Sound Control

Introduction

Shielding a building's environment from increasing noise levels, especially near airports and busy highways, is a critical factor in the specification of glazing materials for both new and renovated structures. Laminated glass is a proven, effective solution for acoustical protection.

Description

Sound Pressure is measured in decibels (dB) and has a logarithmic scale. A difference of 10dB indicates a difference of 10 times the sound pressure level. A difference of 20dB indicates a 100 times difference in sound pressure level. As a rule of thumb, the sound pressure level drops by about 6dB every time the distance is doubled. The sound transmission class (STC) is the common measure by which acoustical performance is rated. It is a weighted average over the frequency range 100 to 5,000 Hz of the STL (Sound Transmission Loss). The higher the STC rating, the more able the material is to resist the transmission of sound. The ASTM E90 *Standard Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements* describes a standard test method for measuring the Sound Transmission Loss for building components. The ASTM E413 *Standard Classification for Rating Sound Insulation* describes the method by which the STC is calculated.

In addition to STC, there are several other methods of determining a weighted average. The ASTM E1332 *Standard Classification for Determination of Outdoor-Indoor Transmission Class* (OITC) is used for external building components. In Europe the ISO 140-3 *Acoustics Measurement of Sound Insulation in Buildings and of Building Elements* defines a weighted average, Rw. Each of these classifications gives slightly different classification numbers. It is important that an acoustic consultant be retained to determine the exact requirements.

Sound sources vary in the range of wavelengths. Airports, for example, generate noise in both the low and high-frequency range, whereas other sources of unwanted noise may generate noise only in one frequency range. In these cases, using the single-number STC, OITC or Rw rating may not be adequate. The acoustics engineer in these cases will need to know the attenuation at each 1/3 octave band frequency, as shown in the following tables.

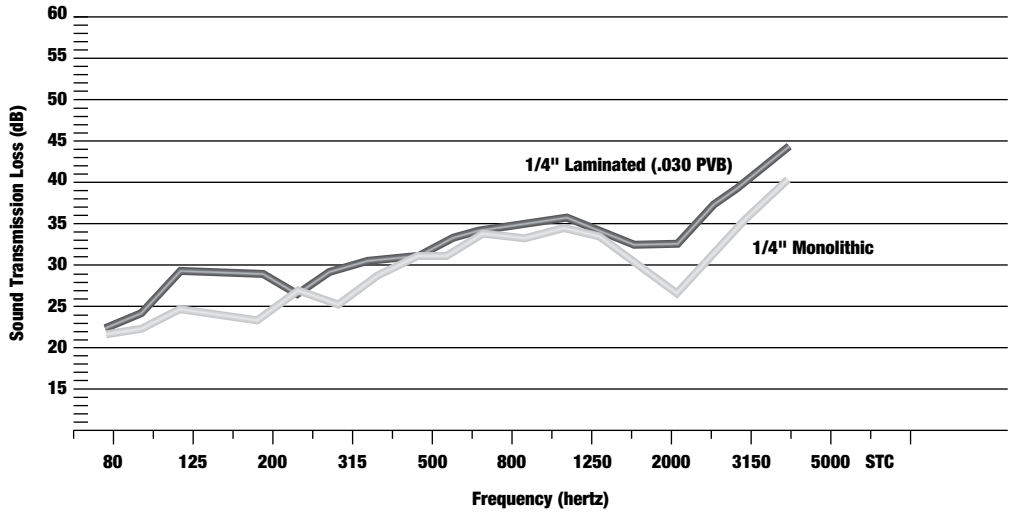
The greatest sound transmittance occurs at different wavelengths for each different thickness of glass, because each has a different mass. Combining different thicknesses of glass, either in an IG unit or a laminated glass makeup, can significantly improve performance. The shear damping characteristics of PVB that are used in laminated glass further reduce the sound transmission. Laminated glass can reduce the perceived noise level by nearly 50% at certain frequencies.

It is very important that suitable windows or frames be used. They must be well made and have a mass capable of dampening sound transmission. Operable windows must have good seals; otherwise, the window will "leak" sound. All joints must be sealed, and the space between the opening and the window must also be filled with a suitable sealant during installation.

