Steel Door Sound Transmission Tests

This package details the sound transmission tests we conducted on our 1.75" thick steel doors on Aug 8-9, 2012 at NWAA Labs in Elma, WA. We tested our 175C steel door with a 5"x29" slim view glass lite and another door with a 23"x65" full view glass lite.

On the 8th, the two doors were tested by NWAA and by JGL Acoustics. First, NWAA tested the slim view glass lite door and then JGL Acoustics tested the same door immediately afterwards using their own equipment. Then the same process was repeated for the full view glass lite door.

Here is what is in this package:

Please ask for any information you may want concerning these tests.
Thank you,

Randy Brown
President
Soundproof Windows, Inc.

* On the second day of testing we changed how we gasketed the test doors. We report these improved results in our various brochures concerning the glass view lite doors. JGL Acoustics was not present for these new tests conducted on day two.

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August 13, 2012

Soundproof Windows, Inc.
4673 Aircenter Circle
Reno, NV 89502

Attention: Randy Brown
Subject: ASTM E90 Testing at NWAA Labs

Ladies and Gentlemen:

This report summarizes my findings regarding the ASTM E90 sound testing services provided by NWAA Labs, located at 90 Tower Blvd. in Elma, WA. As you are aware, NWAA Labs operates a two-room measurements suite specifically designed to test sound transmission loss of walls, windows, and doors in accordance with ASTM E90. JGL Acoustics, Inc. has been retained by your firm to not only witness NWAA's E90 sound tests on two of your sound-rated door products, but also to independently test these same two products in the NWAA lab using my own instrumentation and software. The purpose of this review and independent acoustical testing is to verify that the methodology and procedures used by NWAA labs and the test results obtained from their ASTM E90 tests are reliable and accurate.

NWAA Facilities

The ASTM E90 suite at NWAA Labs consists of a 667 cubic meter all-concrete source room connected to a 737 cubic meter receiving room via an 11.8 square meter test opening. The entire receiving room is vibration isolated from the building structure with 4" thick Kinetics type KIP fiberglass isolation mounts. The receiving room floor is 6" thick dense, reinforced concrete, and the receiving room walls consist of 2 layers of 5/8" gypsum board and 2 layers of ½" thick cement board. The receiving room ceiling consists of two layers of 1" thick gypsum core board suspended from the building structure with Kinetics model ICC spring hangers. The wall separating the source room from the receive room is 12" dense concrete (on the source room side) and 2 layers of 5/8" gypsum board and 2 layers of ½" thick cement board (on the receive room side) with an air space of 16 inches between the concrete and gypsum board. There is no direct connection between the source room and the receiving room.

The filler wall separating the source room and the receive room consists of 8" thick solid concrete blocks (stacked tightly together without any grout or sealant between the blocks)

on the source room side and 3 layers of 5/8" thick gypsum board screwed to 2x4 wood framing on the receive room side. The entire cavity between the concrete blocks and gypsum board was filled with fiberglass batt insulation. The gypsum board joints were sealed with metal tape and acoustic caulk on all layers, and the gap at the perimeter of the filler wall on both sides was sealed with acoustic caulk and putty.

NWAA Instrumentation

Both the source room and receiving room are equipped with six ¼" diameter condenser microphones. The receiving room microphones are suspended from the ceiling, and the source room microphones are mounted on floor stands. Each microphone has a specific location that is fixed for all measurements. The cables from all microphones are fed back to the control room which is located about 20 feet from the receiving room and about 100 feet from the source room. The data acquisition system is a custom modified preamp and A/D converter used with the software package EASERA, and the data analysis software was custom developed by AFMG, Berlin, Germany.

The source room contains 24 loudspeakers distributed throughout the upper 25% of the source room. There are 8 high frequency drivers, 12 mid-high drivers, 8 mid-low drivers, and 2 self-powered, full-range boxes. These speakers are fed by a digital signal processor containing a 4-way crossover feeding 15,000 watts of amplifier power. The large number of loudspeakers is required to achieve high enough source room levels to enable the measurement of high TL products. The receiving room contains two dodecahedron loudspeakers and a large subwoofer for generating broadband noise for reverberation decays. Sound pressure level measurements are taken simultaneously in the source and receive room using a total of 12 fixed microphones. The total duration of these measurements is 20 seconds. A total of 20 individual decays are measured at each microphone in the receiving room, and the computed average sound absorption is therefore based on a net total of 120 (6 x 20 = 120) decays.

JGL Acoustics Instrumentation

All acoustic measurements conducted by me on this project were taken with a hand-held Bruel & Kjaer model 2270 using the Bruel & Kjaer Building Acoustics Software Package (BZ-7228). I used the NWAA source room loudspeakers to generate broad band pink noise for the noise reduction portion of the tests, because my loudspeaker did not have sufficient power to generate the required source room sound pressure levels. I used my QSC model K12 powered loudspeaker (controlled by the Bruel & Kjaer 2270) in the receive room to generate interrupted broad band noise for reverberation decay measurements in the receiving room. Space average sound pressure level measurements

in both the source and receiving rooms were taken over a 60 second time period with the microphone moving slowly throughout each room. A total of 8 fixed source/receiver location combinations were used to measure the average decay rate in the receiving room. Four separate decays were time-averaged prior to analysis at each source/receiver location for a grand total of 32 decays for each test. It should be noted that during all of my measurements there were only two items in the receive room that were not in the receive room during the NWAA measurements: 1) my body, and 2) my loudspeaker and sound level meter.

Description of the Test Specimen

The two test specimens evaluated in this study were hollow metal insulated steel doors with vision lites. Each door leaf measured 37" wide by 83.75" high by 1-3/4" thick. The outside dimensions of the door frame were 43.25" wide by 87" high by 5.25" deep. The first door tested had a 5" wide by 29" high vision lite centered vertically at eye height, and the second door tested had a 23" wide by 65" high vision lite centered in the door. Photos of both doors are presented in Appendix C. Both doors had three cam-lift hinges and were tested in the same grout-filled hollow metal frame. The door frame weighed 108 pounds (after grout fill) and the door panel for the first test weighed 297 pounds, and the door panel for the second test weighed 316 pounds. The net surface weight of the two door panels was 13.8 and 14.7 pounds per square foot, respectively. The design of the internal components of both doors is identical, but proprietary. The only difference between the two doors is the size of the glazing element. The overall thickness of the glazing element of both doors is 2.5 inches. Note that the glazing element protrudes outward 3/8" from the basic door panel thickness on both sides of the door. The doors and frame were fitted with peel and stick rubber fin gaskets that were applied by the manufacturer immediately before the sound test. The seals were applied to both the door frame as well as all four of the door edges.

Acoustic Measurements

Prior to conducting sound transmission loss tests of the two acoustic doors, the filler wall was tested to determine its sound transmission loss. The filler wall measurements were conducted on July 18, 2012. The frequency range of the measurements was from 50 Hz to 10,000 Hz in one-third octave bands. The results showed the STC rating of the filler wall to be 71. The raw data and calculated TL and STC values are shown in Appendix A for the NWAA Lab tests. The raw data and calculated TL and STC values are shown in Appendix B for my test of the filler wall.

Also prior to conducting the sound transmission loss tests, the door frame was installed into the filler wall. This work was performed on August 7, 2012 by Soundproof Windows staff working with NWAA staff. I was not present to observe this work. The door frame was installed flush with the source room wall, and the space between the receive room side of the filler wall and the door frame was filled with 3 layers of 5/8" gypsum board to match the construction of the filler wall on the receive side. The distance from the door panel to the face of the receive room was 27.75 inches.

The test results are presented in tabular form in Appendix A and Appendix B. Appendix A contains the raw data and calculated results from NWAA, and Appendix B contains the raw data and calculated results from JGL Acoustics, Inc. Figures 1 and 2 present the measured transmission loss values in each frequency band for the two doors that were tested. The curves marked by solid black squares represent JGL Acoustics, Inc. data, and the curves marked by open blue squares represent NWAA data. As you can see, the calculated STC ratings are identical for both tests, although the individual TL values in the one-third octave bands vary slightly at some frequency bands.

Summary

This review and analysis presents convincing evidence that the raw data and test results obtained by NWAA Labs are accurate and in conformance with ASTM Standards. The ultimate flanking limits of the lab have yet to be determined, but it is clear that doors, windows and walls with STC ratings as high as 60 can be accurately measured using the existing filler wall. Other higher performing filler walls will have to be constructed in order to determine the ultimate flanking limits of this facility. It is also important to note the low background sound levels, particularly at low frequencies where the background noise level at 50 Hz is typically less than 25 dB. The lab also exhibits low TL confidence limits at low frequencies. For example, at 50 Hz and 63 Hz, the 95% confidence limit is typically significantly less than the maximum allowable confidence limit specified in ASTM E90-09 for 80 Hz.

If you have any questions regarding these test results, do not hesitate to give me a call.

