of a window or door to insulate against sound in its entirety.

To determine how effective a window or door is at reducing sound, APL have undertaken rigorous acoustic testing of Metro Series and APL Architectural Series.

This commitment to performance testing ensures a comprehensive product offering delivering improved sound reduction properties for residential and commercial applications.

APL windows and doors are tested for acoustic performance in an accredited testing laboratory. The test involves measurement of the airborne sound which passes through the window and expression of this sound as an STC value.

Sound Reduction and Windows



Sound reduction is the screening of a room against a noise source. When it comes to windows and sound reduction, we are primarily concerned with airborne sound.

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

STC Values

Sound or acoustic performance of a window is measured by the weighted Sound Transmission Class or STC value. STC values are determined by measuring the reduction in dB achieved where a window is used to insulate against a sound source. Measurements are taken at 1/3 octave intervals from 125Hz up to 4000Hz, then calculated into a single STC value. The STC value will increase as the acoustic performance of a window improves, so that a window with an STC value of 39 has a significantly improved acoustic performance over a window with an STC value of 30.

In fact, it has reduced the airborne sound entering the room through the window by 9 decibels. For every increase in STC value, sound transmission is reduced by 1dB.

80dB (external noise) – STC 39 (glazing unit) = 41dB (internal sound)

Rw Values

Where STC values are common within the USA, most other countries have adopted the Weighted (Rw) Sound Reduction Index method for categorising building products. This is a very similar test method and scale to the STC characterisation, however, the frequency range is over 100 – 3150Hz. The lower frequency range better incorporates traffic frequencies and therefore, can provide a little more information through correction values.

Rw Correction Values

Rw values represent aggregated data showing the average performance of a window across a broad spectrum of sounds. To provide a more accurate description of a windows performance when subjected to a specific type of sound, we use correction values - these values are shown in brackets beside the Rw value e.g Rw41 (-1,1).

The first value is the “C” value which represents mid and high tone noises e.g. people talking. The second value is the “Ctr” value which 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 a reliable interpretation a windows performance when subjected to specific noise sources.

Our product solutions

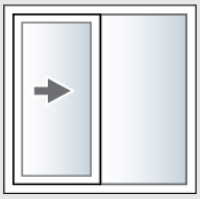
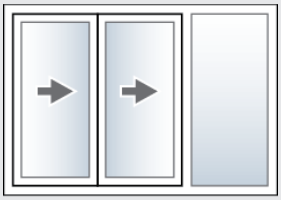
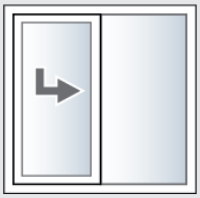
APL Windows Solutions have tested a range of Metro Series and APL Architectural Series systems for acoustic performance. For convenience, a summary of the STC and also Rw values achieved by each product are provided on the following pages.

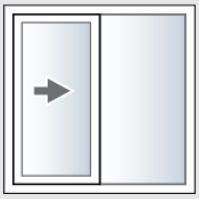
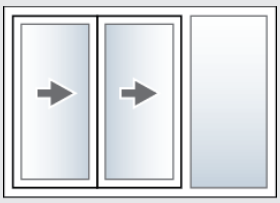
Full test reports are available for acoustics engineers and specifiers upon request.

Contact the APL technical team for more information.
The advisory service can be accessed in the following ways:

Phone | **07 849 8888**
Email | **apl.techinfo@aplnz.co.nz**
Website | **eboss.co.nz**

Test Results

Metro Series Acoustic Test Results		IGU	Rw (C, Ctr)	STC
Metro Series Windows				
Full Fixed		T5/14argon/L8.76 acoustic PVB*	37 dB (-2; -5)	37 dB
Fixed / Fixed		T5/14argon/L8.76 acoustic PVB*	38 dB (-2; -5)	38 dB
Fixed / Awning		T5/14argon/L8.76 acoustic PVB*	38 dB (-2; -5)	38 dB
Awning / Awning		T5/14argon/L8.76 acoustic PVB*	38 dB (-1; -4)	38 dB
Metro Series Sliding Doors				
Single Slider		T6/12argon/T10**	29 dB (-1; -1)	29 dB
Stacker Sliding		T6/12argon/T10**	29 dB (0; -1)	29 dB
Compression Slider		T6/12argon/T10**	35 dB (-1; -3)	35 dB

APL Architectural Series Acoustic Test Results		IGU	Rw (C, Ctr)	STC
APL Architectural Series Windows				
Full Fixed		T5/14argon/L8.76 acoustic PVB*	37 dB (-1; -5)	38 dB
Fixed / Fixed		T5/14argon/L8.76 acoustic PVB*	39 dB (-2; -6)	39 dB
Fixed / Awning		T5/14argon/L8.76 acoustic PVB*	38 dB (-1; -5)	38 dB
Awning / Awning		T5/14argon/L8.76 acoustic PVB*	38 dB (-1; -4)	38 dB
APL Architectural Series Sliding Doors				
Single Slider		T6/12argon/T10**	28 dB (-1; -1)	27 dB
Stacker Sliding		T6/12argon/T10**	29 dB (0; -1)	29 dB

* The theoretical value for the IGU made up of T5/14argon/L8.76 acoustic PVB is Rw 39 (-1, -5)

** The theoretical value for the IGU made up of T6/12argon/T10 is Rw 37 (-1, -3)

APL and its outstanding brands

Heritage and innovation. At APL Window Solutions, we take huge pride in our nearly 50-year track record of supplying window and door solutions for New Zealand home and building owners. That near half-century of market leadership has been rooted in a dedication to high-quality products backed by exceptional service. But it's also a reflection of our commitment to innovation and improvement, to always wanting to develop a better-performing window, a more eco-friendly powdercoating process and superior ranges of hardware.

You can clearly see that philosophy in our award-winning Centre of Innovation in Hamilton, a showpiece of cutting-edge APL technology. Our passion for research and development continues to generate game-changing new products and processes, increasingly with sustainability advantages included in the mix.

The other key strand of our DNA is that commitment to excellence. As New Zealand's leading window solutions company, with a nationwide network of almost 80 manufacturers, we have the kind of scale needed to ensure robust and consistent quality control. We own all the major steps in the process, from aluminium extrusion to specialised manufacture to in house surface finishing – we even handle delivery, courtesy of a nationwide distribution fleet.

The Altherm, First and Vantage brands are owned by APL Window Solutions, New Zealand's leading window systems company.

An extensive network of manufacturers stretches throughout New Zealand. These businesses are individually owned and managed, with knowledge, expertise and skills to assist with projects. They are exclusive providers of the APL range of products.

See our websites **altherm.co.nz, firstwindows.co.nz, vantage.co.nz** for manufacturer details.

Phone | **07 849 8888** Email | **apl.techinfo@aplnz.co.nz** Website | **eboss.co.nz**

APL® WINDOW SOLUTIONS