

TECHNICAL BRIEF

Acoustic Ratings and Methods of Improving Acoustic Performance

As the population has expanded, construction trends have shifted towards higher density residential and commercial constructions. In order to satisfy the expectations of the occupants, the acoustic performance of the construction and its openings requires careful consideration. The following section has been designed to provide a general understanding of what possibilities are available to increase the acoustic resistance of a glazing.

There are **four** main ways in which the acoustic (R_w) rating of a window or glazing can be improved:

1. Decreasing the amount and volume of direct transmission paths through the glazing

Firstly there is no point spending lots of money on upgrading to a high performance glass product if the window frame and seals are not upgraded. Air tightness of the window construction, in particular, has been experimentally proven to be the most effective method of increasing the R_w value of a window. This because each opening in the window, frame and seals provides a direct transmission path for the sound to pass through. By reducing the number and volumes of these paths more sound must pass through the 'barrier' ie. the glass improving the overall performance of the system.

2. Increasing the thickness of the glass

Thicker glass vibrates less than thinner glass, consequently the amount of sound able to pass through the window is reduced. Unfortunately this increase in glass thickness is limited by a phenomenon known as the 'coincidence dip'. The coincidence dip is a frequency range over which the transmission of the sound increases through a material. The location of the coincidence dip is dependent on the materials weight and its inherent stiffness. Otherwise thickening the width of the glass would be the solution to all window acoustic problems.

3. Moving from a monolithic to a laminated glass construction

Laminated glass consists of two sheets of glass bonded together with a plastic interlayer. This plastic interlayer in the construction provides a damping mechanism in the glazing (the interlayer actually absorbs vibrational energy). This damping mechanism is particularly effective over the coincidence dip in the transmission spectrum. The result is that the coincidence dip is minimized and the overall performance is increased. A somewhat recent advance in laminated glass has been the development of 'sound' interlayers. These have been specifically designed to further reduce the coincidence dip, which maximizes the performance possible at each construction thickness.

4. Changing to a Double-glazed unit (DGU / IGU) Construction

Double Glazed Units (DGU or IGU) consists of two glass sheets separated by metal spacer to form an air gap between the two sheets. This allows each glass sheet in the unit to act as a separate barrier to the transmission of sound. Unfortunately the spacer separating the two glass sheets effectively forms a small short-circuit in the system. The spacer itself provides a direct path for the sound vibrations to be transmitted from the external glass sheet to the internal sheet of the DGU. This short circuit could obviously be eliminated by not removing the metal spacer. However, this is not commercially viable option and would directly result in condensation of the DGU as well as allowing dust and particulates to deposit onto the internal faces of the two glass sheets.

Very large air gaps are more effective at reducing sound transfer than smaller air gaps. In practice increasing the air gap from 6mm to 12mm provides little benefit however, substantially increasing the air gap to over 90mm provides a large increase sound reduction. This anomaly is due to air trapped inside the unit acting as sound transfer mechanism between the glass faces of the DGU. As the air gap approaches 90mm this effect decreases in its severity.

Summary

In practice there are numerous approaches that can be used to improve the sound resistance of a glazing and more often than not the most appropriate solution is a combination of one or more of methods listed above.

G.James has outlaid a considerable investment in independent sound transmission testing of its product range. G.James has the knowledge and skills to work with you to obtain the most appropriate product for your application.