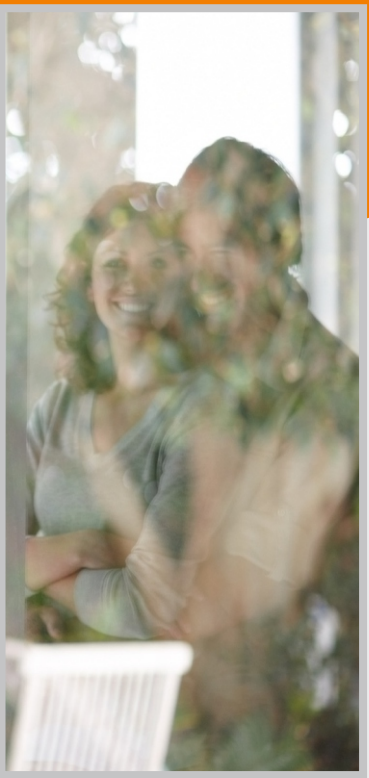


SPECIFICATION GUIDE

SOUND PROOF WINDOWS

Noise stress can be a major cause of illness. It not only damages one's hearing, it also leaves persistent marks on the human psyche.
For many years, effective protection against undesired noise has not merely been a matter of comfort, but a decisive issue in health protection.

Since windows are – literally the thinnest parts of a building's shell, they play a decisive role in the acoustic absorption values of your house.

SOURCE OF NOICE

Noise is any sound that is unwanted, usually because it distracts or disturbs us. Noise can come from a variety of different sources but there are only really two forms:

Airborne

These are sounds which travel in waves through the air and enter our ears. Airborne noise can travel from outside a building to the inside.

Typical examples are:

- Music
- Children playing
- Traffic noise

Impact

These are sounds that are transmitted via vibration through a physical structure such as a conservatory roof.

Typical examples are:

- Rain
- Hail
- Wind

What is sound or noise?

SOUND is everything that we can hear, it doesn't have to be noise.
NOISE is often referred to as "unwanted sound".

Noise is difficult to define and is down to personal interpretation and is subjective according to:

- The person receiving the sound
- The circumstances they are in
- The type of sound
- The duration the listener is exposed to the sound

For example:

- A siren going off for a few seconds may be mildly irritating whereas a siren that goes on for a prolonged period can be become both disturbing and painful.
- We notice the noise of a loud motorbike in the middle of the night where as this noise is lost during the day in the middle of rush hour.

How does sound travel?

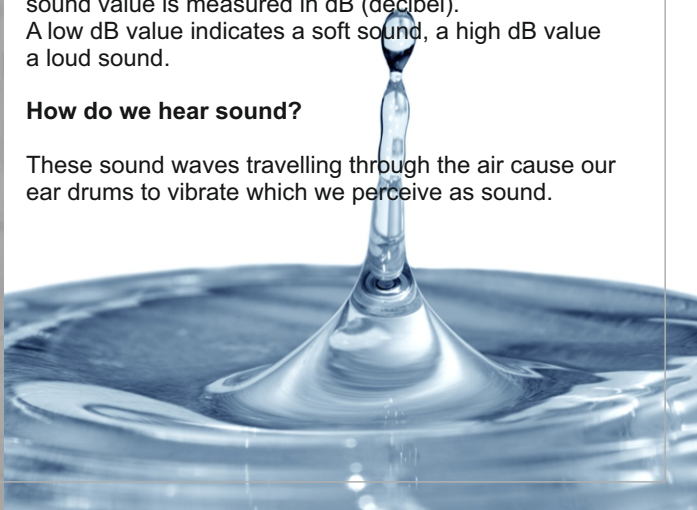
Sound travels through the air like the ripple you see on the surface of water when a stone is dropped into it. The soundwaves radiate out in all directions from the source, steadily reducing in intensity or until an object stops their progress.

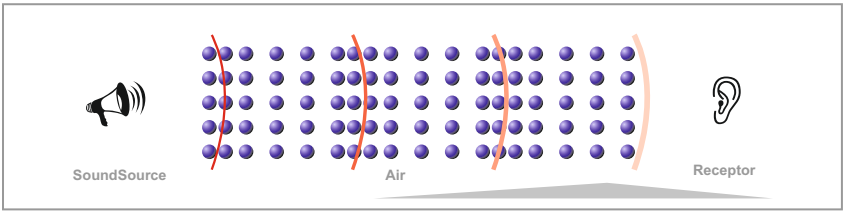
Describing a sound

Sound can be characterised in different ways but primarily in terms of intensity and frequency. The sound intensity describes how soft or loud the sound is. The sound value is measured in dB (decibel).
A low dB value indicates a soft sound, a high dB value a loud sound.

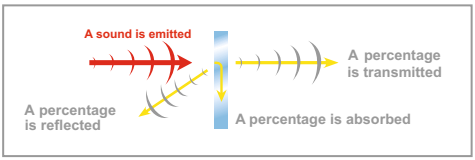
How do we hear sound?

