



ACOUSTIC SERIES
FRAMING, ENTRANCE AND WINDOWS

Tempe Center for the Arts
Tempe, AZ
Architect: Barton Myers Associates, Inc.
OPG1928 STC Series

arcadia

ACOUSTICAL GUIDE - GLOSSARY

Which is better, increasing mass, air space thickness for improving the Transmission Loss (TL) of windows?

In the case of monolithic glass 1/4" or thicker, the first most cost-effective step is usually to add a damping interlayer and then increase glass thickness. However, the cost of glass thicknesses over 1/2" rapidly becomes prohibitive, in which case the use of double or insulating glass configurations may be more feasible.

What is the difference between quiet and privacy? (It's so quiet that it's noisy!)

The general public, understandably, finds it's very confusing the difference between "quiet" and "privacy". This is largely because when "quiet" is pursued, by reducing background sound levels. For example: Sound levels produced by building HVAC systems. Speech between persons in an adjacent space, transmitted through a demising wall, often becomes audible, thus diminishing the "quiet" attribute sought. In this case, eliminating the intrusion of background sound results in the intrusion of unwanted speech.

This is easily explained by viewing this problem as a signal-to-noise issue. The higher the speech signal transmitted from an adjacent room relative to the background noise, the better the speech intelligibility. Good speech intelligibility means poor speech privacy; conversely, poor speech intelligibility means good speech privacy. "Speech privacy" and "speech intelligibility" are opposites. Therefore, achieving "quiet" must take into consideration both sound level and speech privacy.

To achieve "quiet" requires reducing both background sound and intrusive speech level. Typically this would involve methods for reducing background sound levels in rooms, plus methods for increasing the TL of walls to reduce transmitted speech sounds between rooms.

The above considerations when accompanied by attention to window frames, to ensure that windows are properly constructed to minimize air leakage, also to ensure that the frame components are heavy, and that frame voids are kept small or packed with dense loose fill.

ACOUSTICAL GUIDE - SOUND TRANSMISSION LOSS DATA

Arcadia Window Systems

Arcadia projected windows are available glazed with a variety of glass configurations. These include 1" insulating glass (1/4" glass - 1/2" air space - 1/4" glass) with an STC rating of 34. When 1" double laminated insulating glass (1/4" laminated glass - 1/2" air space - 1/4" laminated glass) is used instead, the STC rating increases to 38. The four-point increase in STC rating is the result of damping provided by the PVB interlayer used in the laminated glass.

Figure 3.6a presents one-third octave band sound transmission loss data for the Arcadia projected windows glazed with these two glass configurations. The sound transmission loss data show that damping has its greatest benefit in the mid- and high-frequency ranges.

Similarly, the Arcadia T500 curtain wall system exhibits similar improvements in sound transmission loss resulting from the use of laminated glass.

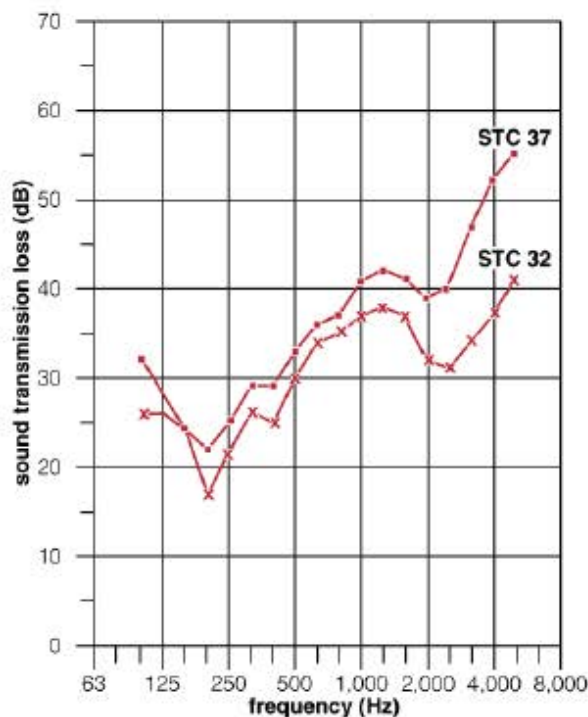


Figure 3.6b Arcadia T500 curtain wall system glazed with 1" standard insulating glass and 1" double laminated insulating glass.

