# Acoustics

Recommended noise levels in a residential property

- Bedroom: 30db
- Living Room: 35db

Single Glazed windows typically perform between 28-30db Solid stone walls typically perform around 40db. Brick and Block 2 inch cavity walls (new build) typically perform around 50db. On the rare occasion a customer is dis-satisfied with the performance of the Secondary Glazing it may be that the noise reduction is affected by the walls as the noise performance is only as good as the weakest point in the room.

Prior to the installation of the secondary glazing the primary window may have performed at 28db and the walls may have performed at 40db. The householder will distinguish the window as being the problem area as this is the weakest point. After installation the walls will still perform at the same level but dependant on which glass and style of secondary it will be at a higher Db level than the walls but the householder will still hear the noise the wall let through but there perception will be the window is not performing.

Soft furnishing will aid noise reduction by absorbing the noise energy inside the room.

| Rw dB values for Granada Secondary Glazing | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 200mm Glass to Glass | | | | | | | | |
| Secondary Glazing | Primary Window with 4mm Float Glass | | | | Primary Window with 6mm Float Glass | | | |
| | SS2 | HHU | BVS | HTBVS | SS2 | HHU | BVS | HTBVS |
| 4mm Float | 49 | 50 | 49 | 47 | 51 | 51 | 51 | 48 |
| 6mm Float | 50* | 51* | 51* | 47* | 51* | 52* | 52* | 48* |
| 6.4mm Stadip Silence | 51 | 52 | 53 | 48 | 52 | 53 | 54 | 50 |
| 8.8mm Stadip Silence | N/A | 52* | 52* | 48 | N/A | 53* | 53* | 49 |
| 10.8mm Stadip Silence | N/A | 53 | N/A | N/A | N/A | 54 | N/A | N/A |
| 4/12/6.4mm Sealed Unit | N/A | 53 | N/A | N/A | N/A | 53 | N/A | N/A |
| 150mm Glass to Glass | | | | | | | | |
| 4mm Float | 48* | 48* | 47* | 46* | 51 | 50* | 50* | 47* |
| 6mm Float | 49* | 49* | 48* | 46* | 51* | 50* | 50* | 47* |
| 6.4mm Stadip Silence | 50* | 50* | 49* | 47* | 52 | 51* | 52* | 48* |
| 8.8mm Stadip Silence | N/A | 50* | N/A | 47* | N/A | 51* | N/A | 48* |
| 10.8mm Stadip Silence | N/A | 51* | N/A | N/A | N/A | 52* | N/A | N/A |
| 4/12/6.4mm Sealed Unit | N/A | 51* | N/A | N/A | N/A | 52* | N/A | N/A |

* Sound reduction figures predicted by Chiltern Dynamics using the basis of actual laboratory test results. Sound Reduction (Rw) measured in dB.

KEY: SS2 - 2 Pane Horizontal Slider, HUU - Side Hung Unit,
BVS - Balanced Verticle Slider, HTBVS - Heritage Tilt-In Balanced Verticle Slider

# Acoustics

### How do we measure sound?

Sound energy travels in waves and is measured in frequency and amplitude. Amplitude measures how forceful the wave is. It is measured in decibels or dBA of sound pressure. 3 dBA is the softest level that a person can hear. Normal speaking voices are around 65 dBA. A rock concert can be about 120 dBA.

Frequency is measured in the number of sound vibrations in one second. A healthy ear can hear sounds of very low frequency, 20 Hertz (or 20 cycles per second), to a very high frequency of 20,000 Hertz. The lowest A key on the piano is 27 Hertz. The middle C key on a piano creates a 262 Hertz tone. The highest key on the piano is 4186 Hertz.

Decibel reduction is measured over four stages where all four stages are important to ensure the window performs well.

Cavity - The larger the cavity the better as noise passes through solid objects quite easily but when a cavity is introduced the noise passing through changes from noise energy to heat energy as it goes from solid object to air.

Stiffness - The stiffness of the product the noise is passing through is also important as the more flexible it is the more energy it will absorb thus reducing the noise.

Mass - The higher the mass of the product the noise is passing through is beneficial, the thicker the glass the better. Please bear in mind this offsets the stiffness factor as more mass in the glass is likely to be stiffer so this could be detrimental to energy absorption.

Air Leakage - If the seal/woolpile etc. are not effective this will have a negative effect on the overall results.

### Glass Thickness

Conflicting thickness of glass is very important because if you have two pieces of glass the same thickness this will cause a coincidence drop as the levels of noise will pass through exactly the same therefore you always require a conflicting thickness of glass in the secondary to the primary window to ensure the coincidence drop does not occur. If the above rules are adhered to the customer can expect a high noise reduction dependant of type of glass used.

### How noise is perceived by the human ear

The human ear does not register low frequency noise but responds very well at high frequency i.e. baby crying or phone ringing 3db is the lowest frequency the human ear can distinguish. An additional 5db is perceived as a clearly noticeable difference. An additional 10db difference is the human ear perception of doubling the noise.

### Examples of external noise levels

- Nightclub noise levels approx. 120db
- Road Traffic noise levels during the day (B Road) 80-85db
- Road Traffic noise levels during the night (B Road) 70-75db
- Road Traffic noise levels city centre 90db