These sound waves travelling through the air cause our ear drums to vibrate which we perceive as sound.

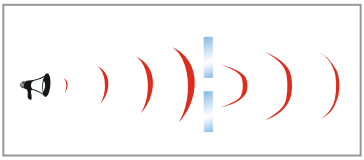




Sound waves steadily reduce in intensity as they travel away from the source.



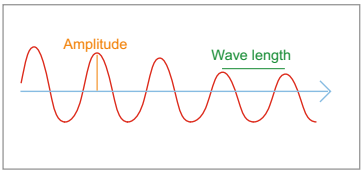
Sound meets an obstacle



One small gap in the obstacle is already enough to allow sound to travel through

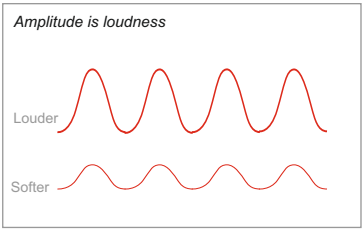
What is amplitude?

Amplitude is directly related to the acoustic energy of a sound, measuring the height or intensity of a soundwave, rather than its length. Both amplitude and intensity are related to sound's power.



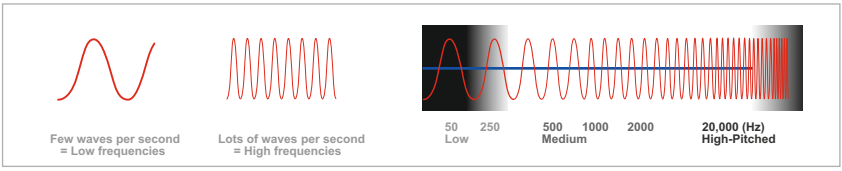
What is loudness?

Loudness is the way in which we perceive amplitude. A particular change in amplitude is not necessarily perceived as being a proportionate change in loudness.
That is because our perception of loudness is influenced by both the frequency and quality of sound, measured as Sound Pressure Level (SPL).



What are low and high frequency sounds?

Frequency is defined as the number of vibrations per second. The higher the number of vibrations per second, the higher the pitch. Pitch is the way we perceive the frequency of sound. Frequency is expressed in Hertz (Hz). Tones that are high in pitch are high frequency (many vibrations per second) and tones that are low in pitch are classed as low frequency.



Effect of Glazing Area:

The larger the glazing area, the greater the amount of noise energy able to pass through it.

Effect of Distance:

The more distant the noise source, the lower the noise level.
If you situate your bedrooms away from a noise source, you can expect lower levels of noise.

Street noise will be reduced approximately 3 dB every 10 metre distance from the source.

For example:

Noise level (NL) beside the source 80 dB:

10 m	(NL-3 dB)	77 dB
20 m	(NL-6 dB)	74 dB
80 m	(NL-12 dB)	68 dB
160 m	(NL-15 dB)	65 dB

Effect of Height:

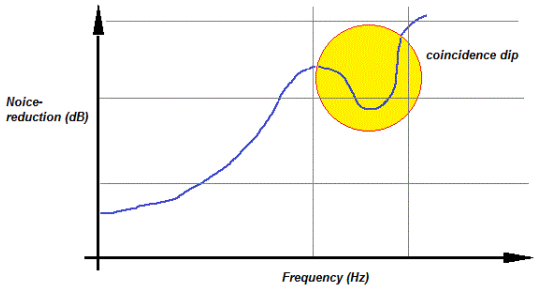
On higher floors in a building, the street noise level is expected to decrease.

Effect of Frequency:

Low frequency noise is usually generated by music, human voice or heavy vehicles and is more difficult to control and reduce than high frequency noise.
Where low frequency noise is of concern, the overall design of a window may need to be evaluated by an acoustic consultant.

Effect of Glazing:

Sound reduction will improve with increased glass thickness due to the greater mass involved.
However, the positive effect of increased glass mass is to some extent restricted by what is known as the coincidence dip.
This is the frequency at which the glass panel vibrates in unison with the frequency of the incident sound pressure waves. The result is a strongly reduced insulation value.



.

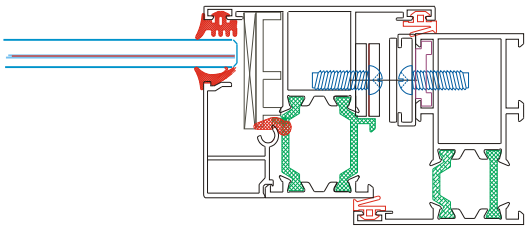
Sound reduction will improve with the use of laminated glass due to the vibration dampening effect of the PVB- interlayer.

Sound reduction will slightly improve with the use of glass/ airspace combinations.

Effect of Profile:

Sound reduction will improve with increased profile thickness due to the greater mass involved.

Sound reduction will improve with the use of “thermal break” unit (green) inside the profile due to the vibration dampening of this fibre glass material.