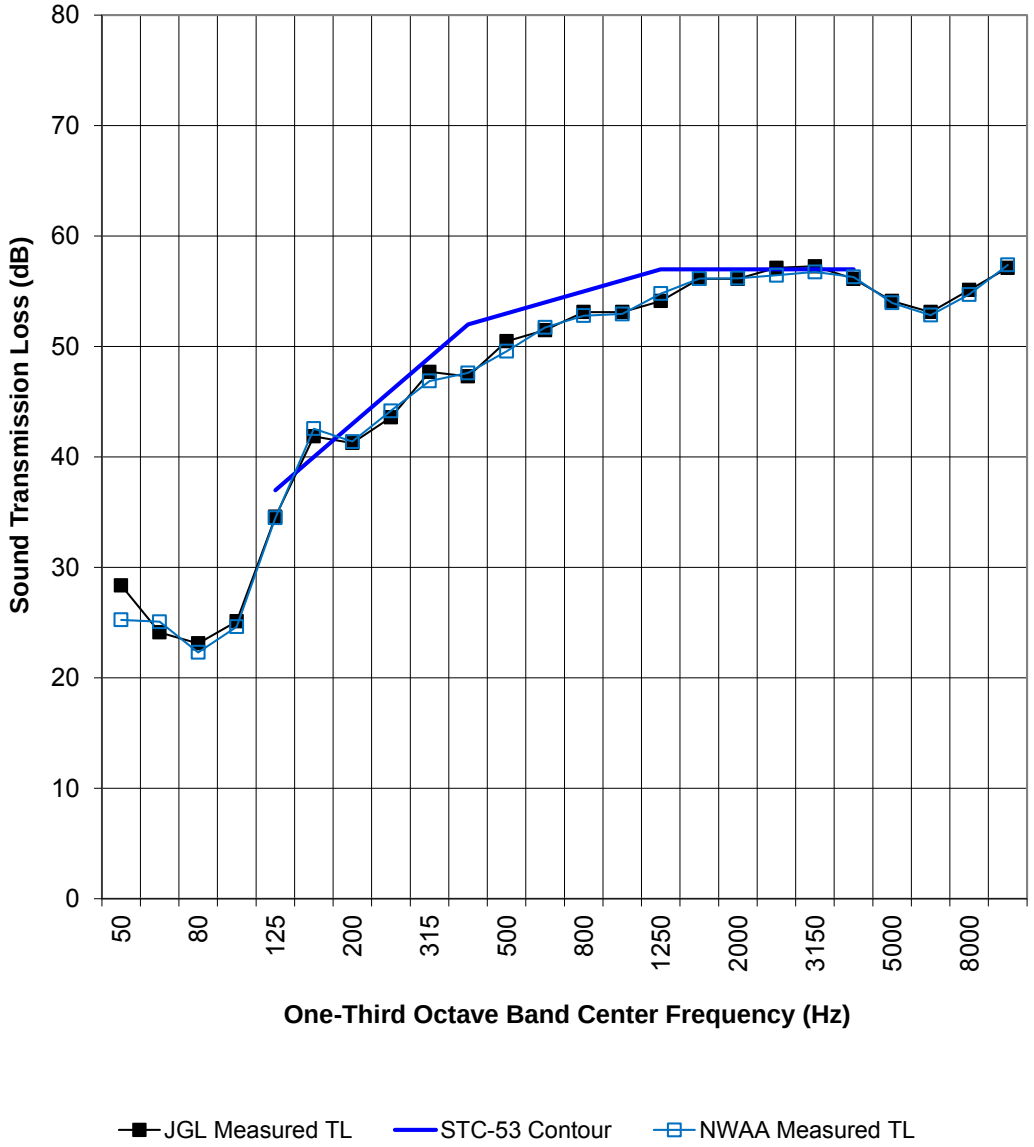
Very truly yours,
JGL Acoustics, Inc,

Jerry G. Lilly, P.E., President, FASA
Member INCE, ASTM, NCAC

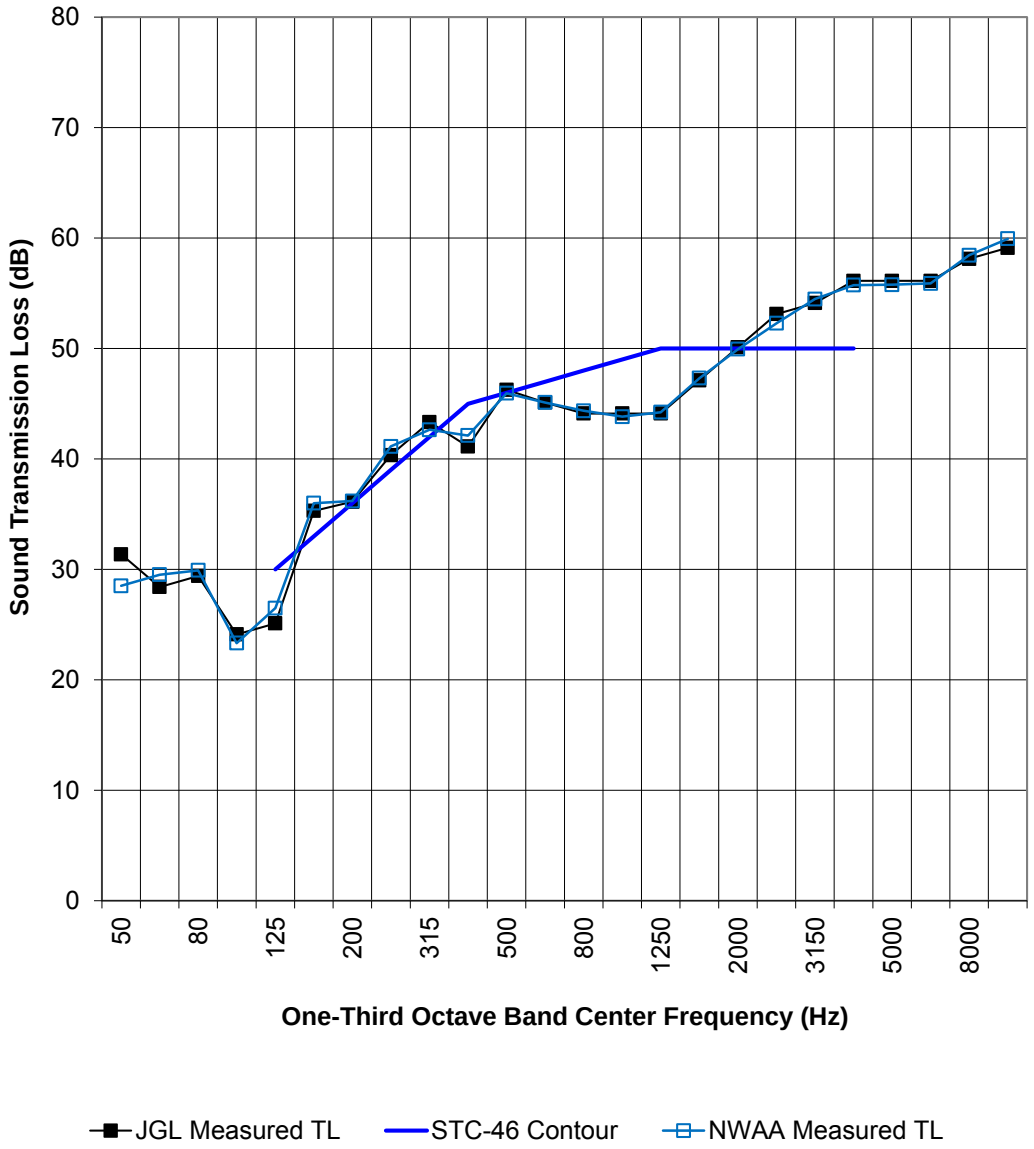
5266 NW Village Park Drive
Issaquah, WA 98027

Phone: (425) 649-9344
FAX: (425) 649-0737

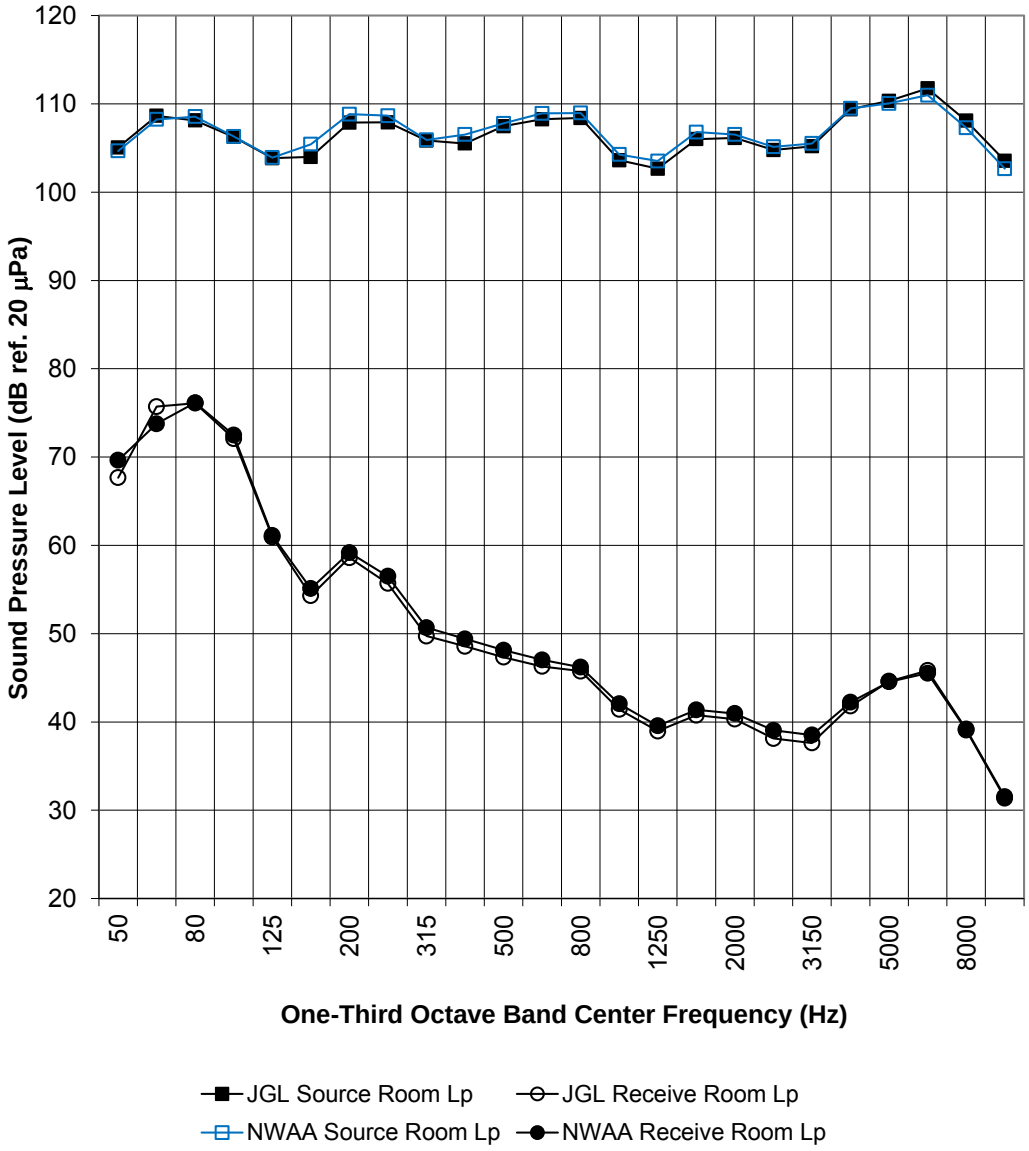
Soundproof Windows
Figure 1. Door #1 Transmission Loss
(with 5" by 29" vision lite)



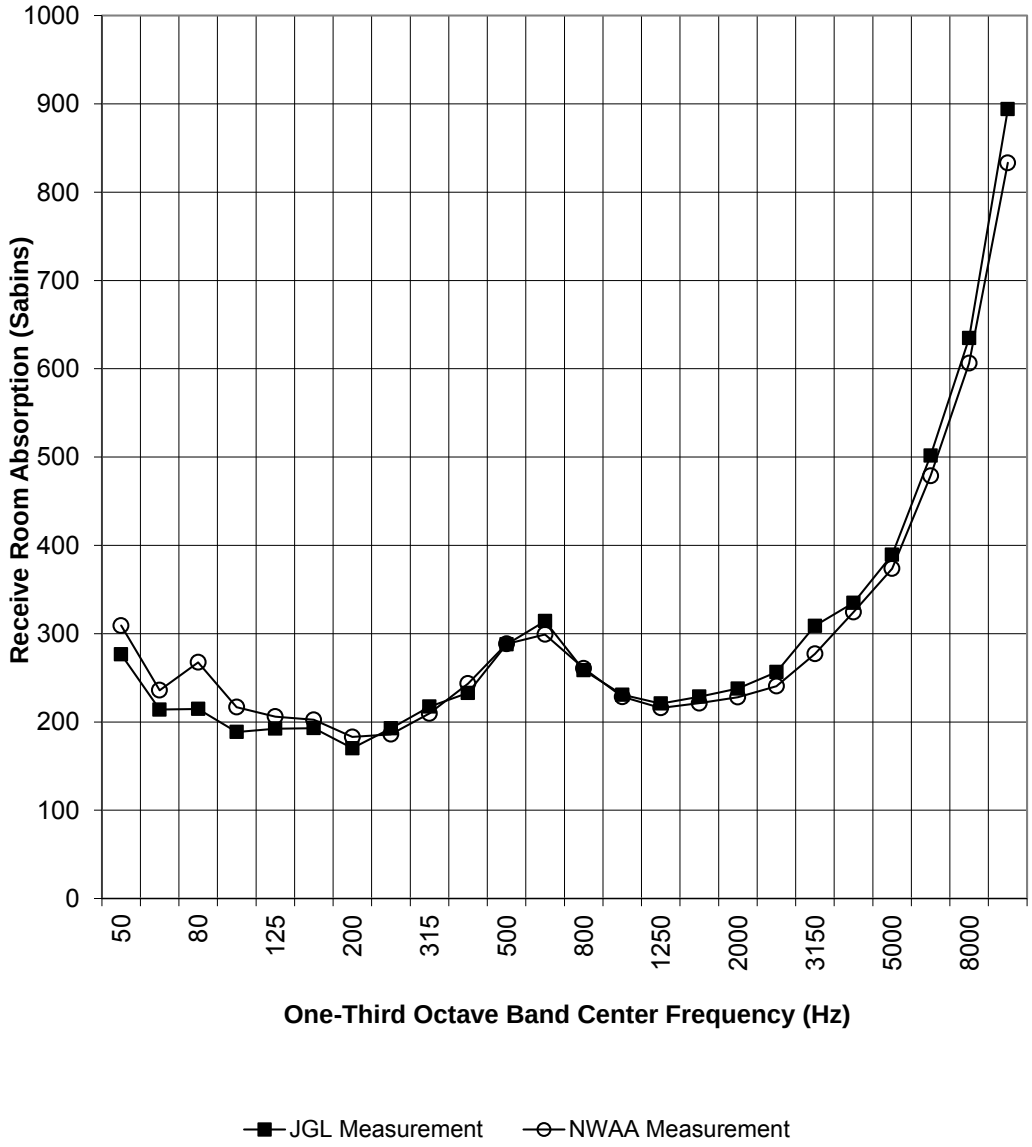
Soundproof Windows
Figure 2. Door #2 Transmission Loss
(with 23" by 65" vision lite)