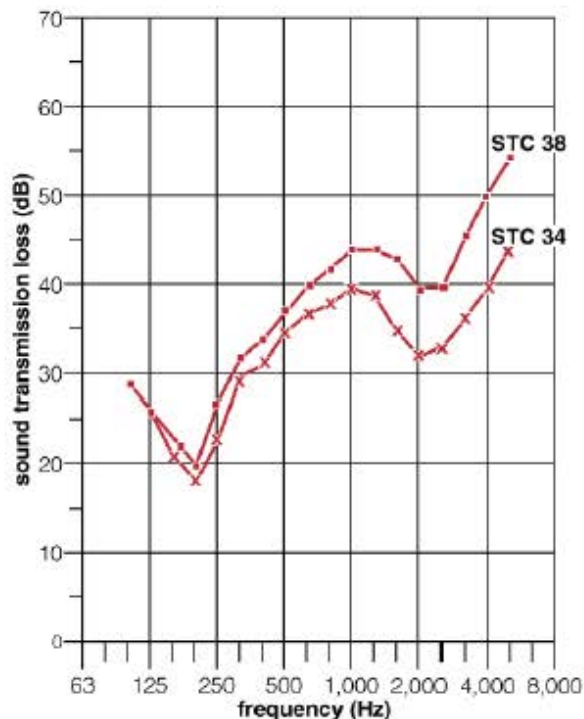


Figure 3.6a Arcadia projected window glazed with 1" standard insulating glass and 1" double laminated insulating glass.

Figure 3.6b compares one-third octave sound transmission loss data for the T500 curtain wall system glazed with 1" standard insulating glass and with 1" double laminated insulating glass.

Arcadia storefront framing systems also exhibit similar improvements in sound transmission loss resulting from the use of laminated glass. A test of a Arcadia storefront framing glazed with 1" standard insulating glass indicates an STC rating of 33. When 1" double laminated insulating glass is used instead, the STC rating improves to 38.

ACOUSTICAL GUIDE - PRINCIPLES OF ACOUSTICS

Acoustical Storm Sash

Acoustical storm sash requires thicker glass, often laminated glass. It must be well sealed and must be generously spaced away from the prime window glass. These installation requirements are usually more easily satisfied inside the prime window, hence the term interior acoustical storm sash.

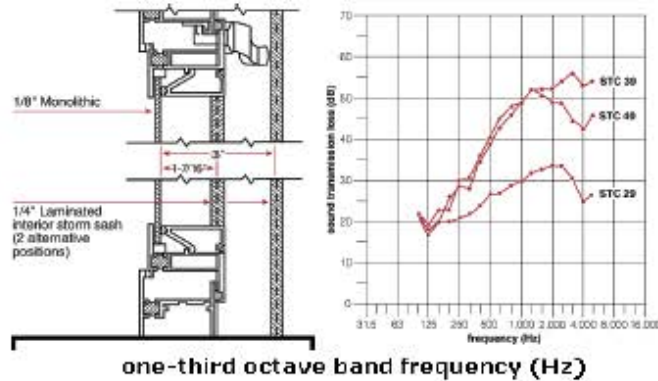
Many of the features for improving glass sound isolation discussed in this section are also true for acoustical storm sash. For example, the greater the storm sash glass surface weight, the higher the insertion loss. Similarly, the greater the distance between the prime window glass and the storm sash glass, the higher the insertion loss. In addition, the use of laminated glass in acoustical storm sash further increases insertion loss, particularly at critical frequency (2,500 Hz for 1/4" glass).

ACOUSTICAL GUIDE - SOUND TRANSMISSION LOSS DATA

Increases in TL of Awning, Single Glazed Prime Windows Produced by Acoustical Storm Sash

Figure 3.3a

Aluminum

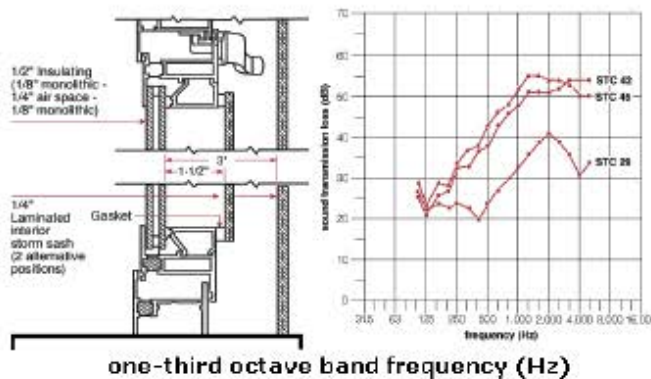


	100	125	150	200	250	315	400	500	630	800	1,000	1,250	1,600	2,000	2,500	3,150	4,000	5,000	STC
Prime Window	22	17	20	20	21	22	24	27	27	29	30	32	33	34	34	31	25	27	29
1.5" AS	22	18	20	26	29	28	35	39	43	46	49	52	52	52	54	56	53	54	39
3.0" AS	22	19	23	23	30	31	36	41	45	48	49	52	51	49	49	45	43	46	40

