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 28, 2010**
Test Number:	**OL10-0936**

RESULT SUMMARY

STC=55

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

PREPARED BY
David M. Berg
Orfield Laboratories, Inc.
2709 East 25th Street
Minneapolis MN 55406
Voice (612) 721-2455
FAX (612) 721-2457
e-mail dave@orfieldlabs.com

Prepared by:

ELECTRONICALLY REPRODUCED SIGNATURE

David M. Berg
Laboratory Manager

Reviewed by:

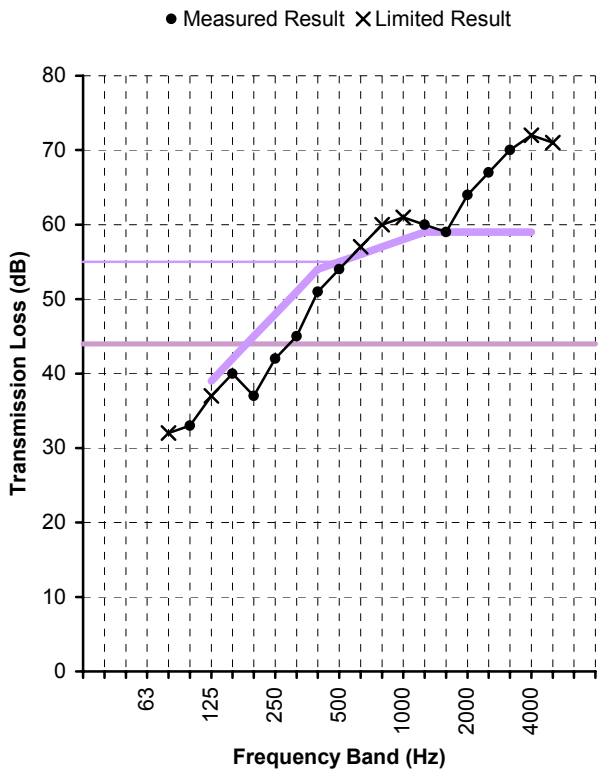
ELECTRONICALLY REPRODUCED SIGNATURE

Michael R. Role

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 28, 2010
Specimen Fixed Window
Method ASTM Standard E90
Technician D. Berg

Single Number Rating
STC = 55
OITC = 44



Freq. (Hz)	TL (dB)	Def. (dB)
80	32*	
100	33	
125	37*	2
160	40	2
200	37	8
250	42	6
315	45	6
400	51	3
500	54	1
630	57*	-
800	60*	-
1000	61*	-
1250	60	-
1600	59	-
2000	64	-
2500	67	-
3150	70	-
4000	72*	-
5000	71*	
Total Deficiencies		28

* Estimate of lower limit

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

Acoustical Window
37.5" x 48" x 6.375

SPECIMEN DESCRIPTION

The specimen under test was 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. 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	70°F [21.1°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	**21.3** †		40			
40	**19.3** ‡		47			
50	**24.3** ‡		43			
63	**26.4** ‡		43			
80	**31.6** †	±1.63	42			49
100	**33.5** ‡	±1.15	45		1.5	50
125	**36.5** §‡	±0.95	46	2	1.5	48
160	**39.6** ‡	±1.27	52	2	1.4	45
200	**36.7** ‡	±1.24	53	8	7.3	49
250	**41.9** ‡	±0.65	56	6	5.1	44
315	**44.9** ‡	±0.65	60	6	5.1	42
400	**50.6** ‡	±0.62	61	3	2.4	37
500	**53.9** ‡	±0.40	65	1	0.1	36
630	**57.1** §†	±0.50	66	-	-	32
800	**59.6** §‡	±0.40	69	-	-	29
1000	**60.9** §‡	±0.25	70	-	-	28
1250	**59.6** ‡	±0.25	72	-	-	30
1600	**58.8** ‡	±0.32	72	-	-	30
2000	**63.7** ‡	±0.44	74	-	-	25
2500	**66.6** ‡	±0.35	79	-	-	21
3150	**69.7** ‡	±0.31	83	-	-	16
4000	**72.1** *†	±0.49		-		13
5000	**71.3** *†	±0.35				
6300	**69.7** *†					
8000	**68.4** *†					
10000	**63.0** *†					
Total deficiencies below STC contour (dB)				28		
STC contour [ASTM E413]				**55**		
Total deficiencies below R_w contour (dB)					24.4	
R_w contour [ISO 717/1]					**54**	
Indoor noise level from reference spectrum (dBA)						56.0
OITC level [ASTM E1332]						**44**

* 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 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 = 187.0 lb [84.8 kg]
Overall Surface Density = 14.96 PSF [73.04 kg/m²]

Element	Mass lb [kg]	Surf. Dens. PSF [kg/m²]
Acoustical Window 37.5" x 48" x 6.375	187.0 [84.8]	14.96 [73.04]

The test window was 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 was one Acoustical Surfaces, Inc. Acoustical Window. The outer dimensions of the window assembly were 37.5” wide by 48” high by 6.375” thick. The window had two glazing lites with an air-space in between them. Detailed descriptions of the glazing and spacing are withheld at the client’s request. The test sample 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 and 7/8” dense putty 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	**24.3**						
63	**26.4**						
80	**31.6**						
100	**33.5**	35	1.5	-29.0	-62.5	-20.0	-53.5
125	**36.5**	38	1.5	-26.0	-62.5	-20.0	-56.5
160	**39.6**	41	1.4	-23.0	-62.6	-18.0	-57.6
200	**36.7**	44	7.3	-21.0	-57.7	-18.0	-54.7
250	**41.9**	47	5.1	-19.0	-60.9	-15.0	-56.9
315	**44.9**	50	5.1	-17.0	-61.9	-14.0	-58.9
400	**50.6**	53	2.4	-15.0	-65.6	-13.0	-63.6
500	**53.9**	54	0.1	-13.0	-66.9	-12.0	-65.9
630	**57.1**	55	-	-12.0	-69.1	-11.0	-68.1
800	**59.6**	56	-	-11.0	-70.6	-9.0	-68.6
1000	**60.9**	57	-	-10.0	-70.9	-8.0	-68.9
1250	**59.6**	58	-	-9.0	-68.6	-9.0	-68.6
1600	**58.8**	58	-	-9.0	-67.8	-10.0	-68.8
2000	**63.7**	58	-	-9.0	-72.7	-11.0	-74.7
2500	**66.6**	58	-	-9.0	-75.6	-13.0	-79.6
3150	**69.7**	58	-	-9.0	-78.7	-15.0	-84.7
4000	**72.1**						
5000	**71.3**						
		Sum =	24.4	$R_{A,1}$ =	52.2	$R_{A,2}$ =	47.8
		R_W =	**54**	**C =**	**-2**	**C_{tr} =**	**-6**

$Rw\ (C\ ;\ Ctr) = 54\ (-2\ ;\ -6)$

$Rw\ (C\ ;\ Ctr\ ;\ C\,50\text{-}3150\ ;\ Ctr,50\text{-}3150) = 54\ (-2\ ;\ -6\ ;\ -3\ ;\ -11)$

$Rw\ (C\ ;\ Ctr\ ;\ C\,100\text{-}5000\ ;\ Ctr,100\text{-}5000) = 54\ (-2\ ;\ -6\ ;\ -1\ ;\ -6)$

$Rw\ (C\ ;\ Ctr\ ;\ C\,50\text{-}5000\ ;\ Ctr,50\text{-}5000) = 54\ (-2\ ;\ -6\ ;\ -2\ ;\ -11)$

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