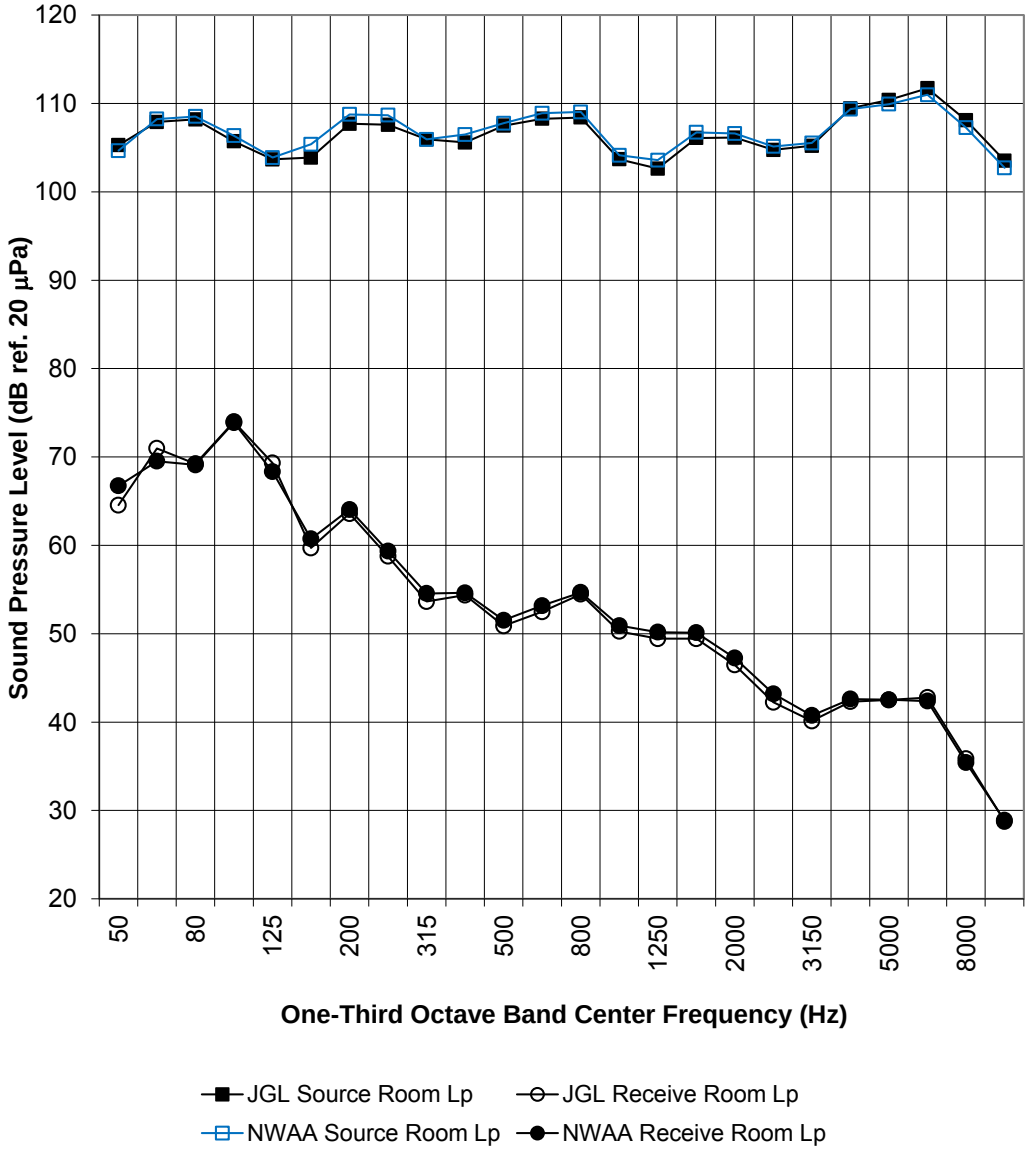
Soundproof Windows
Figure 3. Space Average Sound Pressure Levels
(Door #1 with 5" by 29" vision lite)



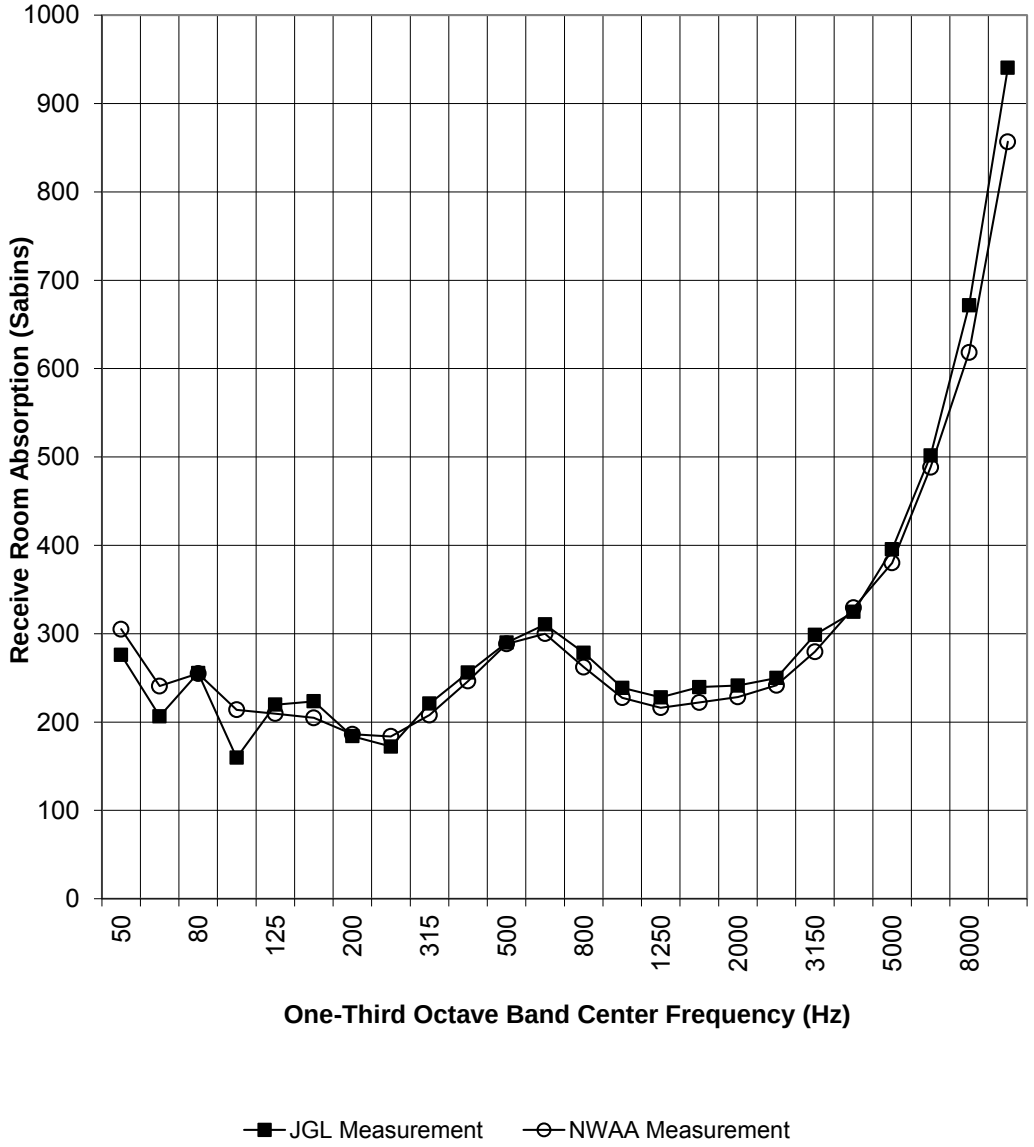
Soundproof Windows
Figure 4. Receive Room Absorption
(Door #1 with 5" by 29" vision lite)



Soundproof Windows
Figure 5. Space Average Sound Pressure Levels
(Door #2 with 23" by 65" vision lite)



Soundproof Windows
Figure 6. Receive Room Absorption
(Door #2 with 23" by 65" vision lite)



Appendix A

NWAA Raw Data and Analysis

This appendix presents detailed raw data and test results of the airborne sound transmission tests conducted by NWAA Labs on two acoustic doors (with vision lites) manufactured for Soundproof Windows. The tests were conducted on August 8, 2012.

This table presents the raw data and analysis for the filler wall test that was conducted approximately 3 weeks prior to the acoustic door tests.

Filler Wall Test																								
Hz	50	63	80	100	125	160	200	250	315	400	500	630	800	1.0k	1.25k	1.6k	2.0k	2.5k	3.15k	4.0k	5.0k	6.3k	8.0k	10k
Ls	104	107	108	106	105	104	109	108	106	107	108	109	109	105	104	107	107	105	106	109	110	111	107	102
StdDev	2.8	1.8	1	0.9	2.3	1	0.5	0.8	0.9	0.8	0.3	0.5	0.4	0.5	0.3	0.4	0.5	0.5	0.6	0.5	0.4	0.4	0.2	0.3
Lr	63	59	59	55	55	49	47	48	43	36	38	38	32	29	24	25	24	23	25	26	23	24	25	25
StdDev	1.2	1.2	1.6	0.4	0.8	0.6	0.5	0.5	0.3	0.4	0.4	0.4	0.3	0.5	0.3	0.3	0.2	0.4	0.3	0.3	0.6	0.6	0.6	0.7
Lab	63	59	59	55	55	49	47	48	43	36	38	38	32	29	25	26	26	25	27	28	25	26	27	27
StdDev	1.2	1.2	1.6	0.4	0.8	0.6	0.5	0.5	0.3	0.4	0.4	0.4	0.3	0.3	0.2	0.2	0.1	0.4	0.3	0.3	0.6	0.6	0.6	0.7
Ln	21	20	19	21	29	18	18	19	17	17	17	17	17	18	19	19	21	21	22	23	24	25	26	27
StdDev	1.1	1.1	0.9	1.9	5.2	1.1	1	1.9	0.9	0.9	0.8	0.8	0.7	0.7	0.8	0.8	0.6	0.8	0.8	0.6	0.8	0.8	0.6	0.9
SNR	42	39	39	34	26	31	29	29	27	20	22	21	14	11	6.7	6.7	5	3.4	4.6	4.7	1.4	0.7	0.5	0.5
Sabins	284	260	252	207	194	188	175	187	207	242	286	289	252	221	209	216	221	233	271	321	370	485	618	861
Abs (m^2)	26	24	23	19	18	17	16	17	19	22	27	27	23	21	19	20	21	22	25	30	34	45	57	80
StdDev	3.1	1.2	1.6	1.6	1.1	1.2	1.2	0.7	0.4	0.4	0.5	0.5	0.4	0.2	0.3	0.2	0.2	0.1	0.2	0.2	0.1	0.5	0.5	0.8
TL[dB]	**37**	**45**	**46**	**49**	**48**	**54**	**61**	**59**	**60**	**67**	**66**	**68**	**75**	**74**	**77**	**79**	**81**	**80**	**78**	**79**	**82**	**81**	**75**	**69**
StdDev	3	2.2	1.9	1.1	2.4	1.2	0.8	1	0.9	0.9	0.5	0.6	0.5	0.7	0.4	0.5	0.5	0.7	0.7	0.5	0.7	0.8	0.7	0.8
[%]	8.2	4.8	4.1	2.2	5	2.3	1.3	1.6	1.6	1.3	0.8	0.9	0.7	1	0.6	0.6	0.7	0.8	0.9	0.7	0.9	0.9	0.9	1.2
95% Confidence interval (CI)																								
CI	3.2	2.3	2	1.1	2.5	1.3	0.8	1	1	0.9	0.5	0.7	0.5	0.8	0.5	0.5	0.6	0.7	0.7	0.5	0.7	0.8	0.7	0.8
CI(max)			6	4	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1				

This table provides raw data and test results for the composite test of the first door mounted in the filler wall.

