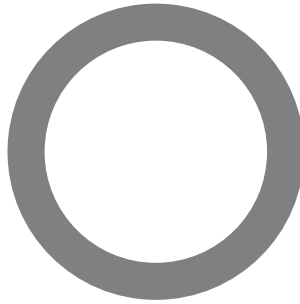


ASTM E 90-09: Laboratory Measurement of Airborne Sound Transmission of Building Partitions and Elements

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: **OL10-0943**

ACCREDITATION



For the scope of accreditation under NVLAP code 200248-0

PREPARED BY

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RESULT SUMMARY

STC=46

CLIENT ADDRESS

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

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.

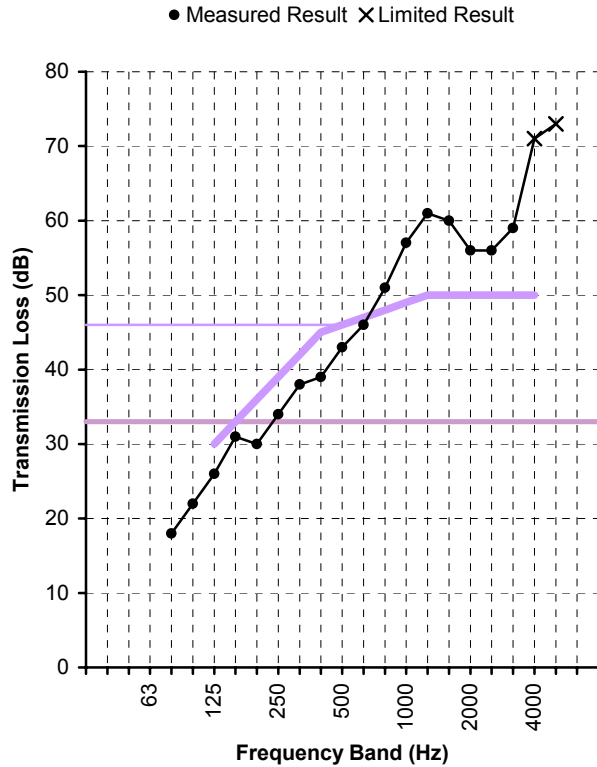




Test Date September 29, 2010
Specimen Fixed Window

Method ASTM Standard E90
Technician D. Berg

Single Number Rating
STC = 46
OITC = 33



Freq. (Hz)	TL (dB)	Def. (dB)
80	18	
100	22	
125	26	4
160	31	2
200	30	6
250	34	5
315	38	4
400	39	6
500	43	3
630	46	1
800	51	-
1000	57	-
1250	61	-
1600	60	-
2000	56	-
2500	56	-
3150	59	-
4000	71*	-
5000	73*	-

Total Deficiencies 31

* Estimate of lower limit

Assembly Elements (listed in order from source room side to receiver room side)
 Fixed Aluminum Commercial Window
 Climate Seal frame
 Climate Seal insert 4.5" AS and 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 ft ² [1.16 m ²]
Filler Wall Area	52.0 ft ² [4.83 m ²]
Composite Wall Area	64.5 ft ² [5.99 m ²]

Chamber Volume - Airborne Transmission

Source Room Volume	3284 ft ³ [93.0 m ³]
Receiving Room Volume	8079 ft ³ [228.8 m ³]

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	22.7 †		40			
40	17.6 ‡		47			
50	21.8 ‡		43			
63	22.6 ‡		43			
80	17.8	±1.63	42			63
100	21.7	±1.15	45		4.3	61
125	25.9	±0.95	46	4	3.1	59
160	30.9	±1.27	52	2	1.1	54
200	29.6	±1.24	53	6	5.4	56
250	33.7	±0.65	56	5	4.3	52
315	38.0	±0.65	60	4	3.0	49
400	39.0	±0.62	61	6	5.0	49
500	42.7	±0.40	65	3	2.3	47
630	45.6	±0.50	66	1	0.4	43
800	50.8 ‡	±0.40	69	-	-	38
1000	56.9 ‡	±0.25	70	-	-	32
1250	61.1 ‡	±0.25	72	-	-	29
1600	60.2 ‡	±0.32	72	-	-	29
2000	55.8	±0.44	74	-	-	33
2500	56.4	±0.35	79	-	-	32
3150	59.2	±0.31	83	-	-	27
4000	71.1 *†	±0.49		-		14
5000	72.5 *†	±0.35				
6300	70.3 *†					
8000	69.6 *†					
10000						
Total deficiencies below STC contour (dB)				31		
STC contour [ASTM E413]				46		
Total deficiencies below R_w contour (dB)					28.9	
R_w contour [ISO 717/1]					45	
Indoor noise level from reference spectrum (dBA)						66.9
OITC level [ASTM E1332]						33

* 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".

‡ 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".

Note: 95% confidence intervals from room qualification data. Flanking Limit from chamber flanking study. Reference sample and repeatability data available upon request. Extended frequency results below 80Hz and above 5000Hz are for reference only.





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 = 110.9 lb [50.3 kg]

Overall Surface Density = 8.87 PSF [43.32 kg/m²]

Element	Mass lb [kg]	Surf. Dens. PSF [kg/m ²]
Fixed Aluminum Commercial Window	87.0 [39.5]	6.96 [33.98]
Climate Seal frame	1.9 [0.9]	0.15 [0.74]
Climate Seal insert 4.5" AS and jamb absorber	22.0 [10.0]	1.76 [8.59]

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 4.5" 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	21.8						
63	22.6						
80	17.8						
100	21.7	26	4.3	-29.0	-50.7	-20.0	-41.7
125	25.9	29	3.1	-26.0	-51.9	-20.0	-45.9
160	30.9	32	1.1	-23.0	-53.9	-18.0	-48.9
200	29.6	35	5.4	-21.0	-50.6	-18.0	-47.6
250	33.7	38	4.3	-19.0	-52.7	-15.0	-48.7
315	38.0	41	3.0	-17.0	-55.0	-14.0	-52.0
400	39.0	44	5.0	-15.0	-54.0	-13.0	-52.0
500	42.7	45	2.3	-13.0	-55.7	-12.0	-54.7
630	45.6	46	0.4	-12.0	-57.6	-11.0	-56.6
800	50.8	47	-	-11.0	-61.8	-9.0	-59.8
1000	56.9	48	-	-10.0	-66.9	-8.0	-64.9
1250	61.1	49	-	-9.0	-70.1	-9.0	-70.1
1600	60.2	49	-	-9.0	-69.2	-10.0	-70.2
2000	55.8	49	-	-9.0	-64.8	-11.0	-66.8
2500	56.4	49	-	-9.0	-65.4	-13.0	-69.4
3150	59.2	49	-	-9.0	-68.2	-15.0	-74.2
4000	71.1						
5000	72.5						
Sum =			28.9	$R_{A,1} =$	43.3	$R_{A,2} =$	38.0
$R_w =$			45	$C =$	-2	$C_{tr} =$	-7

$$R_w (C ; C_{tr}) = 45 (-2 ; -7)$$

$$R_w (C ; C_{tr} ; C_{50-3150} ; C_{tr, 50-3150}) = 45 (-2 ; -7 ; -3 ; -10)$$

$$R_w (C ; C_{tr} ; C_{100-5000} ; C_{tr, 100-5000}) = 45 (-2 ; -7 ; -1 ; -7)$$

$$R_w (C ; C_{tr} ; C_{50-5000} ; C_{tr, 50-5000}) = 45 (-2 ; -7 ; -2 ; -10)$$

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

