Expert Series:
Glass Acoustic Performance

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Effective sound control can be an important aspect of successful glazing applications. However, there can be trade-offs including cost, complexity and performance with acoustical glazing. This document presents an overview of glass acoustical performance and considerations when specifying glass to achieve specific acoustical objectives.

Some of the considerations when specifying acoustical glazing include occupancy conditions, the type of anticipated noise, applicability of the acoustic performance rating system, and budgetary constraints.

Decibel Scale

A common measurement of sound is the decibel scale, within which each 10 dB increment correlates with a ten-fold increase in sound intensity and a roughly two-fold increase in perceived volume.

Table 1

Approximate Sound Levels	
Onset of Hearing	0 dB
Ticking Watch	20 dB
Refrigerator Hum	40 dB
Air Conditioner	60 dB
Lawn Mower	80 dB
Nearby Car Horn	100 dB
Nearby Siren	120 dB
Firecracker	140 dB

Source: Center for Disease Control and Prevention

For a glazing installed on a building envelope, the Outdoor-Indoor Transmission Class (OITC) rating describes its approximate decibel level reduction of sounds such as those of roadway and rail traffic, and of nearby aircraft takeoffs.

For glazing that is installed within a building interior, the Sound Transmission Class (STC) rating may be a more appropriate measure, as it describes the approximate decibel level reduction for the sound of human speech.

With either scale (the OITC scale for exterior glazing or the STC scale for interior glazing) a performance rating of 30, for instance, would represent a volume reduction down to approximately 1/8th of the original level ((1/2)^3 = 1/8). A rating of 40 would likewise correlate with a volume reduction to approximately 1/16th of the original level (1/2)^4 = 1/16).

Implementation of the appropriate rating system is important because OITC and STC ratings are not linearly related, and the achievement of a strong STC rating does not necessarily correlate with a similar OITC rating.

Estimates of laboratory-based center-of-glass performance can be helpful early in the design process, though the context of the data is crucial. A potential 6 dB performance loss between a laboratory test specimen and a site-installed panel correlates with perceived loss of 1/3 of its sound reduction service.

For situations in which acoustic performance is crucial, the guidance of an acoustic consultant can be essential to the reliable and cost-effective attainment of the application objectives. The National Council of Acoustical Consultants (NCAC - https://ncac.com/) offers contact information on many available practices.

Table 2 on the following page was created from Guardian's Glass Analytics tool, which offers a variety of glass performance evaluation resources and is located at https://www.guardianglass.com/us/en/tools-and-resources/tools/glass-analytics. The "Acoustic Assistant" estimates laboratory-based center-of-glass performance for many prospective glazing compositions.

The table shows that the poorest-performing glazing is a single, monolithic lite. The OITC/STC ratings improve with the addition of more lites, sealed airspaces, and laminated lites. The combination of thicker glass and laminated lites containing acoustic grade polyvinyl butyral (PVB) further improves the sound reduction performance. In addition, using lites of glass of differing thicknesses, such as a combination of 6mm and 10mm glass in the same makeup, will provide additional sound attenuation benefits.

Table 2

Estimates of Laboratory-Based Center-of-Glass Performance			
Category	Glazing Composition	OITC Rating	STC Rating
Single Pane	3 mm	22	28
	6 mm	28	30
	8 mm	29	32
	10 mm	32	34
	12 mm	33	36
Single Pane Laminated	3 mm : Standard 0.030" PVB : 3 mm	28	32
	3 mm : Standard 0.060" PVB : 3 mm	28	32
	6 mm : Standard 0.030" PVB : 6 mm	32	36
	6 mm : Standard 0.060" PVB : 6 mm	32	36
	6 mm : Acoustic 0.060" PVB : 6 mm	35	40
	12 mm : Acoustic 0.060" PVB : 12 mm	40	44
Double Pane	6 mm : *1/2" Air* : 6 mm	29	34
	8 mm : *1/2" Air* : 6 mm	30	35
	10 mm : *1/2" Air* : 6 mm	32	37
	12 mm : *1/2" Air* : 6 mm	33	38
	12 mm : *1/2" Air* : 12 mm	34	39
Double Pane Inboard Laminated	6 mm : *1/2" Air* : 6 mm : Standard 0.060" PVB : 6 mm	33	39
	6 mm : *1/2" Air* : 6 mm : Acoustic 0.060" PVB : 6 mm	35	41
	12 mm : *1/2" Air* : 6 mm : Acoustic 0.060" PVB : 6 mm	37	44
Double Pane Dual Laminated	6 mm : Standard 0.060" PVB : 6 mm : *1/2" Air* : 6 mm : Standard 0.060" PVB : 6 mm	35	40
	6 mm : Acoustic 0.060" PVB : 6 mm : *1/2" Air* : 6 mm : Acoustic 0.060" PVB : 6 mm	38	48
Triple Pane	6 mm : *1/2" Air* : 6 mm : *1/2" Air* : 6 mm	29	37

Table 3

Leading ASTM Standards	
E1332	Standard Classification for Rating Outdoor-Indoor Sound Attenuation
E413	Classification for Rating Sound Insulation
E1425	Standard Practice for Determining the Acoustical Performance of Windows, Doors, Skylight, and Glazed Wall Systems

Learn More About Acoustics

If you need more information, Guardian's Technical Services group is available to assist with the evaluation of acoustics in glass glazing configurations. Please contact Guardian at https://www.guardianglass.com/us/en/contact or call 855-58-GLASS (45277).

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