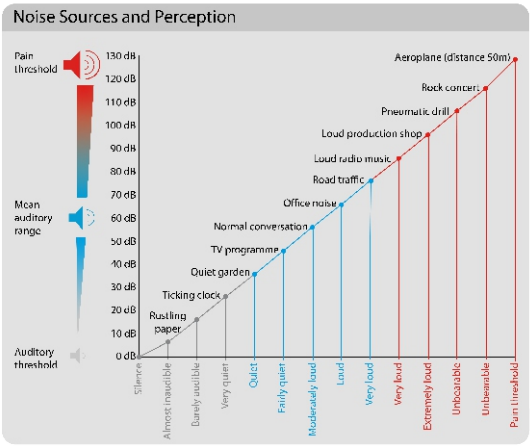


Sound reduction will improve with the use of gap free EDPM gaskets (red) in two levels in frame and sash and additional gaskets to cover the glazing.

Where there is a noise problem to solve, three areas have to examined

1. determine and / or measure the external noise;
2. sound insulation rating of the window system
3. the resultant noise level in the room.

The table beside provides a guide to examples of noise measured in decibels (dB) against the recommended noise levels for a room in a building.



Recommended interior noise levels

Bedroom	30 - 35 dB
Study room	35 - 40 dB
Living room	40 - 45 dB
Home office	45 - 50 dB

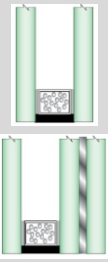
By subtracting the recommended indoor noise level from the typical outdoor noise level, you can estimate the appropriate acoustic performance for your windows.

For example:

External noise source		74 dB
Requested Room noise level	./.	35 dB
Difference	=	**39 dB**

In our sample a **39 dB rating** is required for the window system.

Based on the desired noise reduction choose the glazing

Glazing Type	Thickness (mm)	Glazing Structure (mm)	Sound Reduction (dB)	Weight (kg/m2)
 Single	3 5 6 10 15 19		30 32 32 36 37 40	7.46 12.45 14.94 24.9 37.35 47.31
 Laminated	6.38 10.38 12.38 12.5 16.76 20.76	3- 0.38 PVD-3 5- 0.38 PVD-5 6- 0.38 PVD- 6 6- 0.50 PVD- 6 8- 0.76 PVD- 8 10- 0.76 PVD-10	33 36 37 39 41 43	15.24 25.1 30.18 30.25 40.44 50.4
 Insulated (IGU)	22 24 23.38 24.38	5- 12 Air -5 6- 12 Air -6 5- 12 Air -3-0.38 PVD- 3 6- 12 Air -3-0.38 PVD- 3	33 34 34 37	26.4 31.48 29.25 31.75

After chosen the glazing matching your desired noise reduction, you can start to place your price and delivery enquiries.

Unexpected Facts:

For every 10 dB increase / decrease in intensity we perceive the sound as being a doubling / halving of the noise level.

Insulation value	Sound reduction
10 dB	**50 %**
20 dB	**75 %**
30 dB	**87 %**
40 dB	**94 %**

The decibel is not a linear measurement, rather it uses a logarithmic scale that accommodates the range of sound pressure levels discernable by the ear. Even the smallest decibel level deviations delivers huge results.

Please consider before you finally confirm your window order

Only the combination of the right window type, glazing and installation method will provide you the desired noise reduction !

The weight of sound proofed glazing can rich easily up to 50 kg / m2.
Base on this huge weight the window design and construction must be extraordinary strong.

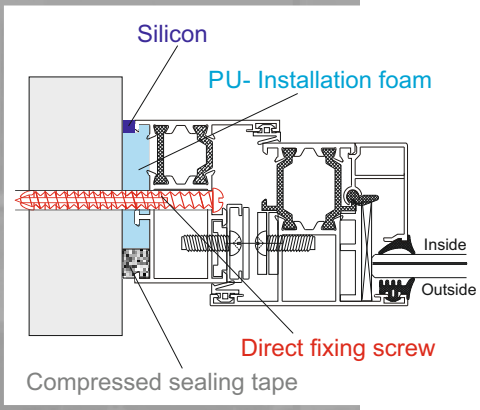
An air gap of only 1% of the total window can reduce the sound insulation by up to 10 dB, meaning that the noise passing through sounds twice as loud as it would if well sealed.

We recommend to use EDPM made gaskets in at least two levels inside window sash and window frame. Gaskets corners should welded or glued to each other to provide an permanent gap free solution. .

Cause of fast aging of silicon under sunshine the glazing has to be fixed by gaskets. Rubber gaskets are not dimension stabile and not recommended.

The right installation method is important to close the gap in between window and building structure. Only installations following the European RAL standard will provide long-lasting water- and airtight connections.

For example:



In case you are looking in addition after energy savings, burglar resistant or security issues, the window design can be adjusted to match your demands.

NOTES

This guide will help you to understand sound and sound proving. If you are considering any sound insulation, it is recommended that you verify the sound insulation specifications with our specialists to ensure the proposed changes provide significant noise reduction.

MAKE YOUR WORLD A QUIETER PLACE...

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