T E S T R E P O R T

ASTM E 90-09: Laboratory Measurement of Airborne Sound Transmission of Building Partitions and Elements

Orfield Laboratories Inc

Design Research Testing
Acoustics / Vibration / Vision / Lighting / Architecture / Market Research

TEST

Client:	**Acoustical Surfaces, Inc.**
Report Date:	**May 25, 2011**
Test Date:	**September 29, 2010**
Test Number:	**OL10-0944**

RESULT SUMMARY

STC=51

CLIENT ADDRESS
Acoustical Surfaces, Inc.
123 Columbia Court North, Suite 201
Chaska, MN
Phone: (800) 448-0121

ACCREDITATION

NVLAP

For the scope of accreditation under NVLAP code 200248-0

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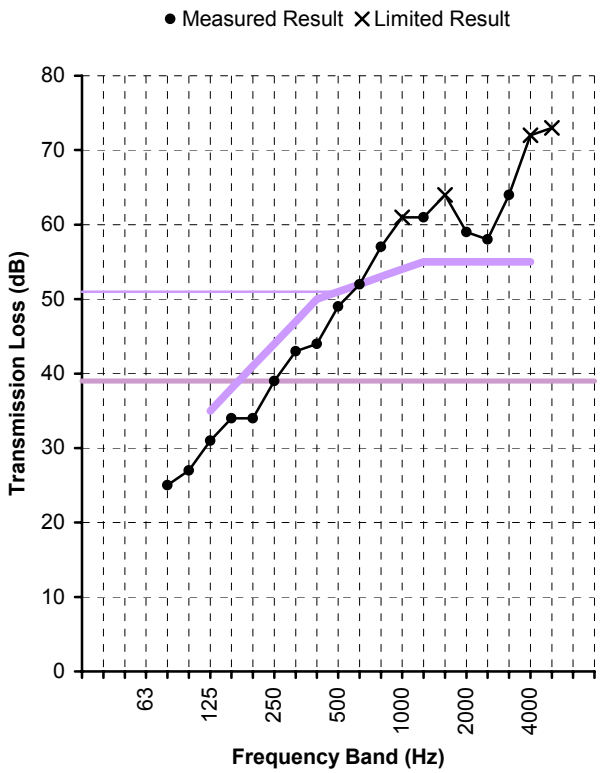
Signatures are required on this document for an official laboratory test report. Copies of this document without signatures are for reference only.

Test Date September 29, 2010
Specimen Fixed Window
Method ASTM Standard E90
Technician D. Berg

Single Number Rating
STC = 51
OITC = 39



Freq. (Hz)	TL (dB)	Def. (dB)
80	25	
100	27	
125	31	4
160	34	4
200	34	7
250	39	5
315	43	4
400	44	6
500	49	2
630	52	-
800	57	-
1000	61*	-
1250	61	-
1600	64*	-
2000	59	-
2500	58	-
3150	64	-
4000	72*	-
5000	73*	
Total Deficiencies		32

* Estimate of lower limit

Assembly Elements (listed in order from source room side to receiver room side)

Fixed Aluminum Commercial Window
37.5" x 48" x 4.625
Climate Seal Frame
Climate Seal Insert w/ 6.5" AS + jamb absorber

SPECIMEN DESCRIPTION

The specimen under test was an acoustic and thermal insulating retrofit system installed over one fixed window assembly. Additional information regarding the specimen may be found in the appendices.

Test results pertain to this specimen only.

INSTALLATION AND DISPOSITION

The filler wall was constructed for this test on September 24, 2010. Independent contractors fabricated the filler wall and test sample frame. Representatives of the client installed and sealed the window in the specimen opening. The installed window installation was retained for subsequent tests in this series. Qualified representatives of Orfield Laboratories observed the installation progress, and visually inspected the specimen and seals prior to testing.

TEST METHODS

The methods followed these published standards:

ASTM E90-09*: *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements*

ASTM E413-10: *Classification for Rating Sound Insulation*

The values presented in this report are from single-direction transmission loss measurements.

** Orfield Laboratories, Inc. has been accredited by the U.S. Department of Commerce, National Institute of Standards and Technology (NIST) under their National Voluntary Laboratory Accreditation Program (NVLAP) for this test procedure. This report shall not be used to claim product endorsement by NVLAP or any agency of the U.S. Government.*

CONFIDENTIALITY

The client has full control over this information and any release of information will be only to the client. The specific testing results are deemed to be confidential exclusively for the client's use. Reproduction of this report, except in full, is prohibited.