Increases in TL of Awning, Double Glazed Prime Windows Produced by Acoustical Storm Sash

Figure 3.4a

Aluminum



	100	125	150	200	250	315	400	500	630	800	1,000	1,250	1,600	2,000	2,500	3,150	4,000	5,000	STC
Prime Window	27	22	24	23	24	23	20	24	27	30	33	36	39	41	39	36	31	34	29
1.5" AS	26	21	26	27	33	33	37	38	43	46	48	51	51	51	52	54	54	54	42
3.0" AS	29	23	29	28	34	37	37	43	46	48	52	55	55	54	54	53	50	50	45

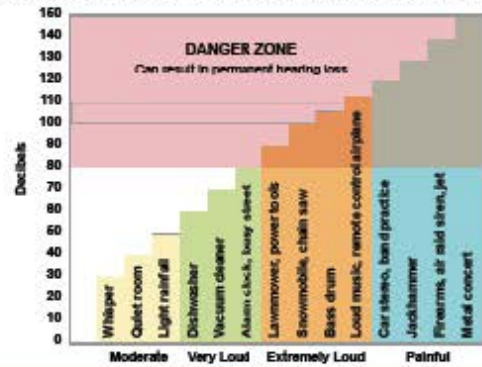
Fenestration improvements and challenges

Since there are no commonly used computer modeling tools available for estimating performance of untested combinations, manufacturers rely on their past experience. Due to variations, specifiers should accept existing test reports as proof of compliance to acoustical performance specifications for previously tested frame/glass combinations, even if results or exact compositions nominally vary. (One should consult a qualified acoustical consultant for acceptance criteria when necessary.) Manufacturers should make no acoustical performance guarantees relative to future job-specific testing results, or regarding acoustical performance of untested frame/glass combinations.

WHAT IS STC AND OITC?

STC stands for "Sound Transmission Class," a measure of the extent to which sound is prevented from being transferred from one area to another. The higher the STC value, the less that sound can be transferred from one space to another.

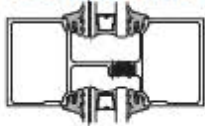
OITC stands for "Outdoor / Indoor Transmission Class," a rating system developed in ASTM E-1332, was formed in the late 1980s to respond to the perceived need for a more robust classification system that addresses more of the low frequency incident sounds. OITC measures the ability of a product to reduce the overall noise of ground and air transportation.



STC Value	Rating	Description
50-60	EXCELLENT	Loud speech heard faintly or not at all
40-49	VERY GOOD	Loud speech heard faintly, but not understood
35-39	GOOD	Loud speech heard but hardly intelligible
30-34	FAIR	Loud speech heard and understood fairly well
25-29	POOR	Normal speech heard and understood easily and distinctly
20-24	VERY POOR	Loud speech audible

ARCADIA ACOUSTIC PRODUCTS

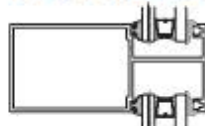
AG451T STC SERIES



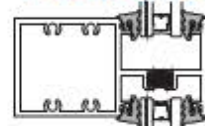
AG451 STC SERIES



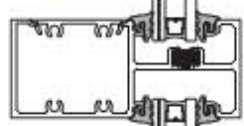
AFG451 STC SERIES



TC470 STC SERIES



TC570 STC SERIES



STOREFRONT

SERIES	GLASS SIZE	STC	OITC	GLASS MAKE UP (Outboard) (Air Space) (Inboard)		
AG451T STC	1-1/8"	39	32	1/4"	1/2" *A.S	3/8" (.030 lami)
AG451 STC	1"	38	29	1/4" (.030 lami)	1/2" *A.S	1/4" (.030 lami)
AFG451 STC	1"	36	28	1/4" (.030 lami)	1/2" *A.S	1/4" (.030 lami)
TC470 STC	1-1/32"	33	26	1/4"	1/2" *A.S	1/4"
		36	28	1/4" (.030 lami)	1/2" *A.S	1/4"
	1-3/16"	39	33	3/8" (.030 lami)	1/2" *A.S	1/4" (.030 lami)
	1-1/8" Warm Edge	40	32	3/8" (.030 lami)	1/2" *A.S	1/4" (.030 lami)
TC570 STC	1"	34	27	1/4"	1/2" *A.S	1/4"
		38	30	1/4" (.030 lami)	1/2" *A.S	1/4"

