

SOUND SOLUTIONS

ACOUSTICAL GLAZING

No. 7

The acoustical properties of glass are of considerable importance in many applications, not the least of which being exterior windows facing a busy street or highway. The ability to transmit light does not directly affect the ability of glass to block sound transmission. In fact, it is possible to construct glazing systems that are more effective in reducing sound transmission than solid concrete! However, these glazing systems are considerably more expensive than concrete.

Acoustical Design

In most buildings the windows are the dominant sound transmission path for exterior noise. This is primarily because the windows are much thinner than the exterior walls. Another contributing factor is the use of operable windows. By their nature, all operable windows have air leakage which can seriously degrade the acoustical performance. For a balanced acoustical design, the exterior wall and window should have equal sound transmission loss performance if the exposed areas of each are equal. If the wall has a much larger percentage of the total exposed surface area, then the window STC rating can be up to 10 points lower than the wall STC. Hiring a qualified consultant to make these design decisions is the best way to ensure that you get the performance you need at minimum cost.

Table 1 Glazing STC Ratings

Glazing System	STC Rating
Monolithic	
1/8" thick solid glass	STC-30
1/4" thick solid glass	STC-31
1/2" thick solid glass	STC-36
Laminated	
1/4" laminated glass	STC-35
3/8" laminated glass	STC-36
1/2" laminated glass	STC-38
3/4" laminated glass	STC-41
Insulating	
1/8" glass - 1/4" air space - 1/8" glass	STC-28
1/8" glass - 3/8" air space - 1/8" glass	STC-31
1/4" glass - 1/2" air space - 1/4" glass	STC-35
1/4" glass - 1" air space - 1/4" glass	STC-37
1/4" glass - 4" air space - 3/16" glass *	STC-51
Laminated Insulating	
1/4" laminated - 1/2" air space - 1/4" glass	STC-39
1/4" laminated - 1" air space - 3/16" glass	STC-42
1/4" laminated - 2" air space - 3/16" glass *	STC-45
1/4" laminated - 4" air space - 3/16" glass *	STC-48
Double Laminated Insulating	
1/4" laminated - 1/2" air - 1/4" laminated	STC-42
1/4" laminated - 8" air - 1/4" laminated *	STC-49
1/2" laminated - 4" air - 1/4" laminated *	STC-51
1/2" laminated - 8" air - 1/4" laminated *	STC-56

* perimeter lined with acoustical material

Table 1 lists the approximate STC rating of common glazing systems. Remember, the STC is directly proportional to noise reduction *when comparing like sounds*. For example, the noise level on the quiet side of an STC-30 window will be approximately 10 dB greater than it would with an STC-40 window and the same noise source. This is not necessarily true for dissimilar sounds. For example, an STC-35 window might provide 30 dBA noise reduction for automobile traffic noise and only 25 dBA noise reduction for jet aircraft noise.

Monolithic and Laminated Glass

You will note in Table 1 that increasing the thickness of monolithic (solid) glass increases the STC rating. However, increasing the thickness greatly increases cost, without achieving a comparable improvement in performance. Laminated glass is a very effective means of improving the sound rating without using double pane construction. Laminated glass is two or more layers of monolithic glass sandwiched together with a thin layer of plastic. Laminated glass is used in automobile windshields for safety reasons (to prevent shattering during impact). The improvement in STC rating using laminated glass varies with the exact construction, but in all cases laminated glass is superior to monolithic glass of the same total thickness. The improvement is due to the additional damping which converts the acoustic vibrations to heat.

Insulating Glass

As far as double glazing is concerned, the larger the air cavity the better the STC rating. Air cavities less than 1/2" should be avoided. *Note that double glazing with two layers of 1/8" glass and a 1/4" air space actually has a lower STC rating than a single layer of 1/8" glass!* Air cavities larger than 1" thick are not generally available in sealed, insulated units. However, acoustically designed systems are commercially available with air cavities as large as 8 inches.

Triple glazing is not generally recommended because it is much more expensive than double glazing, and its acoustical performance at low frequencies is generally poorer than double glazing of the same total thickness. Using dissimilar glass thicknesses in double glazing is generally a good idea for improved acoustical performance. When both layers of glass have equal thickness, the resonance effects of each pane will match causing increased transmission at certain frequencies.

Of course, acoustical glazing systems must be properly sealed for air leakage at the perimeter in order to achieve the desired performance. This is why installation should always be provided by professionals experienced with acoustical glazing.

The above information has been reviewed and is believed to be accurate, however we assume no responsibility for errors or omissions.