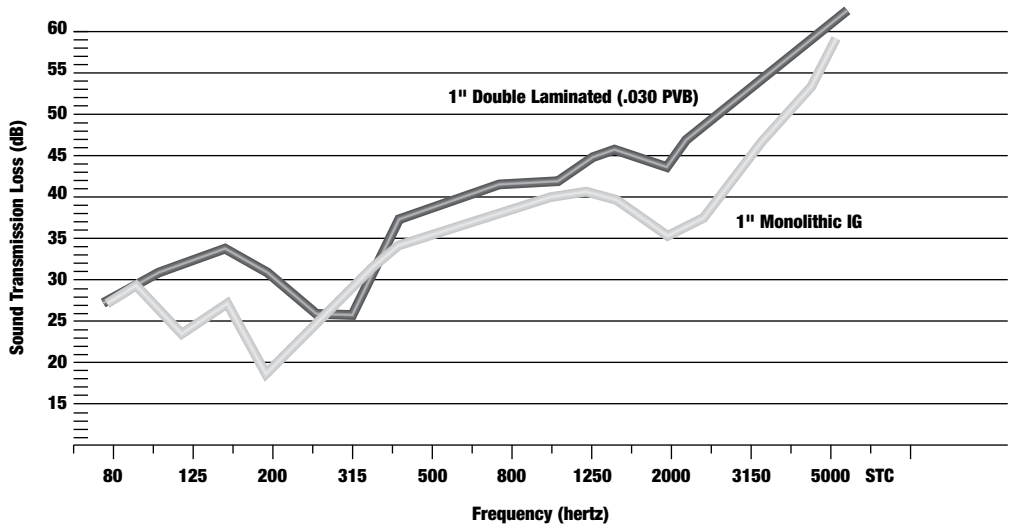
Sound Control

Description (continued)

Typical Improvement in Sound Attenuation when using Laminated Glass[1]



SINGLE-LITE DESIGN



INSULATING GLASS UNITS

(1) Sound Transmission Loss Measurement performed at Riverbank Acoustical Laboratories.

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Sound Control

Capabilities

Laminated Glass: Sound Transmission Loss Data[1]

1/3 Octaveband (HZ)	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	STC	OITC	Rw
1/4" RAL-TL85-169	23	25	25	24	28	26	29	31	33	34	34	35	34	30	27	32	37	41	31	29	32
1/2" RAL-TL85-198	26	30	26	30	33	33	34	36	37	35	32	32	36	40	43	46	50	51	36	33	37
Lami-0.030"-Lami RAL-TL85-218	24	26	27	27	28	29	30	32	34	35	36	36	36	35	35	39	43	46	35	31	35
1/8"-0.030"-1/8" RAL-TL85-170	25	26	28	27	29	29	30	32	34	35	35	36	36	35	35	38	43	46	35	31	35
1/8"-0.060"-1/8" RAL-TL85-224	25	26	27	28	28	29	30	33	34	35	36	37	37	37	36	38	42	46	35	32	35
1/8"-0.045"-1/8" RAL-TL85-234	24	27	27	28	28	29	30	32	34	35	36	36	37	36	35	38	43	46	35	31	35
3/16"-0.030"-3/16" RAL-TL85-200	27	27	27	30	31	31	33	34	35	36	36	35	34	37	41	45	49	52	36	33	36
1/4"-0.030"-1/8" RAL-TL85-229	27	27	28	31	30	31	32	34	35	36	36	36	35	36	40	44	48	52	36	33	36
1/4"-0.060"-1/8" RAL-TL85-223	27	28	27	30	31	31	33	35	36	37	37	37	36	37	41	44	48	51	37	33	37
1/4"-0.030"-1/4" RAL-TL85-225	25	29	28	30	33	33	34	36	37	37	37	36	37	41	45	48	51	53	38	34	38
1/4"-0.045"-1/4" RAL-TL85-232	26	30	27	30	33	33	34	36	37	38	37	36	37	41	45	48	51	54	38	34	38
1/4"-0.060"-1/4" RAL-TL85-228	26	29	28	30	33	33	35	36	37	38	38	37	38	41	44	47	51	54	39	34	39
3/8"-0.030"-1/4" RAL-TL85-222	29	30	28	32	34	35	36	38	38	38	36	38	42	46	49	52	55	57	40	36	40
1/2"-0.060"-1/4" RAL-TL85-230	29	30	29	32	35	35	37	38	38	38	37	41	44	48	50	53	56	56	41	36	41

Insulating Glass: Sound Transmission Loss Data[1]