*A.S (Air Space)

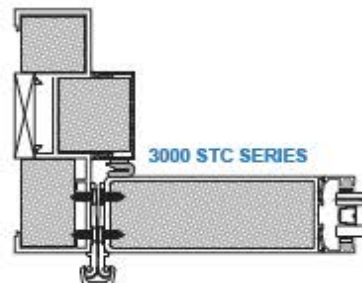
ARC82502 STC SERIES



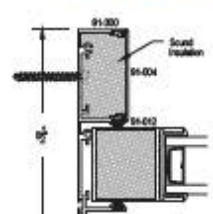
ULT5000 STC SERIES



3000 STC SERIES



9100 STC SERIES

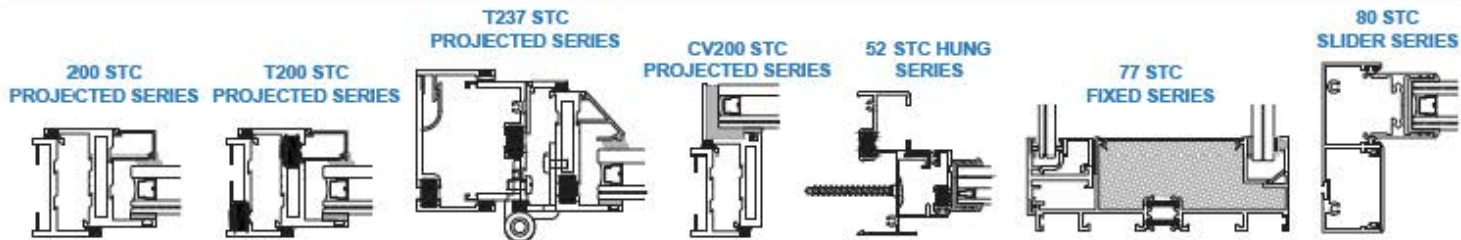


DOORS

SERIES	GLASS SIZE	STC	OITC	GLASS MAKE UP (Outboard) (Air Space) (Inboard)		
ARC8250 STC Terrace	1"	34	28	3/16" tempered	5/8" *A.S	3/16" tempered
	1-1/16"	38	32	1/4" tempered	1/2" *A.S	5/16" lami
ULT5000 STC Slider	1-1/8"	40	32	1/4" (.030 lami)	17/32" *A.S	1/4" (.060 lami)
3000 STC Swing	1"	40	33	1/4" (.030 lami)	1/2" *A.S	1/4" (.030 lami)
9100 STC Slider	1-1/2"	41	34	1/4" (.030 lami)	1" *A.S	1/4" (.030 lami)

*A.S (Air Space)