APPENDIX A: MEASUREMENT SETUP

Environment	
Temperature	71°F [21.7°C]
Relative Humidity	55%

Specimen Area	
Specimen Area	12.5 ft² [1.16 m²]
Filler Wall Area	52.0 ft² [4.83 m²]
Composite Wall Area	64.5 ft² [5.99 m²]

Chamber Volume - Airborne Transmission	
Source Room Volume	3284 ft³ [93.0 m³]
Receiving Room Volume	8079 ft³ [228.8 m³]

INSTRUMENTATION

Description	Brand	Model	S/N
Calibrator	Brüel & Kjær	Type 4230	1379712
Microphone	Brüel & Kjær	Type 4134	1478843
Preamplifier	Brüel & Kjær	Type 2639	1202479
Microphone	Brüel & Kjær	Type 4134	558007
Preamplifier	Brüel & Kjær	Type 2639	1312147
Power Supply	Brüel & Kjær	Type WB1057	n/a
Analyzer	Norsonic	Type 121	31185

APPENDIX B: CALCULATION RESULTS

Freq. Band (Hz)	Specimen T.L. (dB)	95% Conf. (dB)	Flanking Limit (dB)	STC Defic. (dB)	R_w Defic. (dB)	OITC Level (dBA)
25						
31.5	**22.0** †		40			
40	**16.1** ‡		47			
50	**17.5** ‡		43			
63	**25.0** ‡		43			
80	**24.7** ‡	±1.63	42			56
100	**26.9** ‡	±1.15	45		4.1	56
125	**30.6** ‡	±0.95	46	4	3.4	54
160	**33.6** ‡	±1.27	52	4	3.4	51
200	**34.2** ‡	±1.24	53	7	5.8	52
250	**38.8** ‡	±0.65	56	5	4.2	47
315	**43.1** ‡	±0.65	60	4	2.9	44
400	**44.0** ‡	±0.62	61	6	5.0	44
500	**48.9** ‡	±0.40	65	2	1.1	41
630	**52.3** ‡	±0.50	66	-	-	37
800	**57.3** ‡	±0.40	69	-	-	32
1000	**61.2** §‡	±0.25	70	-	-	28
1250	**60.9** ‡	±0.25	72	-	-	29
1600	**64.2** §†	±0.32	72	-	-	25
2000	**58.7** ‡	±0.44	74	-	-	30
2500	**57.8**	±0.35	79	-	-	30
3150	**64.1** ‡	±0.31	83	-	-	22
4000	**71.8** *†	±0.49		-		13
5000	**73.1** *†	±0.35				
6300	**70.3** *†					
8000	**69.3** *†					
10000						

Total deficiencies below STC contour (dB)	32		
STC contour [ASTM E413]	**51**		
Total deficiencies below R_w contour (dB)		29.9	
R_w contour [ISO 717/1]		**50**	
Indoor noise level from reference spectrum (dBA)			61.5
OITC level [ASTM E1332]			**39**

* Actual transmission loss of specimen may be higher than measured at this frequency band. Signal-to-noise in the receiving room less than 5 dB, therefore the result is "an estimate of the lower limit".

§ Actual transmission loss of specimen may be higher than measured at this frequency band. Result within 10 dB of flanking limit found in separate study, therefore the result may be "potentially limited by the laboratory" due to flanking around the specimen.

‡ Correction included in calculation due to a portion of the sound transmitted by way of the filler wall. Sound transmission through the filler wall is within correction limits established in ASTM E90.

† Actual transmission loss of specimen may be higher than measured at this frequency band. Sound transmission through the filler wall exceeds correction limits established in ASTM E90; therefore the result is "an estimate of the lower limit".

APPENDIX C: SPECIMEN ASSEMBLY DESCRIPTION

The following table shows the size and weight of the insert and window assembly tested. Independent contractors constructed the filler wall and specimen opening. The client installed and sealed the window assembly in the laboratory test opening. A qualified representative of Orfield Laboratories observed the installation in process and visually inspected the completed specimen and seals. All materials were weighed prior to installation. Fastener weights are not included.

Overall Mass = 0.0 lb [0.0 kg]
Overall Surface Density = 0.00 PSF [0.00 kg/m²]

Element	Mass lb [kg]	Surf. Dens. PSF [kg/m²]
Fixed Aluminum Commercial Window		
37.5" x 48" x 4.625		
Climate Seal Frame		
Climate Seal Insert w/ 6.5" AS + jamb absorber		

The test insert, frame and commercial window were provided by the client. Other construction materials were acquired by the independent construction contractors through local construction material suppliers.

FILLER WALL

A double-stud filler wall was constructed. The filler wall contained three layers of 5/8” gypsum board at each surface and two layers of glass fiber batt insulation, one in each stud cavity. The sample test frame was pre-built into the wall and lined with 3 layers of 5/8” gypsum board. The outer two layers were laminated with damping compound. The sample frame was prevented from coupling the two stud walls by cutting around the perimeter. The resulting narrow gap with filled with non-hardening acoustic sealant. The finished filler wall had a surface density of roughly 19 lbs. per square foot and an STC rating of 69. Appropriate filler wall corrections were applied to the sample transmission loss calculations in accordance with ASTM E90-09 and are reflected in the data as indicated in Appendix B.