Composite Test (test speciment in filler wall)																								
Hz	50	63	80	100	125	160	200	250	315	400	500	630	800	1.0k	1.25k	1.6k	2.0k	2.5k	3.15k	4.0k	5.0k	6.3k	8.0k	10k
Ls	105	108	109	106	104	105	109	109	106	107	108	109	109	104	104	107	107	105	106	109	110	111	107	103
StdDev	4.2	2.4	0.7	1.6	1.2	1	1.3	0.9	0.7	0.7	0.5	0.2	0.5	0.6	0.3	0.7	0.4	0.4	0.4	0.2	0.3	0.3	0.2	0.5
Lr	70	74	76	73	61	55	59	57	51	49	48	47	46	42	40	41	41	39	39	42	45	46	39	31
StdDev	2.4	2	3.3	3.5	0.9	1.2	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.4	0.3	0.4	0.3	0.2	0.3	0.2	0.2	0.3	0.4	0.5
Lab	70	74	76	73	61	55	59	57	51	49	48	47	46	42	40	41	41	39	39	42	45	46	39	33
StdDev	2.4	2	3.3	3.5	0.9	1.2	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.4	0.3	0.4	0.3	0.2	0.3	0.2	0.2	0.3	0.4	0.5
Ln	22	21	21	21	29	18	18	19	17	17	17	17	17	18	19	20	21	21	22	23	24	25	26	27
StdDev	1.2	1	0.9	1.7	4.8	1	1	1.7	1	0.9	0.9	0.9	0.8	0.7	0.7	0.8	0.6	0.8	0.8	0.7	0.8	0.8	0.6	0.9
SNR	48	53	55	51	32	37	42	37	34	33	31	30	29	24	21	22	20	18	16	19	21	20	13	5.8
Sabins	309	236	268	217	206	202	183	186	210	243	288	299	261	228	216	221	228	240	277	325	374	479	606	833
Abs (m2)	29	22	25	20	19	19	17	17	19	23	27	28	24	21	20	21	21	22	26	30	35	44	56	77
StdDev	0.6	2.6	1.8	1.5	0.7	1.3	0.5	0.7	0.6	0.4	0.1	0.3	0.4	0.3	0.2	0.3	0.2	0.1	0.1	0.2	0.2	0.3	0.5	0.7
TL[dB]	31	32	29	32	41	48	48	51	53	54	56	58	60	60	62	63	63	63	64	63	61	60	61	63
StdDev	4.9	3.1	3.4	3.9	1.5	1.6	1.4	1.1	0.9	0.8	0.6	0.5	0.7	0.7	0.4	0.8	0.5	0.4	0.5	0.3	0.4	0.4	0.5	0.7
[%]	16	9.9	12	12	3.8	3.4	3	2.2	1.7	1.5	1.1	0.9	1.1	1.2	0.7	1.2	0.8	0.7	0.7	0.5	0.6	0.7	0.7	1.1
95% Confidence interval (CI)																								
CI	5.1	3.3	3.6	4.1	1.6	1.7	1.5	1.1	0.9	0.9	0.7	0.6	0.7	0.7	0.4	0.8	0.5	0.5	0.5	0.4	0.4	0.5	0.5	0.8
CI(max)			6	4	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1				

This table shows the calculation of the test specimen transmission loss, STC, and OITC ratings for the first door test.

Filler Wall Area	101.3	sq.ft.					
Test Specimen Area	26.13	sq.ft.					
Total Test Opening	127.4	sq.ft.				Max. Def.	
			Test	Rounded		4	
	Filler	Composite	Specimen	Specimen	STC	Total Def.	OITC
Frequency	Wall TL	Wall TL	TL	TL	53	29	38
							Δ
50	37.35	31.2	25.3	25			7.1
63	45.1	31.8	25.1	25			14.3
80	46.3	29.2	22.3	22			18.1
100	49.1	31.5	24.6	25			18.5
125	48.3	40.7	34.5	34	37	3	8.6
160	53.7	48.3	42.6	43	40	0	6.4
200	60.7	48.1	41.4	41	43	2	13.6
250	58.9	50.5	44.2	44	46	2	9.3
315	60.5	53.1	46.9	47	49	2	8.4
400	67.4	54.3	47.6	48	52	4	14.1
500	66.5	56.1	49.6	50	53	3	11.4
630	67.5	58.2	51.7	52	54	2	10.3
800	74.6	59.7	52.8	53	55	2	15.9
1K	73.6	59.7	52.9	53	56	3	14.9
1.2K	77.2	61.7	54.8	55	57	2	16.5
1.6K	79.4	63.0	56.1	56	57	1	17.4
2K	80.6	63.1	56.2	56	57	1	18.5
2.5K	80.1	63.3	56.4	56	57	1	17.8
3.15K	77.7	63.6	56.7	57	57	0	15.0
4K	79.1	63.2	56.3	56	57	1	16.9
5K	81.7	60.8	54.0	54			21.9
6.3K	81.1	59.7	52.8	53			22.4
8K	75.3	61.5	54.7	55			14.9
10K	68.5	63.1	57.4	57			6.4

NWAA Labs, Inc.

90 Tower Blvd,
Elma, WA 98541
(253)-973-1018

Test #	NWTL120808-05
Test Date:	8-Aug-12
Area Tested: M²	0.00
Temperature: °C	23
Barometer: pa	101800
Humidity: %	71

STC	53
OITC	38
DEF	29

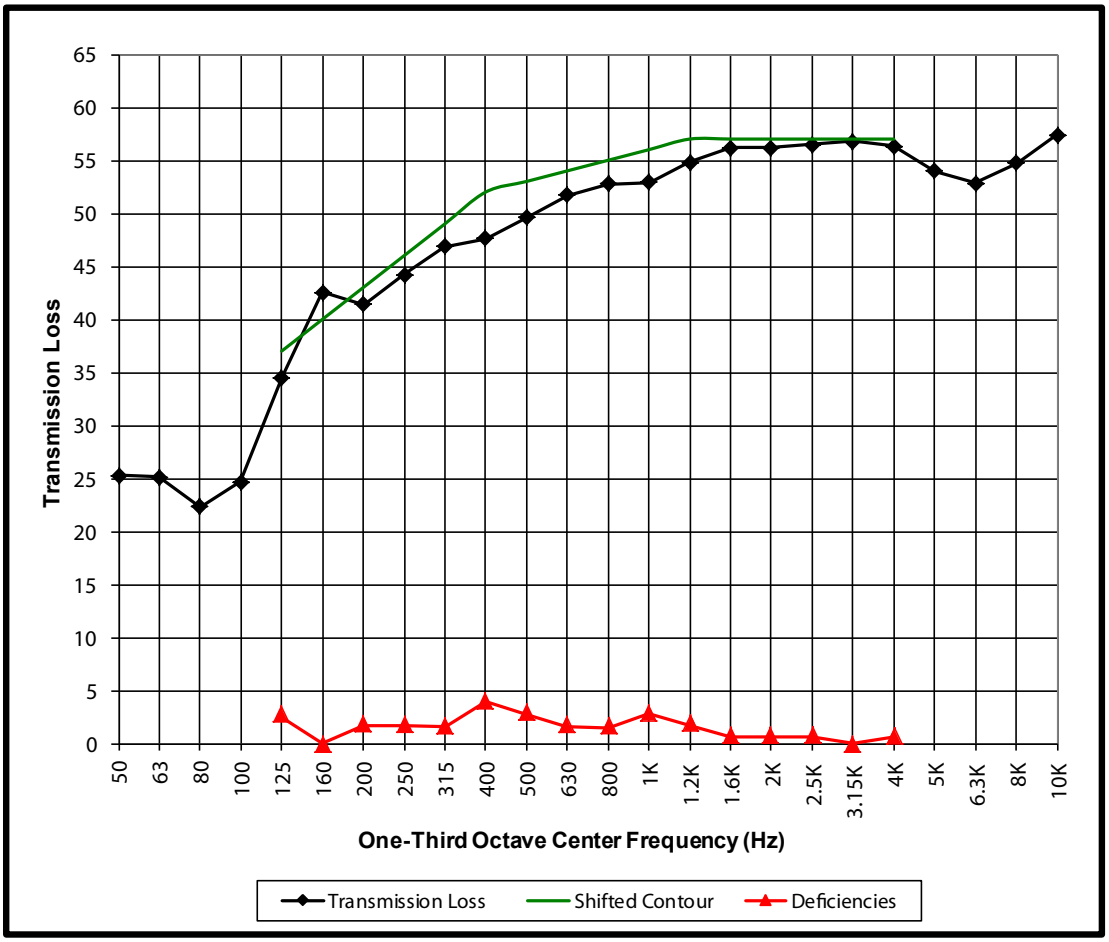
Soundproof Windows 175CG-view seal operable

Frequency (Hz)	Transmission Loss	Shifted Contour	Deficiencies	S/N Ratio	Notes
50Hz	25			0.0	2
63Hz	25			0.0	2
80Hz	22			0.0	
100Hz	25			0.0	
125Hz	34	37	3	0.0	2
160Hz	43	40	0	0.0	2
200Hz	41	43	2	0.0	2
250Hz	44	46	2	0.0	2
315Hz	47	49	2	0.0	2
400Hz	48	52	4	0.0	2
500Hz	50	53	3	0.0	2
630Hz	52	54	2	0.0	2
800Hz	53	55	2	0.0	
1000Hz	53	56	3	0.0	2
1250Hz	55	57	2	0.0	
1600Hz	56	57	1	0.0	
2000Hz	56	57	1	0.0	
2500Hz	56	57	1	0.0	
3150Hz	57	57	0	0.0	
4000Hz	56	57	1	0.0	
5000Hz	54			0.0	
6300Hz	53			0.0	
8000Hz	55			0.0	2
10000Hz	57			0.0	2

Note 1: Flanking noise limited. True value of Transmission Loss is greater than shown.

Note 2: Flanking noise correction applied.

Soundproof Windows 175CG-view seal operable



This table provides raw data and test results for the composite test of the second door mounted in the filler wall.

