TECHNICAL SALES BULLETIN 019

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Acoustic Insulation

Like fire rated products and Thermal insulation products, Acoustic Insulation is system dependant. The glass and the frame together determine the acoustic insulation performance of the entire window/façade. The sound reduction index for a window can only be verified after testing the complete assembly.

Acoustic Power

Acoustic power can be expressed by its intensity I or P, measured in Watts per m^2 or Pascal. It's common practice to measure sound by its level of pressure or intensity.
Although the acoustic intensity of two or more sources increase by addition, the same is not true of the acoustic power.

Example

2 Trumpets EACH producing a level of 80dB but together produce 83dB, and not 160dB.

Weighted Reduction Index (R_w)

This is the most common method of rating sound insulation in buildings and building elements. It incorporates a weighted correction for the human ear and is expressed in dB.

Spectrum adaptation terms (R_w ($C;C_{tr}$))

The correction C_{tr} should be used when the source of the noise in question is road traffic noise.

For outside background noise it is better to use the correction *C (Referred to as Pink Noise)*
Both ($C;C_{tr}$) are generally negative values and are deducted from the R_w to determine the noise reduction properties of the building element.
R_w ($C;C_{tr}$) = 37 (-4;-9)
(C) 37 – 4 = 33dB (Expected Background Noise Reduction) (Pink Noise)
(Ctr) 37 – 9 = 28dB (Expected Traffic Noise Reduction)
Depending on how Windows are assembled and installed, it may under-perform at low, medium or high frequencies.

Changes in Apparent Loudness

+/- 1 dB Change – Almost Evident
+/- 3 dB Change – Noticeable
+/- 5 dB Change – Clearly Noticeable
+/- 10 dB Change – Twice as Loud / Half as Loud
+/- 20 dB Change – Four times as Loud / ¾ Of original Loudness
The following table gives you a COG (Centre Of Glass) expected reductions in dB.
These values cannot be added for example.
6.38mm Laminated Safety Glass (33dB) combined with 6mm Toughened Safety Glass (29dB) does not give you a 62dB reduction. Please see the table below for more info on single and double glazing expected dB reductions.
**When a 12mm Spacer bar is used.*

Product			Rw	C	Ctr
Glass	Air Gap	Glass			
4mm	N/A	N/A	30	-2	-2
5mm	N/A	N/A	31	-2	-2
6mm	N/A	N/A	32	-1	-2
8mm	N/A	N/A	33	-1	-2
10mm	N/A	N/A	35	-1	-2
15mm	N/A	N/A	37	-	-2
19mm	N/A	N/A	40	-1	-3
6.38mm Laminated	N/A	N/A	33	-1	-2
8.38mm Laminated	N/A	N/A	34	-1	-3
10.38mm Laminated	N/A	N/A	35	-1	-2
12.38mm Laminated	N/A	N/A	38	-1	-3
16.38mm Laminated	N/A	N/A	39	-1	-3
6.50mm SoundPrufe	N/A	N/A	35	-	-3
8.50mm SoundPrufe	N/A	N/A	37	-1	-3
10.50mm SoundPrufe	N/A	N/A	38	-	-2
12.50mm SoundPrufe	N/A	N/A	39	-	-2
16.50mm SoundPrufe	N/A	N/A	41	-1	-3
6.38mm Laminated	12mm	4mm	33	-1	-4
6.38mm Laminated	12mm	6mm	32	-1	-4
6.38mm Laminated	12mm	8mm	35	-1	-5
8.38mm Laminated	12mm	6mm	35	-2	-5
8.38mm Laminated	12mm	8mm	33	-2	-6
10.38mm Laminated	12mm	6mm	37	-2	-5
10.38mm Laminated	12mm	8mm	38	-1	-4
10.38mm Laminated	12mm	10mm	25	-2	-4
6.50mm SoundPrufe	12mm	4mm	36	-2	-6
6.50mm SoundPrufe	12mm	6mm	38	-2	-6
6.50mm SoundPrufe	12mm	8mm	40	-2	-7
8.50mm SoundPrufe	12mm	6mm	38	-1	-4
8.50mm SoundPrufe	12mm	8mm	40	-1	-5
10.50mm SoundPrufe	12mm	6mm	40	-2	-6
10.50mm SoundPrufe	12mm	8mm	41	-3	-7
12.50mm SoundPrufe	12mm	10mm	43	-2	-6
6.38mm Laminated	12mm	6.38mm Laminated	33	-2	-5
6.38mm Laminated	12mm	8.38mm Laminated	36	-1	-5
6.38mm Laminated	12mm	6.50mm SoundPrufe	38	-2	-6
8.38mm Laminated	12mm	6.50mm SoundPrufe	40	-2	-6

Certain frequencies like earthmoving equipment and high pitched sounds will penetrate the building elements. The Human ear is more sensitive to certain sounds so these are noticed easily and cannot always be eliminated.

Using the table above one can get an indication of what the expected dB reduction would be on a window taking note that size of the window and amount of glass to frame member also plays a role.

I you have external noise of 62dB with an expected reduction of 33(-1;-4) then you will have the following inside the house (*if all other elements are also acoustic insulated*)

External dB - Rw (C)
62 – (33 – 1) = **30dB** (Expected Background Noise Inside) (Pink Noise)
External dB - Rw (Ctr)
62 – (33 – 4) = **33dB** (Expected Traffic Noise Inside)

dB	Environmental Condition
120	Threshold of pain,
120	Jet engine take off at 30 metres
114	Loud car horn at one metre
74	Average traffic at the kerb
60	Conversational Speech
54	Typical Open Plan Office
34	Library
24	Bedroom at night
18	In the bush
14	Recording Studio
0	Threshold of hearing

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