Glass Acoustical Information

Glass products can be used to reduce unwanted noise in residential homes and commercial buildings. The need for acoustical glazing products is increasing due to environmental noise caused by aircraft, highway traffic, rail transportation, industry and the building of homes and commercial buildings near areas of high noise levels.

The acoustical performance of windows and doors is influenced not only by the glass but also by the framing members and construction of the window assembly. Sound transmission class (STC) measured in decibels (dB) is the standard method for rating sound attenuation characteristics of glass products and window assemblies. The higher the STC rating means the higher the sound attenuation properties of the window. It should be noted that the attached STC data is for glass only and that the final STC rating of the window assembly could vary because of the influence of the acoustical performance of the framing members and the construction of the window assembly. Depending on the tightness and acoustical performance of the window frame, the final STC rating of the window assembly could have no influence to a 3-point drop in STC ratings from the base glass STC rating. To determine the specific STC ratings of glass and a window or door assembly, the following ASTM standards should be used:

- ASTM E 90 - 90 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions
- ASTM E 1425 - 91 Standard Practice for Determining the Acoustical Performance of Exterior Windows and Doors
- ASTM E 1332 - 94 Standard Classification for Determination of Outdoor-Indoor Transmission Class

Influence of Gas Filling on Acoustical Properties

Transportation noise is most often rich in low frequency sound energy. Because some gases such as Sulfur Hexafluoride (SF6 SF) have lower sound wave speeds than air, they will produce a higher sound transmission loss and therefore improved sound attenuation at high frequencies. This will benefit the acoustical performance for general noise (i.e. speech and audio noise). However, with the use of these gases, the acoustical performance at lower frequencies is not as good as air or argon-filled insulating glass units. This will result in a poorer performing window product for acoustical applications where transportation noise is of concern. A general rule of thumb is that with SF6 the overall STC rating of the glass can be improved by as much as 3 points. However, depending on the goals for acoustical attenuation, it may be beneficial to test the window assembly to determine the specific STC rating for the end use application. With SF6 gas, it is recommended to use a mixture of this gas with air or argon with 25% SF6 and 75% air or argon.

Definitions

Sound Transmission Class (STC) - The STC rating is a single number value quantifying the ability of a material to resist the transmission of sound. For example, the STC of a 1/2" insulating glass unit (3mm/6mm airgap/3mm) is 28 and the STC rating of a 3/4" insulating glass unit (3mm/13.0 airgap/3mm) is 30. The higher the STC rating, the more able the material is to resist the transmission of sound.

Decibel (dB) - Decibel is a measure of the amplitude of sound. The higher the number of decibels signifies the louder the sound. Decibel only quantifies the loudness of sound and does not quantify any other characteristics of sound. For example, a jet aircraft and a lawn mower at different distances may both produce sound levels that are measured to be 80 dB; however, they will sound quite different. The reason they sound different is because they have sound energy distributed differently across the audible frequency spectrum.

Hertz (Hz) - Hertz is a measure of frequency, where 1 Hz equals the cps (cycles per second) of air pressure. Frequency is the measure of the tonal or pitch quality of sound, not amplitude. The higher the frequency means the higher the pitch.

Acoustical properties of tested glass constructions chart is attached. These tests were conducted by the Monsanto Corporation and tests conducted at the Riverbank Acoustical Laboratory.

Some of the above and the attached performance information on the STC properties of glass products were obtained from Monsanto Corporations Acoustical Glazing Design Guide Publication No. 8018B.

Airborne Sound Transmission Loss (STC) Testing Results

Sample	STC
3.1mm Glass	29
7mm Laminated (3.1/ 0.030"/ 3.1) - PVB	34
8.8mm Sea-Storm® PET (3.1/ 0.060" PVB/ 0.007" PET/ 0.030" PVB/ 3.1)	35
11.7mm Sea-Storm® PVB (4.7/ 0.090"/ 4.7)	36
11.7mm Sea-Storm® SGP® (4.7/ 0.090"/ 4.7)	35
19.2mm IG (3.1mm/ 13.0/ 3.1mm) Air Fill	30
19.2mm IG (3.1mm E/ 13.0/ 3.1mm) Argon Fill	30
15.6mm Laminated (3.1mm/ 6.5/ 7.0mm Lami (3.1/ 0.030"/ 3.1)) - PVB	33
22.1mm Laminated (3.1mm/ 13.0/ 7.0mm Lami (3.1/ 0.030"/ 3.1)) - PVB	35
19.6mm Sea-Storm® PVB (3.0mm E/ 8.0/ 8.5mm Lami (3.1/ 0.090"/ 3.1))	34
19.6mm Sea-Storm® SGP® (3.0mm E/ 8.0/ 8.5mm Lami (3.1/ 0.090"/ 3.1))	33

Testing conducted at accredited Acoustical Laboratory through NVLAP.
Testing was performed to ASTM E 90-02 procedures.
Glass products tested were produced by Cardinal Glass Industries using Cardinal XL Edge® stainless steel spacer system.
Sea-Storm® laminated glass by Cardinal IG Company.
SGP® – SentryGlas® Plus interlayer from Dupont.
E – Cardinal's LoE™ coating #2 surface.

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