1/3 Octave band (HZ)	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	STC	OITC	Rw
1/8"-1/4"AS[2]-1/8" (SEALED) RAL-TL85-212	26	21	23	23	26	21	19	24	27	30	33	36	40	44	46	39	34	45	28	26	30
1/8"-3/8"AS-1/8" (SEALED) RAL-TL85-213	26	23	23	20	23	19	23	27	29	32	35	39	44	47	48	41	36	43	31	26	32
1/4"-1/2"AS-1/4" (SEALED) RAL-TL85-294	29	22	26	18	25	25	31	32	34	36	39	40	39	35	36	46	52	58	35	28	35
3/16"-1"AS-3/16" (SEALED) RAL-TL85-215	20	25	18	17	26	28	33	36	38	39	41	44	46	43	38	40	48	51	35	27	37
1/4"-1"AS-1/4" (UNSEALED) RAL-TL85-293	22	19	27	23	31	30	35	35	36	39	41	42	41	36	37	46	51	56	37	30	37
3/16"-4"AS-3/16" (UNSEALED) RAL-TL85-216	24	28	30	33	30	38	38	44	46	50	50	50	51	49	41	42	50	52	44	35	44

(1) The data here is based on samples tested at Riverbank Acoustical Laboratories in accordance with ASTM E90-97, ASTM E413-87 and ASTM E1332-90 and are not guaranteed for all samples or applications.

(2) Airspace

See important note on page 14.

Sound Control

Capabilities (continued)

Laminated Insulating Glass: Sound Transmission Loss Data[1]

1/3 Octaveband (HZ)	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	STC	OITC	Rw
1/4" Lam.-1/4" AS[2]-1/8" (SEALED) RAL-TL95-296	32	31	30	28	27	24	26	28	31	34	37	39	41	43	49	52	51	57	35	31	35
1/4" Lam.-3/8" AS-3/16" (SEALED) RAL-TL85-189	27	27	26	24	22	28	32	35	38	38	39	40	42	43	41	45	52	57	37	31	37
1/4" Lam.-1/2" AS-3/16" (SEALED) RAL-TL85-238	26	23	25	23	27	31	34	36	38	39	41	43	45	46	43	49	55	55	39	31	39
1/4" Lam.-1/2" AS-1/4" (SEALED) RAL-TL85-235	28	20	29	24	26	30	34	36	39	42	43	44	44	41	40	47	52	56	39	31	39
3/8" Lam.-1/2" AS-1/4" (SEALED) RAL-TL85-192	28	17	28	29	33	34	38	40	40	41	41	41	41	40	43	49	54	58	40	31	40
1/4" Lam.-1" AS-3/16" (UNSEALED) RAL-TL85-239	22	27	27	28	31	35	38	41	42	43	44	45	47	47	45	50	58	61	42	33	42
1/4" Lam.-2" AS-3/16" (UNSEALED) RAL-TL85-173	24	25	34	33	34	40	41	44	44	46	47	47	48	48	46	50	55	56	45	35	45
1/2" Lam.-2" AS-3/16" (UNSEALED) RAL-TL85-194	27	36	33	33	35	39	41	45	45	46	46	46	49	51	52	56	60	62	46	38	46
1/2" Lam.-2" AS-3/8" (UNSEALED) RAL-TL85-196	34	37	33	38	40	42	44	48	47	46	45	42	46	51	55	59	61	62	46	42	47
1/2" Lam.-1" AS-3/16" (UNSEALED) RAL-TL95-298	24	30	32	32	36	39	42	45	47	50	51	50	53	57	57	60	62	63	47	36	47
1/4" Lam.-4" AS-3/16" (UNSEALED) RAL-TL85-174	26	36	34	37	37	43	44	48	49	51	51	50	51	50	47	51	58	60	48	39	48
1/2" Lam.-4" AS-3/16" (UNSEALED) RAL-TL85-195	30	37	33	38	37	42	45	49	50	51	50	48	50	53	53	57	61	64	49	41	49
1/2" Lam.-4" AS-3/8" (UNSEALED) RAL-TL85-197	38	38	33	40	40	43	46	51	52	52	50	45	48	53	56	59	62	64	49	44	50
3/4" Lam.-4" AS-1/8" (UNSEALED) RAL-TL85-240	29	33	31	36	38	43	44	46	47	49	50	52	52	55	59	59	58	60	49	40	49

(1) The data here is based on samples tested at Riverbank Acoustical Laboratories in accordance with ASTM E90-97, ASTM E413-87 and ASTM E1332-90 and are not guaranteed for all samples or applications.
(2) Airspace

Note: The numbers contained in the above tables should be used as a guide and treated as glass only numbers. They may not be indicative of performance in the intended fenestration system. Variables such as air infiltration, size, temperature and glazing methods may have adverse affects on the performance of the entire system. Whenever possible, actual installation practices should be utilized on a mock-up panel to ensure accurate rating of the desired acoustical fenestration products.