Composite Test (test specimen in filler wall)																								
Hz	50	63	80	100	125	160	200	250	315	400	500	630	800	1.0k	1.25k	1.6k	2.0k	2.5k	3.15k	4.0k	5.0k	6.3k	8.0k	10k
Ls	105	108	109	106	104	105	109	109	106	106	108	109	109	104	104	107	107	105	106	109	110	111	107	103
StdDev	4.2	2.3	0.7	1.6	1.3	1.1	1.4	0.9	0.7	0.8	0.5	0.3	0.4	0.7	0.3	0.5	0.3	0.5	0.4	0.4	0.2	0.4	0.2	0.4
Lr	67	70	69	74	68	61	64	59	55	55	52	53	55	51	50	50	47	43	41	43	43	42	35	29
StdDev	2.1	2.1	2.6	3.3	1.9	1.2	0.7	0.5	1	0.9	0.7	0.4	0.4	0.2	0.1	0.2	0.2	0.1	0.2	0.2	0.2	0.3	0.3	0.5
Lab	67	70	69	74	68	61	64	59	55	55	52	53	55	51	50	50	47	43	41	43	43	42	36	31
StdDev	2.1	2.1	2.6	3.3	1.9	1.2	0.7	0.5	1	0.9	0.7	0.4	0.4	0.2	0.1	0.2	0.2	0.1	0.2	0.2	0.2	0.3	0.4	0.5
Ln	21	20	20	21	29	18	18	19	17	17	17	17	17	18	19	20	21	21	22	23	24	25	26	27
StdDev	1	1	1	1.8	5.2	1.1	1	1.8	0.8	0.8	0.8	0.8	0.8	0.7	0.8	0.8	0.6	0.8	0.8	0.7	0.8	0.8	0.6	0.9
SNR	46	50	49	53	40	43	46	40	38	38	35	36	37	33	31	31	27	22	19	19	18	17	9.6	4
Sabins	305	241	255	214	209	205	186	184	208	246	288	300	262	227	216	222	228	242	280	329	380	488	618	857
Abs (m^2)	28	22	24	20	19	19	17	17	19	23	27	28	24	21	20	21	21	22	26	31	35	45	57	80
StdDev	0.5	2	2.2	1.6	0.9	1.5	0.5	0.5	0.7	0.5	0.4	0.3	0.2	0.3	0.2	0.2	0.3	0.1	0.2	0.1	0.1	0.4	0.6	0.8
TL[dB]	34	36	36	30	33	43	43	48	49	49	53	52	51	51	51	54	57	59	61	63	63	63	65	66
StdDev	4.7	3.1	2.8	3.7	2.3	1.6	1.6	1	1.2	1.2	0.8	0.5	0.6	0.7	0.3	0.5	0.4	0.5	0.5	0.5	0.3	0.5	0.4	0.7
[%]	14	8.7	7.6	12	7	3.8	3.6	2.2	2.5	2.5	1.6	0.9	1.1	1.4	0.6	1	0.6	0.9	0.7	0.7	0.5	0.7	0.6	1
95% Confidence interval (CI)																								
CI	4.9	3.3	2.9	3.9	2.5	1.7	1.6	1.1	1.3	1.3	0.9	0.5	0.6	0.7	0.3	0.6	0.4	0.5	0.5	0.5	0.3	0.5	0.4	0.7
CI(max)			6	4	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1				

This table shows the calculation of the test specimen transmission loss, STC, and OITC ratings for the second door test.

Filler Wall Area	101.3	sq.ft.					
Test Specimen Area	26.13	sq.ft.					
Total Test Opening	127.4	sq.ft.				Max. Def.	
			Test	Rounded		6	
	Filler	Composite	Specimen	Specimen	STC		OITC
Frequency	Wall TL	Wall TL	TL	TL	46	27	36
						Total Def.	Δ
50	37.35	34.1	28.5	29			4.2
63	45.1	36.0	29.5	30			10.1
80	46.3	36.4	29.9	30			10.8
100	49.1	30.2	23.3	23			19.8
125	48.3	33.4	26.5	26	30	4	15.9
160	53.7	42.6	36.0	36	33	0	12.1
200	60.7	43.1	36.2	36	36	0	18.6
250	58.9	47.7	41.1	41	39	0	12.1
315	60.5	49.3	42.6	43	42	0	12.2
400	67.4	49.0	42.1	42	45	3	19.4
500	66.5	52.7	46.0	46	46	0	14.8
630	67.5	52.0	45.1	45	47	2	16.5
800	74.6	51.2	44.4	44	48	4	24.3
1K	73.6	50.7	43.8	44	49	5	23.9
1.2K	77.2	51.1	44.2	44	50	6	27.1
1.6K	79.4	54.2	47.3	47	50	3	26.2
2K	80.6	56.8	49.9	50	50	0	24.7
2.5K	80.1	59.2	52.3	52	50	0	21.9
3.15K	77.7	61.4	54.5	54	50	0	17.3
4K	79.1	62.6	55.7	56	50	0	17.5
5K	81.7	62.7	55.8	56			20.1
6.3K	81.1	62.8	55.9	56			19.4
8K	75.3	65.0	58.4	58			11.3
10K	68.5	65.6	59.9	60			3.9

NWAA Labs, Inc.

90 Tower Blvd,
Elma, WA 98541
(253)-973-1018

Test #	NWTL120808-07
Test Date:	8-Aug-12
Area Tested: M²	0.00
Temperature: °C	23
Barometer: pa	101800
Humidity: %	69

STC	46
OITC	36
DEF	27

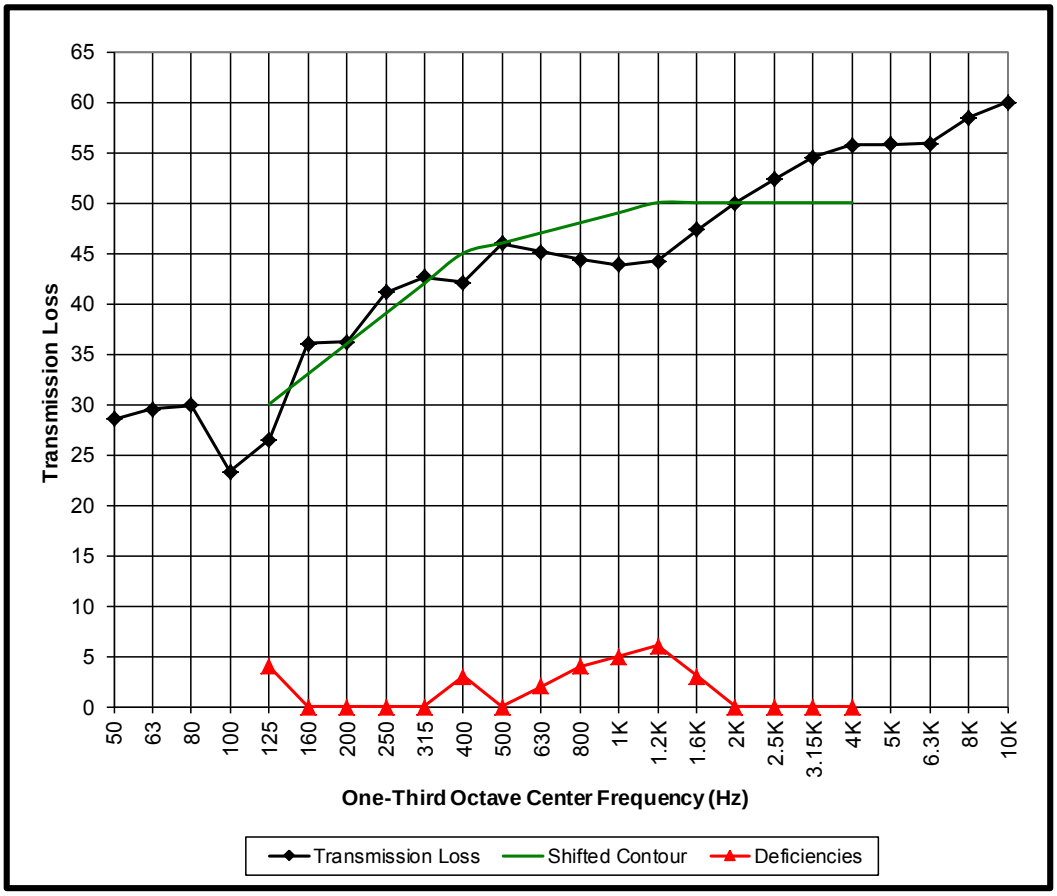
Soundproof Windows 175CG-10 operable

Frequency (Hz)	Transmission Loss	Shifted Contour	Deficiencies	S/N Ratio	Notes
50Hz	29			0.0	1
63Hz	30			0.0	2
80Hz	30			0.0	2
100Hz	23			0.0	
125Hz	26	30	4	0.0	
160Hz	36	33	0	0.0	2
200Hz	36	36	0	0.0	
250Hz	41	39	0	0.0	2
315Hz	43	42	0	0.0	2
400Hz	42	45	3	0.0	
500Hz	46	46	0	0.0	2
630Hz	45	47	2	0.0	
800Hz	44	48	4	0.0	
1000Hz	44	49	5	0.0	
1250Hz	44	50	6	0.0	
1600Hz	47	50	3	0.0	
2000Hz	50	50	0	0.0	
2500Hz	52	50	0	0.0	
3150Hz	54	50	0	0.0	
4000Hz	56	50	0	0.0	
5000Hz	56			0.0	
6300Hz	56			0.0	
8000Hz	58			0.0	2
10000Hz	60			0.0	1

Note 1: Flanking noise limited. True value of Transmission Loss is greater than shown.

Note 2: Flanking noise correction applied.

Soundproof Windows 175CG-10 operable



End of Appendix A

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Appendix B

JGL Acoustics, Inc. Raw Data and Analysis

This appendix presents detailed raw data and test results of the airborne sound transmission tests conducted by JGL Acoustics, Inc. at NWAA Labs on two acoustic doors (with vision lites) manufactured for Soundproof Windows. The tests were conducted on August 8, 2012.

This table presents the raw data and analysis for the filler wall test that was conducted on July 18, 2012, approximately 3 weeks prior to the acoustic door tests.

NWAA Labs Filler Wall TL Test: Concrete Blocks on Source Side, 3 layers 5/8" GWB on receive side														
Air Temperature	74	deg. F												
Speed of Sound	1132.7	ft/sec												
Source Room	22,937	cu. ft.	650.0	m3										
Receive Room	26,021	cu. ft.	**737.4**	m3										
Partition Area	126.9	sq. ft.	**11.8**	m2										
					Ambient									
					Adjusted		NIC	Def.	Decay			STC		
Frequency	L1	L2	B2	T2	L2	NR	**73**	28	Rate	Receive	**TL**	**71**	29	S/N
							Contour		(dB/s)	Sabins		Contour	Def.	Ratio
50	105.2	63.1	21.9	3.87	63.1	42			15.5	328	38			41.2
63	107.8	58.7	19.6	5.04	58.7	49			11.9	252	46			39.1
80	107.5	58.2	17.8	5.75	58.2	49			10.4	221	47			40.4
100	106.7	55.3	16.8	6.35	55.3	51			9.4	200	49			38.6
125	104.9	53.3	17.1	6.65	53.3	52	57	5	9.0	191	50	55	5	36.2
160	104.1	48.3	8.7	7.34	48.3	56	60	4	8.2	173	55	58	3	39.6
200	108.5	45.7	7.8	7.57	45.7	63	63	0	7.9	168	62	61	0	38.0
250	108.0	47.5	7.1	6.58	47.5	61	66	5	9.1	193	59	64	5	40.4
315	106.2	42.8	5.9	6.58	42.8	63	69	6	9.1	193	62	67	5	36.9
400	106.2	35.8	5.9	4.71	35.8	70	72	2	12.7	270	67	70	3	30.0
500	107.8	37.3	6.4	4.31	37.3	70	73	3	13.9	295	67	71	4	31.0
630	108.6	37.3	5.9	4.29	37.3	71	74	3	14.0	296	68	72	4	31.4
800	109.0	30.8	6.0	4.87	30.8	78	75	0	12.3	261	75	73	0	24.8
1000	104.1	27.0	5.7	5.52	27.0	77	76	0	10.9	230	75	74	0	21.3
1250	103.2	22.3	6.1	5.76	22.3	81	77	0	10.4	220	79	75	0	16.2
1600	106.4	22.9	6.2	5.50	22.9	84	77	0	10.9	231	81	75	0	16.7
2000	106.5	23.2	6.6	5.46	23.2	83	77	0	11.0	233	81	75	0	16.6
2500	105.1	21.2	7.0	5.08	21.2	84	77	0	11.8	250	81	75	0	14.2
3150	105.4	24.2	7.3	4.45	24.2	81	77	0	13.5	285	78	75	0	16.9
4000	109.4	25.3	7.9	3.87	25.3	84	77	0	15.5	328	80	75	0	17.4
5000	110.2	18.8	8.7	3.16	18.8	91			19.0	402	86			10.1
6300	111.3	15.8	9.6	2.56	14.6	97			23.4	496	91			5.0
8000	107.5	13.0	10.5	1.94	11.0	97			30.9	654	89			0.4
10000	102.8	12.8	11.5	1.41	10.8	92			42.6	900	83			-0.7