TEST SPECIMEN DESCRIPTION

The test specimen consisted of an Acoustical Surfaces Inc, Climate Seal™ window insert installed over a typical aluminum commercial window, as used in glass curtain wall assemblies. The Climate Seal™ window insert, commonly known as an “interior storm window,” is sold as an acoustic and thermal insulating retrofit system. The Climate Seal™ is magnetically attached to its companion steel frame, which is provided with the window insert. The Climate Seal™ frame was screwed to the window jamb and sealed with acoustic sealant. The Climate Seal™ insert was then attached to the frame using only its integral magnetic seal. Apart from its integral magnetic seals, no additional means of sealing the Climate Seal™ window insert to the frame was used. The frame used for this test created a 6.5" air-space with integral jamb absorber between the commercial window aluminum frame and the metal Climate Seal™ insert frame. The Climate Seal™ inserts were tested with their protective shipping film in place on both sides of the insert.

The commercial window consisted of one, 1” insulating glass unit mounted in an aluminum frame. The outer dimensions of the commercial window assembly were 37.5” wide by 48” high by 4.5” thick. The commercial window was sealed in the test specimen opening with acoustic sealant filling the gap between the specimen and test opening as well as 5 mil foil tape over the sealed gap.

APPENDIX D: SINGLE-NUMBER CALCULATION TO ISO 717-1

Freq. Band (Hz)	R_i ($R_i \equiv$ TL) (dB)	Ref Curve (dB)	Unfav. Deviat. (dB)	L_{i1} Spectrum (dB)	$L_{i1} - R_i$ Level (dB)	L_{i2} Spectrum (dB)	$L_{i2} - R_i$ Level (dB)
50	**17.5**						
63	**25.0**						
80	**24.7**						
100	**26.9**	31	4.1	-29.0	-55.9	-20.0	-46.9
125	**30.6**	34	3.4	-26.0	-56.6	-20.0	-50.6
160	**33.6**	37	3.4	-23.0	-56.6	-18.0	-51.6
200	**34.2**	40	5.8	-21.0	-55.2	-18.0	-52.2
250	**38.8**	43	4.2	-19.0	-57.8	-15.0	-53.8
315	**43.1**	46	2.9	-17.0	-60.1	-14.0	-57.1
400	**44.0**	49	5.0	-15.0	-59.0	-13.0	-57.0
500	**48.9**	50	1.1	-13.0	-61.9	-12.0	-60.9
630	**52.3**	51	-	-12.0	-64.3	-11.0	-63.3
800	**57.3**	52	-	-11.0	-68.3	-9.0	-66.3
1000	**61.2**	53	-	-10.0	-71.2	-8.0	-69.2
1250	**60.9**	54	-	-9.0	-69.9	-9.0	-69.9
1600	**64.2**	54	-	-9.0	-73.2	-10.0	-74.2
2000	**58.7**	54	-	-9.0	-67.7	-11.0	-69.7
2500	**57.8**	54	-	-9.0	-66.8	-13.0	-70.8
3150	**64.1**	54	-	-9.0	-73.1	-15.0	-79.1
4000	**71.8**						
5000	**73.1**						
		Sum =	29.9	$R_{A,1}$ =	48.0	$R_{A,2}$ =	42.8
		R_W =	**50**	**C =**	**-2**	**C_{tr} =**	**-7**

$Rw\ (C\ ;\ Ctr) = 50\ (-2\ ;\ -7)$

$Rw\ (C\ ;\ Ctr\ ;\ C\,50\text{-}3150\ ;\ Ctr,\,50\text{-}3150) = 50\ (-2\ ;\ -7\ ;\ -3\ ;\ -12)$

$Rw\ (C\ ;\ Ctr\ ;\ C\,100\text{-}5000\ ;\ Ctr,100\text{-}5000) = 50\ (-2\ ;\ -7\ ;\ -1\ ;\ -7)$

$Rw\ (C\ ;\ Ctr\ ;\ C\,50\text{-}5000\ ;\ Ctr,\,50\text{-}5000) = 50\ (-2\ ;\ -7\ ;\ -2\ ;\ -12)$

Note: The calculations in ISO 717-1 are performed based on assumed equivalency of the ASTM and the corresponding ISO test methods. The test herein is performed according to the ASTM standards. Orfield Laboratories *does not* hold accreditation for ISO 140 or ISO 717 under their NVLAP scope of accreditation.

The spectrum adaptation terms C and C_{tr} characterize performance against two specific sound sources, A-weighted pink noise and A-weighted traffic noise respectively. The standard ISO 717-1 includes a discussion of “Use of Spectrum Adaptation Terms” in Annex A (informative).

Each spectrum adaptation term may additionally be reported with extended frequency bands included. A calculation for the primary frequency range is shown above, but all available extended-frequency calculations were performed to compare against corresponding ratings of other specimens