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SOUND CONTROL WITH GLAZING

For most cases a practical definition of sound control is acoustical privacy or the elimination of interfering or distracting sound.

The fist and most important question to ask is why do we require sound control? To answer the question it is critical to look at a building and describe its final function. A hotel near to an airport would be a critical example. It is required to provide a sound controlled environment in which a customer can sleep at any time of day or night. A corporate office block may have different sound control requirement in different parts of the building. For example, an open plane office has a relatively high level of ambient sound which masks incoming sound. The executive offices may have a requirement to not only control sound from sources outside the building but also from within. The presentation facilities may require concert hall type acoustics and sound control. As with all environmental control, it is essential and most cost effective to design a project with sound control issues taken into account. To attempt to patch up a building in the end is normally less effective and more expensive.

What follows is a checklist that will aid a project designer with sound control issues.

1. Sound Target
   Project requirements in terms of sound.
   What sound levels required in which areas of the building? Does the building have sound control requirements 24 hours of a day 365 days a year (for example a hospital), only during the day (an office), only at night (nightclub) or only specific times (a building next to a motor racing circuit)?

2. Sound Sources
   Different noise sources have different sound signature. This means that sound from a jet aircraft has a different signature from turboprop, a train, a freeway, a city street etc. Different sound reducing measures are suitable for these different sources.

3. Project Location
   The further away the project is from the noise source the less the noise will be. For example should the project be close to a freeway, place the more noise critical areas on the side away from the freeway. Also, consider positioning the whole building as far away as possible from the sound source. Look at the orientation of the building and rather than aligning a façade square onto the sound source, angle it away. Sound is also reflected and the shallower the angle at which sound hits a façade the less the amount of transmitted sound.

4. Project Construction

Look at the construction of the building in terms of sound control. What is the basic construction of the walls and roof and are these sufficient in terms of sound control? Are there holes in the wall (for air conditioners, service pipes, airbricks etc.) compromising the sound control? Look also at the roof construction. Pitched roofs are often sealed at the eaves allowing sound through the ceiling boards.

5. Internal Sound Sources

Are internal sound sources compromising sound levels? For example, a noisy air conditioning system may produce more sound than the target. Also hard surfaces such as stone, steel or painted plaster reflect sound, causing a reverberation effect (echo). Stairwells, atria and light wells can become sources of unwanted sound.

6. Sound Masking

Adding acceptable sound to the environment can mask unwanted or annoying sound. This can take many forms but may include music, the sound of a water feature etc.

7. Glazing System

As the connection to the environment, the glazing system can allow sound into the project environment. Any air leak in a façade will allow sound in. Specify frames that are leak proof and with air seals around opening windows. These seals must be of a closed cell foam type.

8. Glass

Sound is transmitted through glass - as through any solid. Glass thickness and composition govern the amount and nature of transmitted sound. Doubling the thickness of the glass will theoretically reduce the transmitted sound by 3dB – a slight but noticeable charge. For example 6mm will have 3dB more transmission loss than 3mm and 3dB less than 12mm. Measured sound reduction values are reproduced below. The composition of the glass can be changed by one of two methods. Laminating the glass adds a soft plastic layer which reduces sound transmission. Double-glazing or **Insulvue** units create an airspace which also reduces sound but lacks the elastic interlayer of the laminated glass. Ordinary 6.38mm laminated glass therefore has better sound reducing properties that double glazing manufactured from two pieces of annealed 4mm glass. This is not altogether surprising, as the primary function of double-glazing is thermal insulation. To maximize sound reduction the airspace must be increased above the optimum for thermal insulation. Double glazing units, unless hermetically sealed, have problems of dirt and moisture ingress. The larger air spaces must therefore allow access for cleaning whilst also maintaining an air seal. Introduction of laminated glasses into double-glazing also helps to reduce noise. It is possible to provide glass with the correct sound reducing properties for any project.

9. Sound Reduction Measurement

Unfortunately there are many methods of measuring sound reduction. The most often quoted in South Africa are R and STC (sound transmission class) reflecting the influence of both Europe and the United States on South Africa standards. A more in depth explanation of the STC standard can be found here http://www.genesisacoustics.co.za/productdetails.php?id=100017 Both measurement standards assign a single number to the ability to reduce sound by matching a standard curve to the measured sound. Although standards are similar, different glass make-up's must only be compared using either STC or R – not a combination. Both standards are measured in dB.

10. What does 1dB mean?
1 dB is measurable but impossible for the human ear to discern. 3dB is a perceptible difference in sound. 5-6dB is a significant change in sound. 10dB represents a doubling or halving of the sound.

Below is a table comparing sound reducing properties of glass and glass compositions. Sound reduction values for common wall constructions are included. Please note that these values are estimated and not tested.

	STC
	(dB)
3mm Clearvue	23
6mm Clearvue	28
12mm Clearvue	31
6.38mm IntruderPrufe Normal Strength	33
6.76mm IntruderPrufe HPR	34
12.76mm IntruderPrufe HPR	38
4mm Clearvue 12mm Airspace 4mm Clearvue Insulvue	33
6mm Clearvue 12mm Airspace 4mm Clearvue Insulvue	35
8.76mm Soundprufe HPR	38
6.76mm IntruderPrufe HPR 12mm Air space 6.76mm IntruderPrufe HPR Insulvue	42
6.76mm IntruderPrufe HPR 100mm Air space 6.76mm HPR IntruderPrufe Insulvue	52
4 inch brick wall sealed	41
Double brick wall sealed	45
6.38mm IntruderPrufe 100mm Air space 4.0mm Clearvue	45
6.38mm IntruderPrufe 100mm Air space 6.38mm IntruderPrufe	48

In order to combine one way vision and sound control, we recommend:

1. 26mm Insulvue, 6.76mm Solarshield S10 Bronze / 12mm Air gap / 6.76mm IntruderPrufe HPR.STC value 42 dB.

All types of one-way vision glasses depend upon a colour or a transparent metallic deposit to provide a reflective surface which, in effect, reflects a light source back to the eye of the observer. It is therefore essential that the side of the glass facing the subject of observation is more brightly lit that the side from which the observation takes place i.e. viewing is always from a dark area in to the light area.

Points to consider before specifying one-way vision glasses:

1. The observer should not be silhouetted against a window or any other light source.
2. The greater the difference is light intensity levels between the two areas, the more efficient the result. Generally, a minimum ratio of 6:1 is required.

3. The greater the density of the colour or metallic deposit on the glass, the more effective it becomes. We recommend a Solarshield S10 Silver, Grey, Bronze with the **silver side to the subject of observation**, to achieve optimum results.

Information supplied courtesy Glass South Africa.