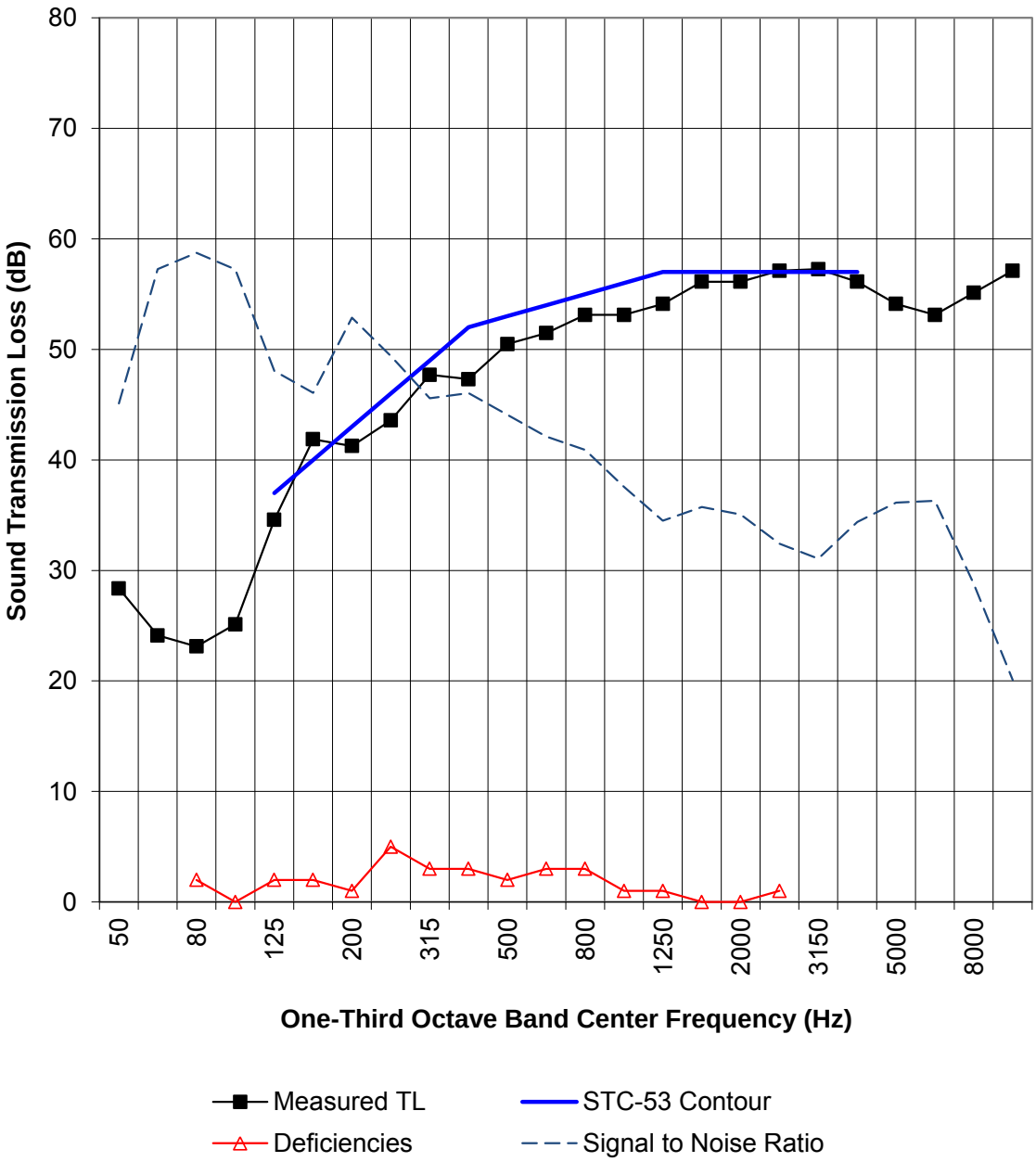
This table provides raw data and test results for the composite test of the first door mounted in the filler wall.

Soundproof Windows Test 1 with small vision lite (composite wall test with door in filler wall)														
Air Temperature	74	deg. F												
Speed of Sound	1132.7	ft/sec												
Source Room	4,360	cu. ft.	650.0	m3										
Receive Room	26,021	cu. ft.	**737.4**	m3										
Partition Area	127.3	sq. ft.	**11.8**	m2										
					Ambient									
					Adjusted		NIC	Def.	Decay			STC		
Frequency	L1	L2	B2	T2	L2	NR	**46**	0	Rate	Receive	**TL**	**60**	32	S/N
							Contour		(dB/s)	Sabins		Contour	Def.	Ratio
50	105.1	67.7	22.6	4.59	67.7	37			13	277	34			45.1
63	108.7	75.7	18.5	5.93	75.7	33			10	214	31			57.3
80	108.1	76.1	17.4	5.91	76.1	32			10	215	30			58.7
100	106.3	72.1	14.8	6.73	72.1	34			9	189	32			57.3
125	103.9	60.9	12.9	6.60	60.9	43	30	0	9	192	41	44	3	48.1
160	104.0	54.3	8.2	6.58	54.3	50	33	0	9	193	48	47	0	46.1
200	107.9	58.6	5.7	7.46	58.6	49	36	0	8	170	48	50	2	52.9
250	107.9	55.7	6.3	6.59	55.7	52	39	0	9	193	50	53	3	49.4
315	105.9	49.7	4.2	5.84	49.7	56	42	0	10	217	54	56	2	45.6
400	105.5	48.6	2.5	5.45	48.6	57	45	0	11	233	54	59	5	46.0
500	107.5	47.3	3.3	4.41	47.3	60	46	0	14	288	57	60	3	44.1
630	108.3	46.3	4.2	4.04	46.3	62	47	0	15	314	58	61	3	42.1
800	108.4	45.8	4.9	4.91	45.8	63	48	0	12	259	60	62	2	40.9
1000	103.6	41.4	3.8	5.50	41.4	62	49	0	11	231	60	63	3	37.6
1250	102.7	39.0	4.5	5.75	39.0	64	50	0	10	221	61	64	3	34.5
1600	106.0	40.8	5.0	5.55	40.8	65	50	0	11	229	63	64	1	35.8
2000	106.1	40.3	5.2	5.34	40.3	66	50	0	11	238	63	64	1	35.1
2500	104.8	38.1	5.7	4.95	38.1	67	50	0	12	256	64	64	0	32.4
3150	105.2	37.6	6.6	4.11	37.6	68	50	0	15	309	64	64	0	31.1
4000	109.4	41.8	7.4	3.79	41.8	68	50	0	16	335	63	64	1	34.4
5000	110.3	44.6	8.5	3.26	44.6	66			18	389	61			36.1
6300	111.8	45.8	9.5	2.53	45.8	66			24	502	60			36.3
8000	108.1	39.2	10.4	2.00	39.2	69			30	635	62			28.8
10000	103.6	31.5	11.4	1.42	31.5	72			42	894	64			20.1

This table shows the calculation of the test specimen transmission loss and STC rating for the first door test.

Soundproof Windows Test #1 with small vision lite						Test Date:	8/8/2012	
Filler Wall Area	101.2	sq.ft.	9.41	m^2				
Test Specimen Area	26.13	sq.ft.	2.43	m^2				
Total Test Opening	127.4	sq.ft.	11.84	m^2			Max. Def.	
			Test	Rounded			5	
	Filler	Composite	Specimen	Specimen		STC	Total Def.	
Frequency	Wall TL	Wall TL	TL	TL	Notes	53	29	Δ
						Contour		
50	38	34	28.4	28	**			5.0
63	46	31	24.1	24				16.0
80	47	30	23.1	23				18.0
100	49	32	25.1	25				18.0
125	50	41	34.6	35	*	37	2	10.0
160	55	48	41.9	42	*	40	0	8.0
200	62	48	41.3	41	*	43	2	15.0
250	59	50	43.6	44	*	46	2	10.0
315	62	54	47.7	48	*	49	1	9.0
400	67	54	47.3	47	*	52	5	14.0
500	67	57	50.5	50	*	53	3	11.0
630	68	58	51.5	51	*	54	3	11.0
800	75	60	53.1	53		55	2	16.0
1000	75	60	53.1	53		56	3	16.0
1250	79	61	54.1	54		57	3	19.0
1600	81	63	56.1	56		57	1	19.0
2000	81	63	56.1	56		57	1	19.0
2500	81	64	57.1	57		57	0	18.0
3150	78	64	57.3	57	*	57	0	15.0
4000	80	63	56.1	56		57	1	18.0
5000	86	61	54.1	54				26.0
6300	91	60	53.1	53				32.0
8000	89	62	55.1	55				28.0
10000	83	64	57.1	57				20.0
** Δ < 6 dB, TL listed is lower limit of true TL								
* 6 < Δ < 15 dB, TL listed has been corrected for sound transmission through filler wall								

Soundproof Windows
Door #1 Transmission Loss
(with 5" by 29" vision lite)



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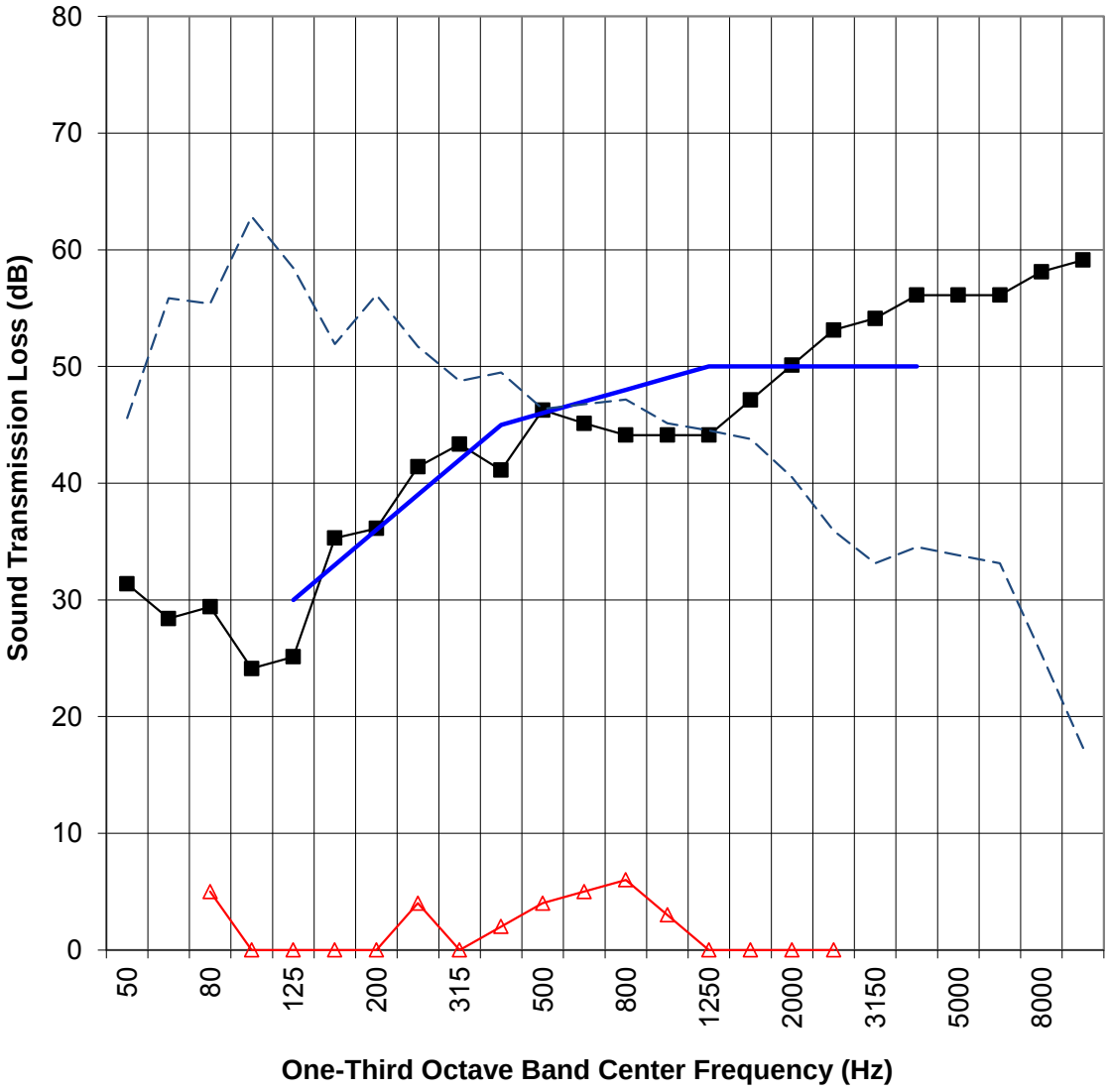
This table provides raw data and test results for the composite test of the second door mounted in the filler wall.

