Glass Acoustical Performance

The reduction of transmitted sound into and within the occupied space of buildings and homes is often an important design consideration. Glass is one of many components that influence the acoustical performance of doors, partitions, windows, skylights, and vertical wall glazing systems.

Two common acoustical rating systems are:

Sound Transmission Class Rating (STC) – *applicable to interior building partitions and viewing windows where the sound source is human speech and/or office equipment.*

Outdoor-Indoor Transmission Class (OITC) *– applicable to exterior walls (including doors and windows) where the sound source is due to transportation vehicles (cars, trucks, trains).*

Both of these ratings present a single number that represents the measured sound transmission loss (TL) obtained in accordance with ASTM E-90-02 *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.* **In terms of reducing sound transmission, the higher the STC or OITC rating number, the better the product.**

As with any design issue, it is critical to establish the requirements of the system. In the case of acoustics, the first question to ask is: *What are the sources of the sound?* The sound attenuation properties of materials, including glass, vary depending on the wavelength of the sound. The following steps are offered as a guide:

- Determine the magnitude and source of the noise exposure that is anticipated. This can be done using estimation techniques or actual on-site noise measurements.
- Determine the noise reduction that is required of the glazing system.
- Based on the desired noise reduction, specify the STC or OITC that is required of the glazing system.

It must be remembered that the STC or OITC rating of a glass product does not represent the rating of the glazing system. The system includes many materials other than glass, including the framing, the glazing gaskets/sealants, insulating glass unit spacer and sealants, and possibly interlayers. In addition, proper installation is critical to ensure that sound does not enter through poorly fitted components. While STC and OITC ratings are published for various glass configurations, accurate ratings for the glazing system can only be determined by testing.

Even with laboratory testing, consideration must be given to unavoidable differences between laboratory testing conditions and actual site conditions, including the unit size tested versus actual design sizes, and the potential effect this may have on acoustical performance. It is strongly recommended that a consultant be retained to coordinate the proper design, testing, and interpretation of the results.

There are a number of ASTM (*American Society for Testing and Materials)* standards

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pertaining to acoustical testing and classification. These include:

E1332-98 *Standard Classification for Determination of Outdoor-Indoor Transmission Class*

E1433-95 *Standard Guide for Selection of Standards on Environmental Acoustics*

E1425-91(1999) *Standard Practice for Determining the Acoustical Performance of Exterior Windows and Doors*

E966-02 *Standard Guide for Field Measurements of Airborne Sound Insulation of Building Facades and Facade Elements*

E90-02 *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.*

Acoustical testing can be performed at a number of qualified laboratories, including:

Riverbank Acoustical Laboratories
Geneva, IL

Architectural Testing
York, PA

The following is offered as general guidelines for improving the acoustical performance of glass products.

For Monolithic Glass

► Increase glass thickness

For Laminated Glass

► Increase glass thickness

► Use different glass thickness for individual glass lites, i.e., ¼" glass + interlayer + $^{3}/_{8}$" glass

For Insulating Glass Units

► Increase glass thickness

► Increase air space dimension

► Evaluate different gas fills

► Evaluate different spacer and sealant materials

► Use different glass thickness for individual glass lites

► Use a laminated component for one or both of the plies.

Vitro (formerly PPG Industries) does not manufacture insulating glass units, nor do we manufacture any glass products specifically designed for acoustical control. The following "generic" information is offered for comparative purposes only, and as a point of departure in considering the acoustical properties of various glass products. The fabricator of the final product must obtain specific acoustical ratings.

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GENERIC STC and OITC RATINGS *Not to be used for design or specification purposes*		
Glass Product Type and Thickness	**STC Rating**	**OITC Rating**
Monolithic		
3/32"	26	-
1/8"	29	-
¼"	31	29
½"	36	33
Sealed Insulating Glass Units		
1/8" glass + ¼" air + 1/8" glass	28	26
¼" glass + ½" air + ¼" glass	35	28
¼" glass + 1" air + ¼" glass	37	30
Laminated Glass with 0.030" PVB Interlayer		
1/8" glass + PVB + 1/8" glass	35	31
3/16" glass + PVB + 3/16" glass	36	33
¼" glass + PVB + ¼" glass	38	34
3/8" glass + PVB + ¼" glass	40	36
Sealed IG Units with Laminate (0.030" Interlayer)		
1/8" glass + PVB + 1/8" glass + 1/2" air + 1/4" glass	39	31
1/8" glass + PVB + ¼" glass + ½" air + ¼" glass	40	31

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HISTORY TABLE		
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