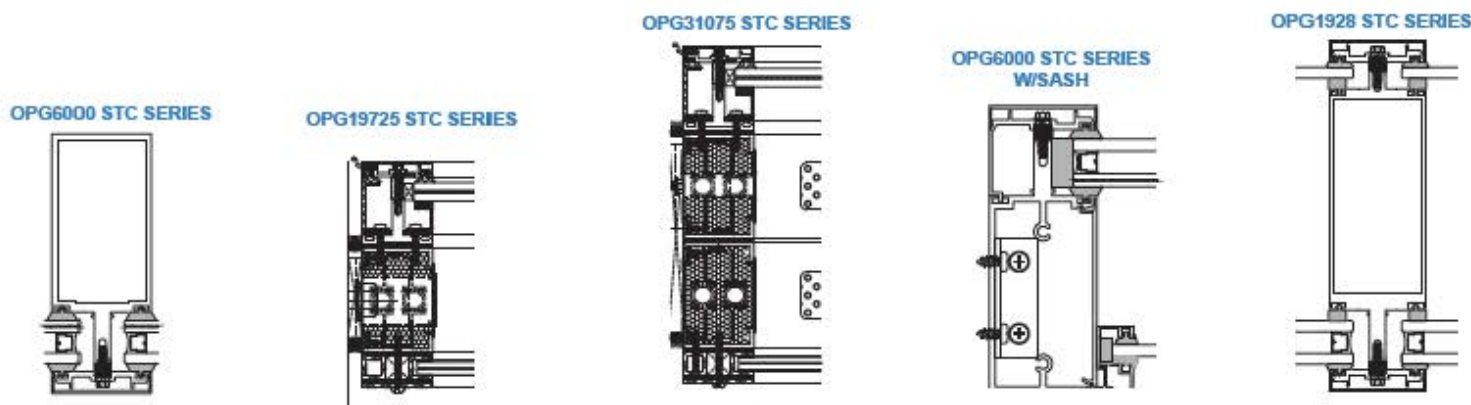
ARCADIA ACOUSTIC PRODUCTS



WINDOWS

SERIES	GLASS SIZE	STC	OITC	GLASS MAKE UP (Outboard) (Air Space) (Inboard)		
200 STC Projected	1-1/8"	40	32	3/8" (.030 lami)	1/2" *A.S	1/4"
	1-1/2"	43	32	3/8" (.030 lami)	3/4" *A.S	5/16" (.030 lami)
T237 STC Projected	1-1/2"	41	33	1/2" (.030 lami)	3/4" *A.S	1/4"
	1-1/2" Warm Edge	43	34	1/2" (.030 lami)	3/4" *A.S	1/4"
T200 STC Projected	1"	34	28	1/4"	1/2" *A.S	1/4"
		36	30	1/4" (.030 lami)	1/2" *A.S	1/4"
		38	31	1/4" (.030 lami)	1/2" *A.S	1/4" (.030 lami)
CV200 STC Projected	1"	34	27	1/4"	1/2" *A.S	1/4"
52 STC Hung	1"	37	30	1/4" (.030 lami)	1/2" *A.S	1/4" (.030 lami)
77 STC Fixed	1/2" laminated	52	-	1/2" lami	4-3/8" *A.S	1/4"
80 STC Slider	1" laminated	39	-	1/4" (.030 lami)	1/2" *A.S	1/4" (.030 lami)

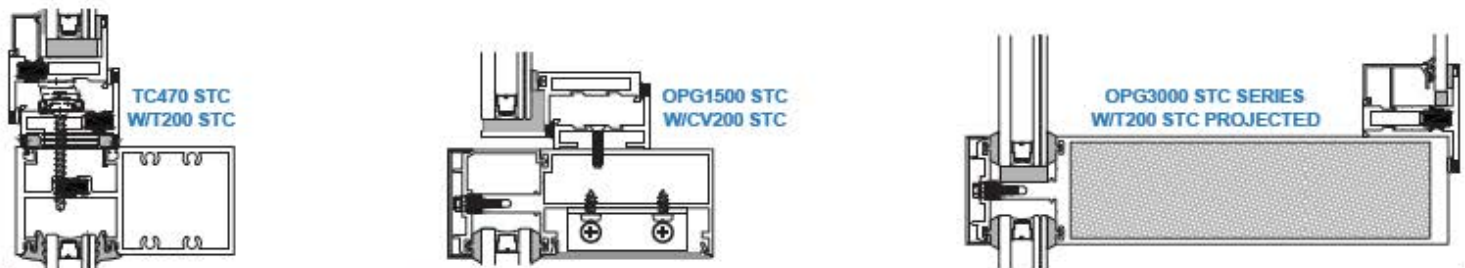
*A.S (Air Space)



CURTAIN WALL

SERIES	GLASS SIZE	STC	OITC	GLASS MAKE UP (Outboard) (Air Space) (Inboard)		
OPG6000 STC	1"	32	26	1/4"	1/2" *A.S	1/4"
	1-1/32"	35	28	1/4" (.030 lami)	1/2" *A.S	1/4"
	1-5/16"	40	32	3/8" (.030 lami)	1/2" *A.S	3/8" (.030 lami)
OPG19725 STC	9/16" laminated	55	46	9/16" (.030 lami)	5 3/16" *A.S	3/8" (.030 lami)
OPG31075 STC	9/16" laminated	57	50	9/16" (.030 lami)	5 3/16" *A.S	3/8" (.030 lami)
OPG6000 STC w/sash	1" & 1/4"	46	39	1/4"	1/2" *A.S	1/4" with 1/4" (interior)
OPG1928 STC	1-3/8"	46	42	1/4"	1/2" *A.S	1/4" with 3/8" (interior)

*A.S (Air Space)



CURTAIN WALL PROJECTED ASSEMBLY

SERIES	GLASS SIZE	STC	OITC	GLASS MAKE UP (Outboard) (Air Space) (Inboard)		
TC470 STC w/T200 STC	1/2"	38	34	1/4" (.060 lami)	1/2" *A.S	1/4"
OPG1500 STC w/CV200 STC	1"	41	34	1/2" (.060 lami)	3/4" *A.S	3/8" (.060 lami)
OPG3000 STC w/T200 STC Projected	1-1/2"	51	42	1/4"	3/4" *A.S	1/2" (.090 lami)

**Additional tests may be available upon request. Always consult with Arcadia Representative during design.

*A.S (Air Space)

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