Soundproof Windows Door #2 Test with full vision lite (composite test in filler wall)														
Air Temperature	74	deg. F												
Speed of Sound	1132.7	ft/sec												
Source Room	4,360	cu. ft.	650.0	m3										
Receive Room	26,021	cu. ft.	**737.4**	m3										
Partition Area	127.3	sq. ft.	**11.8**	m2										
					Ambient									
					Adjusted		NIC	Def.	Decay			STC		
Frequency	L1	L2	B2	T2	L2	NR	**55**	25	Rate	Receive		**53**	29	S/N
							Contour		(dB/s)	Sabins	TL	Contour	Def.	Ratio
50	105.3	64.5	19.0	4.60	64.5	41			13	276	37			45.6
63	107.9	71.0	15.1	6.15	71.0	37			10	206	35			55.9
80	108.2	69.2	13.9	4.97	69.2	39			12	255	36			55.4
100	105.7	74.0	11.1	7.95	74.0	32			8	160	31			62.9
125	103.7	69.3	10.9	5.78	69.3	34	39	5	10	220	32	37	5	58.4
160	103.9	59.7	7.8	5.68	59.7	44	42	0	11	223	42	40	0	51.9
200	107.7	63.6	7.5	6.90	63.6	44	45	1	9	184	43	43	0	56.1
250	107.6	58.8	7.0	7.37	58.8	49	48	0	8	172	48	46	0	51.7
315	105.9	53.6	4.9	5.75	53.6	52	51	0	10	221	50	49	0	48.7
400	105.6	54.4	4.9	4.96	54.4	51	54	3	12	256	48	52	4	49.5
500	107.5	50.9	4.5	4.38	50.9	57	55	0	14	290	53	53	0	46.4
630	108.3	52.5	5.7	4.09	52.5	56	56	0	15	310	52	54	2	46.8
800	108.4	54.5	7.3	4.56	54.5	54	57	3	13	278	51	55	4	47.2
1000	103.7	50.3	5.1	5.32	50.3	53	58	5	11	239	51	56	5	45.1
1250	102.6	49.4	4.9	5.57	49.4	53	59	6	11	228	51	57	6	44.5
1600	106.1	49.4	5.7	5.30	49.4	57	59	2	11	240	54	57	3	43.8
2000	106.1	46.5	6.0	5.26	46.5	60	59	0	11	241	57	57	0	40.5
2500	104.8	42.3	6.3	5.08	42.3	63	59	0	12	250	60	57	0	35.9
3150	105.2	40.1	7.0	4.25	40.1	65	59	0	14	299	61	57	0	33.1
4000	109.5	42.3	7.8	3.91	42.3	67	59	0	15	325	63	57	0	34.5
5000	110.4	42.5	8.7	3.21	42.5	68			19	395	63			33.8
6300	111.7	42.8	9.7	2.53	42.8	69			24	502	63			33.1
8000	108.1	35.9	10.5	1.89	35.9	72			32	672	65			25.4
10000	103.5	28.8	11.5	1.35	28.8	75			44	940	66			17.3

This table shows the calculation of the test specimen transmission loss and STC rating for the second door test.

Soundproof Windows Test #2 with vision lite						Test Date:	8/8/2012	
Filler Wall Area	101.2	sq.ft.	9.41	m^2				
Test Specimen Area	26.13	sq.ft.	2.43	m^2				
Total Test Opening	127.4	sq.ft.	11.84	m^2			Max. Def.	
			Test	Rounded			6	
	Filler	Composite	Specimen	Specimen		STC	Total Def.	
Frequency	Wall TL	Wall TL	TL	TL	Notes	46	29	Δ
						Contour		
50	38	37	31.4	31	**			2.0
63	46	35	28.4	28	*			12.0
80	47	36	29.4	29	*			12.0
100	49	31	24.1	24				19.0
125	50	32	25.1	25		30	5	19.0
160	55	42	35.3	35	*	33	0	14.0
200	62	43	36.1	36		36	0	20.0
250	59	48	41.4	41	*	39	0	12.0
315	62	50	43.3	43	*	42	0	13.0
400	67	48	41.1	41		45	4	20.0
500	67	53	46.3	46	*	46	0	15.0
630	68	52	45.1	45		47	2	17.0
800	75	51	44.1	44		48	4	25.0
1000	75	51	44.1	44		49	5	25.0
1250	79	51	44.1	44		50	6	29.0
1600	81	54	47.1	47		50	3	28.0
2000	81	57	50.1	50		50	0	25.0
2500	81	60	53.1	53		50	0	22.0
3150	78	61	54.1	54		50	0	18.0
4000	80	63	56.1	56		50	0	18.0
5000	86	63	56.1	56				24.0
6300	91	63	56.1	56				29.0
8000	89	65	58.1	58				25.0
10000	83	66	59.1	59				18.0
** Δ < 6 dB, TL listed is lower limit of true TL								
* 6 < Δ < 15 dB, TL listed has been corrected for sound transmission through filler wall								

Soundproof Windows
Door #2 Transmission Loss
(with 23" by 65" vision lite)



End of Appendix B

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Appendix C

Photographs

Photo 1. View of test specimen #1 from the source room side.

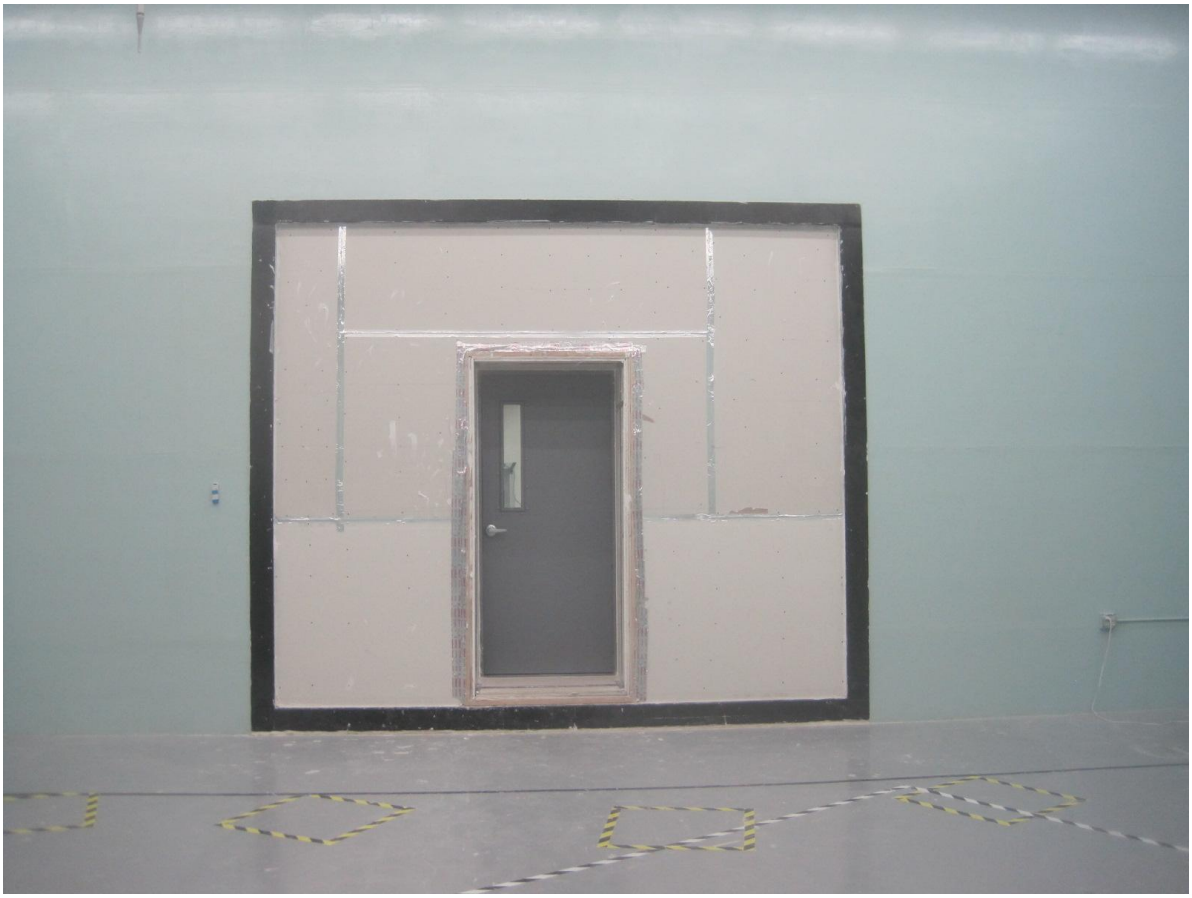


Photo 2. View of test specimen #1 and filler wall from the receive room side.

Photo 3. View of receive room from source room through open test specimen #1.

Photo 4. View of test specimen #2 and filler wall from the source side.

End of Appendix C

NWAA Labs

90 Tower Blvd, Elma, WA 98541, Phone:(253) 973-1018
Email address: audio_ron@msn.com

AIRBORNE SOUND TRANSMISSION LOSS
TEST REPORT #: NWTL120808-05

Client: Soundproof Windows, Inc.
4673 Aircenter Circle
Reno, NV 89501

Test Date: 8 August, 2012
Report Date: 15 August 2012
Test Specimen: Door, 175CG-529

INTRODUCTION

The methods and procedures used in this test conform to the provisions and requirements of ASTM Procedure E 90-09, *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements* and E413-10 *Classification for Rating Sound Insulation*. Copies of the test standards are available at www.astm.org. The receive room test chamber is a cuboid, 12.79 m (42.0 ft) long by 10.75 m (35.3 ft) wide by 5.31 m (17.4 ft) high, and volume is 737.4 m^3 (26041.0 ft^3). There are six fixed surfaces in the receive room. The source room test chamber is a cuboid, 10.67 m (35.0 ft) long by 8.85 m (29.0 ft) wide by 6.86 m (22.5 ft) high. There are six fixed basic wall surfaces in the source room. The source room also has 7 fixed reflecting/ absorbing shapes on the walls. A small rectangular niche is in a corner that is 1.84 m (6.0 ft) long by 1.52 m (5.0 ft) wide by 6.86 m (22.5FT) high. Together, they have a total volume of 667.0 m^3 (23654.9 ft^3). There are thirty two sources: two Renkus-Heinz ST94s, each in a separate corner, and two mid frequency cabinets containing four conic sources in each cabinet. The room also contains twelve mid/high frequency horns, six of each located near the ceiling and facing opposite walls and splayed, and sixteen SHF drivers, two of each mounted on aluminum plates and then mounted near the ceiling and splayed randomly across the room. A test opening in the common walls is 3.17 m (10.4 ft) high by 3.78 m (12.4 ft) wide by 81.28 cm (32 in) deep. This test report relates only to the item(s) tested. Any advertisement that utilizes this test report or test data must not imply product certification or endorsement by NWAA Labs and has to include all pages of the report.

DESCRIPTION OF TEST SPECIMEN

The test specimen was a door assembly with overall dimensions of 109.9 cm (43.25 in) wide by 221.0 cm (87.00 in) high by 13.3 cm (5.25 in) deep. The door leaf measured 94.0 cm (37 in) wide by 212.7cm (83.75 in) high by 4.4 cm (1.75 in) deep. This door has a 12.70 cm (5.0 in) wide by 73.66 cm (29.0 in) high vision lite centered vertically at eye level in the door. The door had three cam-lift hinges mounted to a grout filled frame. The door frame weight was 49.0kg (108 lbs){after grout filling} and the door leaf weight was 134.72 kg (297 lbs) for an overall weight of 183.70 kg (405 lbs). The net surface weight of the assembly was 67.4 kg/m^2 (13.8 $lbs/ft^{2)}$.