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Capabilities (continued)

Double-Laminated Insulating Glass: Sound Transmission Loss Data[1]

1/3 Octaveband (HZ)	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	STC	OITC	Rw
1/4" Lam. 1/2" AS(2)-1/4"Lam. (SEALED) RAL-TL85-172	26	21	29	28	30	34	36	40	42	44	44	44	45	46	47	52	57	58	42	33	42
1/4" Lam. 1" AS-1/4" Lam. (UNSEALED) RAL-TL95-299	28	28	36	32	34	37	40	44	47	50	50	49	49	48	55	62	63	62	46	37	46
1/2" Lam. 1" AS-1/4" Lam. (UNSEALED) RAL-TL85-236	21	28	33	37	38	42	43	45	44	44	44	45	49	53	57	59	62	63	46	34	46
1/2"-0.060"-1/4" 4" AS-1/4"-0.030"-1/4" (UNSEALED) RAL-TL85-220	31	42	33	40	42	43	46	50	50	50	49	50	52	55	60	62	64	64	50	42	50
1/4"-0.060"-1/4" 4" AS-1/2" Lam. (UNSEALED) RAL-TL85-221	31	39	35	39	41	43	46	51	52	52	49	48	50	54	59	61	63	64	50	42	50
1/2"Lam. 4" AS-1/8"-0.060"-1/8" (UNSEALED) RAL-TL85-237	34	38	34	40	41	45	47	51	52	53	53	51	52	55	58	60	62	64	51	44	51
1/4" Lam. 4" AS-1/4" Lam. (UNSEALED) RAL-TL95-301A	24	37	39	38	41	44	47	49	51	53	54	54	54	53	57	60	63	62	52	38	51
1/4" Lam. 4" AS-1/2" Lam. (UNSEALED) RAL-TL95-302	34	42	40	41	42	45	48	50	52	54	54	54	56	58	60	63	64	65	53	45	53

Triple Insulating Glass: Sound Transmission Loss Data[1]

1/3 Octaveband (HZ)	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	STC	OITC	Rw
1/4"-1/2" AS-1/4"1/2" AS-1/4" (SEALED) RAL-TL95-294	25	22	29	24	25	29	34	37	40	43	46	48	47	41	41	47	52	58	39	31	39
1/4" Lam.-1/2" AS(2) 1/4"Lam.-1/2" AS-1/4"Lam. (UNSEALED) RAL-TL95-295	22	24	34	33	30	37	38	41	44	48	48	49	48	47	52	57	59	55	44	33	44
1/4"-1" AS-1/4"-1/2" AS-1/4" (UNSEALED) RAL-TL95-297	28	34	33	28	31	37	42	45	48	51	53	54	54	48	51	60	62	63	46	37	47
1/4" Lam.-1" AS-1/4" Lam. 1/2" AS-1/4" Lam. (UNSEALED) RAL-TL95-300	31	28	38	36	35	41	43	47	50	53	54	54	55	55	60	63	64	63	49	39	49

(1) The data here is based on samples tested at Riverbank Acoustical Laboratories in accordance with ASTM E90-97, ASTM E413-87 and ASTM E1332-90 and are not guaranteed for all samples or applications.

(2) Airspace

Note: The numbers contained in the above tables should be used as a guide and treated as glass only numbers. They may not be indicative of performance in the intended fenestration system. Variables such as air infiltration, size, temperature and glazing methods may have adverse effects on the performance of the entire system. Whenever possible, actual installation practices should be utilized on a mock-up panel to ensure accurate rating of the desired acoustical fenestration products.

Sound Control

Additional Important Information

Specifications

A sample Section 08 81 00 Specification for North America can be found in the last section of this binder titled: Sample Architectural Glass Specifications.

For specifications on other laminated glass make-ups, call 1-866-OLDCASTLE (653-2278) or log on to www.oldcastlebe.com and click on "Project Assistance" and enter your request.

Contact Us

For any additional information, including details, technical data, specifications, technical assistance and samples, call 1-866-OLDCASTLE (653-2278).

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To view performance data on a wide range of glass make-ups, or to build your own product specification, log on to www.oldcastlebe.com and choose GlasSelect®.

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