The design of the interior door components is proprietary and the overall glazing thickness is 6.35cm (2.5 in) and protrudes outward from the surface of the door panel. The doors and the frame were fitted in the field with fin gaskets on both surfaces.

A filler wall was constructed out of 20.3 cm (8 in) thick solid concrete blocks stacked together without grout or sealer between the blocks on the source room side and 3 layers of 1.6 cm (5/8in) thick gypsum board screwed to 2 x 4 wood framing on the receive room side. The cavity between the concrete blocks and gypsum board was filled with fiberglass batt insulation. The perimeters of both walls were sealed with acoustic caulk and putty. The door frame was installed on the source room side of the opening. All exposed edges were then sealed with acoustic seal.

The STC is 53

Test results are on the following pages.

Submitted by,
NWAA Labs Inc

Ron Sauro
NWAA Labs Inc

NWAA Labs, Inc.

90 Tower Blvd,
Elma, WA 98541
(253)-973-1018

Test #	NWTL120808-05
Test Date:	8-Aug-12
Area Tested: M²	2.43
Temperature: ºC	23
Barometer: pa	101800
Humidity: %	71

STC	53
OITC	38
DEF	29

Soundproof Windows 175CG-529 operable

Frequency (Hz)	Transmission Loss	Shifted Contour	Deficiencies	S/N Ratio	Notes
50Hz	25			0.0	2
63Hz	25			0.0	2
80Hz	22			0.0	
100Hz	25			0.0	
125Hz	34	37	3	0.0	2
160Hz	43	40	0	0.0	2
200Hz	41	43	2	0.0	2
250Hz	44	46	2	0.0	2
315Hz	47	49	2	0.0	2
400Hz	48	52	4	0.0	2
500Hz	50	53	3	0.0	2
630Hz	52	54	2	0.0	2
800Hz	53	55	2	0.0	
1000Hz	53	56	3	0.0	2
1250Hz	55	57	2	0.0	
1600Hz	56	57	1	0.0	
2000Hz	56	57	1	0.0	
2500Hz	56	57	1	0.0	
3150Hz	57	57	0	0.0	
4000Hz	56	57	1	0.0	
5000Hz	54			0.0	
6300Hz	53			0.0	
8000Hz	55			0.0	2
10000Hz	57			0.0	2

Note 1: Flanking noise limited. True value of Transmission Loss is greater than shown.

Note 2: Flanking noise correction applied.

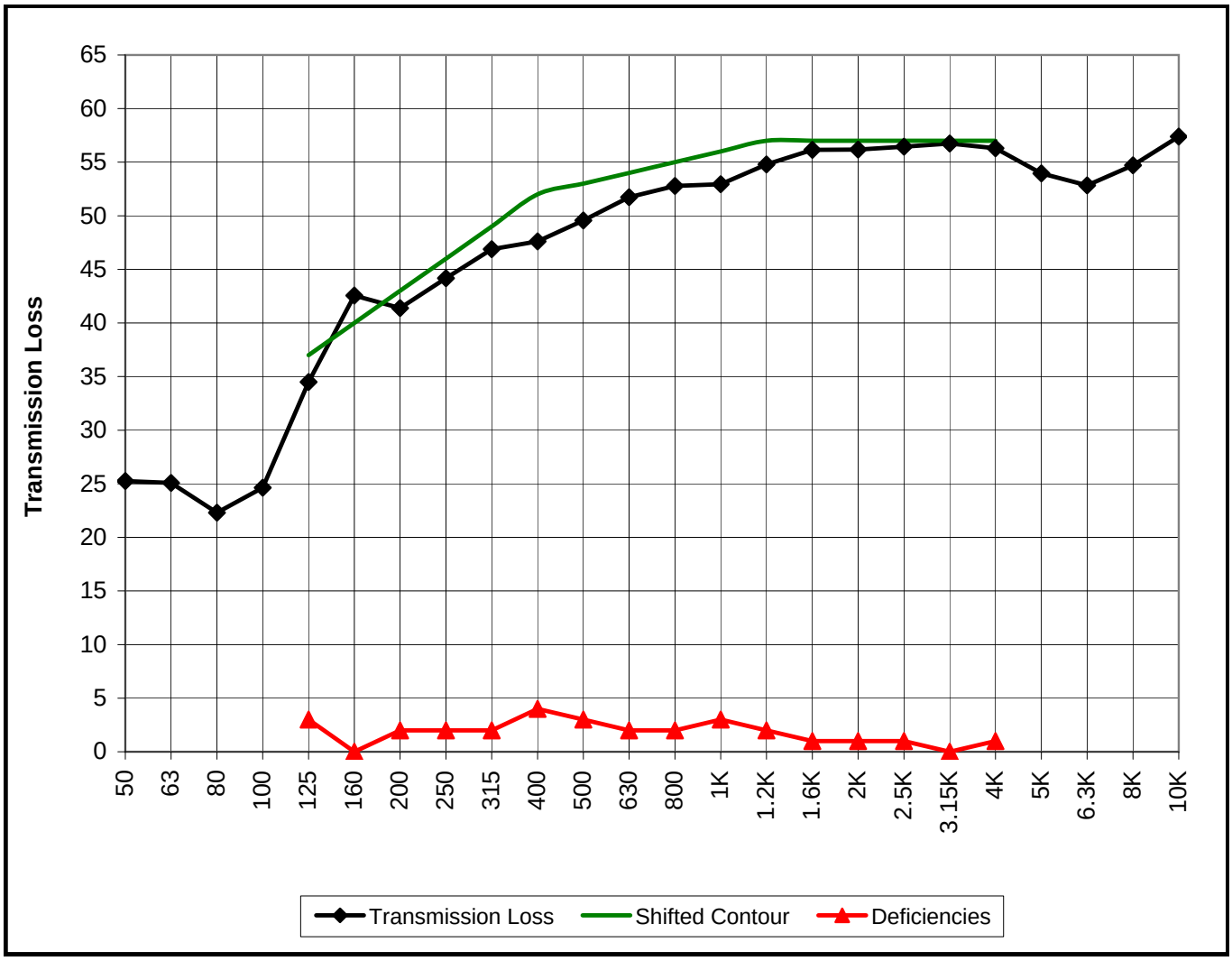
NWAA Labs, Inc.

90 Tower Blvd,
Elma, WA 98541
(253)-973-1018

Test #	**NWTL120808-05**
Test Date:	**8-Aug-12**
Area Tested: M²	**2.43**
Temperature: ºC	**23**
Barometer: pa	**101800**
Humidity: %	**71**

STC	**53**
OITC	**38**
DEF	**29**

Soundproof Windows 175CG-529 operable



NWAA Labs

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Email address: audio_ron@msn.com

AIRBORNE SOUND TRANSMISSION LOSS
TEST REPORT #: NWTL120808-07

Client: Soundproof Windows, Inc.
4673 Aircenter Circle
Reno, NV 89501

Test Date: 8 August, 2012
Report Date: 15 August 2012
Test Specimen: Door, 175CG-10

INTRODUCTION

The methods and procedures used in this test conform to the provisions and requirements of ASTM Procedure E 90-09, *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements* and E413-10 *Classification for Rating Sound Insulation*. Copies of the test standards are available at www.astm.org. The receive room test chamber is a cuboid, 12.79 m (42.0 ft) long by 10.75 m (35.3 ft) wide by 5.31 m (17.4 ft) high, and volume is 737.4 m^3 (26041.0 ft^3). There are six fixed surfaces in the receive room. The source room test chamber is a cuboid, 10.67 m (35.0 ft) long by 8.85 m (29.0 ft) wide by 6.86 m (22.5 ft) high. There are six fixed basic wall surfaces in the source room. The source room also has 7 fixed reflecting/ absorbing shapes on the walls. A small rectangular niche is in a corner that is 1.84 m (6.0 ft) long by 1.52 m (5.0 ft) wide by 6.86 m (22.5FT) high. Together, they have a total volume of 667.0 m^3 (23654.9 ft^3). There are thirty two sources: two Renkus-Heinz ST94s, each in a separate corner, and two mid frequency cabinets containing four conic sources in each cabinet. The room also contains twelve mid/high frequency horns, six of each located near the ceiling and facing opposite walls and splayed, and sixteen SHF drivers, two of each mounted on aluminum plates and then mounted near the ceiling and splayed randomly across the room. A test opening in the common walls is 3.17 m (10.4 ft) high by 3.78 m (12.4 ft) wide by 81.28 cm (32 in) deep. This test report relates only to the item(s) tested. Any advertisement that utilizes this test report or test data must not imply product certification or endorsement by NWAA Labs and has to include all pages of the report.

DESCRIPTION OF TEST SPECIMEN

The test specimen was a door assembly with overall dimensions of 109.9 cm (43.25 in) wide by 221.0 cm (87.00 in) high by 13.3 cm (5.25 in) deep. The door leaf measured 94.0 cm (37 in) wide by 212.7cm (83.75 in) high by 4.4 cm (1.75 in) deep. This door has a 58.42cm (23.0 in) wide by 165.10 cm (65.0 in) high vision lite centered in the door. The door had three cam-lift hinges mounted to a grout filled frame. The door frame weight was 49.0kg (108 lbs){after grout filling} and the door leaf weight was 143.34 kg (316 lbs) for an overall weight of 192.32 kg (424 lbs). The net surface weight of the assembly was 71.77kg/m^2 (14.7 lbs/$ft^{2)}$.

The design of the interior door components is proprietary and the overall glazing thickness is 6.35cm (2.5 in) and protrudes outward from the surface of the door panel. The doors and the frame were fitted in the field with fin gaskets on both surfaces.

A filler wall was constructed out of 20.3 cm (8 in) thick solid concrete blocks stacked together without grout or sealer between the blocks on the source room side and 3 layers of 1.6 cm (5/8in) thick gypsum board screwed to 2 x 4 wood framing on the receive room side. The cavity between the concrete blocks and gypsum board was filled with fiberglass batt insulation. The perimeters of both walls were sealed with acoustic caulk and putty. The door frame was installed on the source room side of the opening. All exposed edges were then sealed with acoustic seal.

The STC is 46

Test results are on the following pages.

Submitted by,
NWAA Labs Inc

Ron Sauro
NWAA Labs Inc

NWAA Labs, Inc.

90 Tower Blvd,
Elma, WA 98541
(253)-973-1018

Test #	NWTL120808-07
Test Date:	8-Aug-12
Area Tested: M²	2.43
Temperature: ºC	23
Barometer: pa	101800
Humidity: %	69

STC	46
OITC	36
DEF	27

Soundproof Windows 175CG-10 operable

Frequency (Hz)	Transmission Loss	Shifted Contour	Deficiencies	S/N Ratio	Notes
50Hz	29			0.0	1
63Hz	30			0.0	2
80Hz	30			0.0	2
100Hz	23			0.0	
125Hz	26	30	4	0.0	
160Hz	36	33	0	0.0	2
200Hz	36	36	0	0.0	
250Hz	41	39	0	0.0	2
315Hz	43	42	0	0.0	2
400Hz	42	45	3	0.0	
500Hz	46	46	0	0.0	2
630Hz	45	47	2	0.0	
800Hz	44	48	4	0.0	
1000Hz	44	49	5	0.0	
1250Hz	44	50	6	0.0	
1600Hz	47	50	3	0.0	
2000Hz	50	50	0	0.0	
2500Hz	52	50	0	0.0	
3150Hz	54	50	0	0.0	
4000Hz	56	50	0	0.0	
5000Hz	56			0.0	
6300Hz	56			0.0	
8000Hz	58			0.0	2
10000Hz	60			0.0	1

Note 1: Flanking noise limited. True value of Transmission Loss is greater than shown.

Note 2: Flanking noise correction applied.

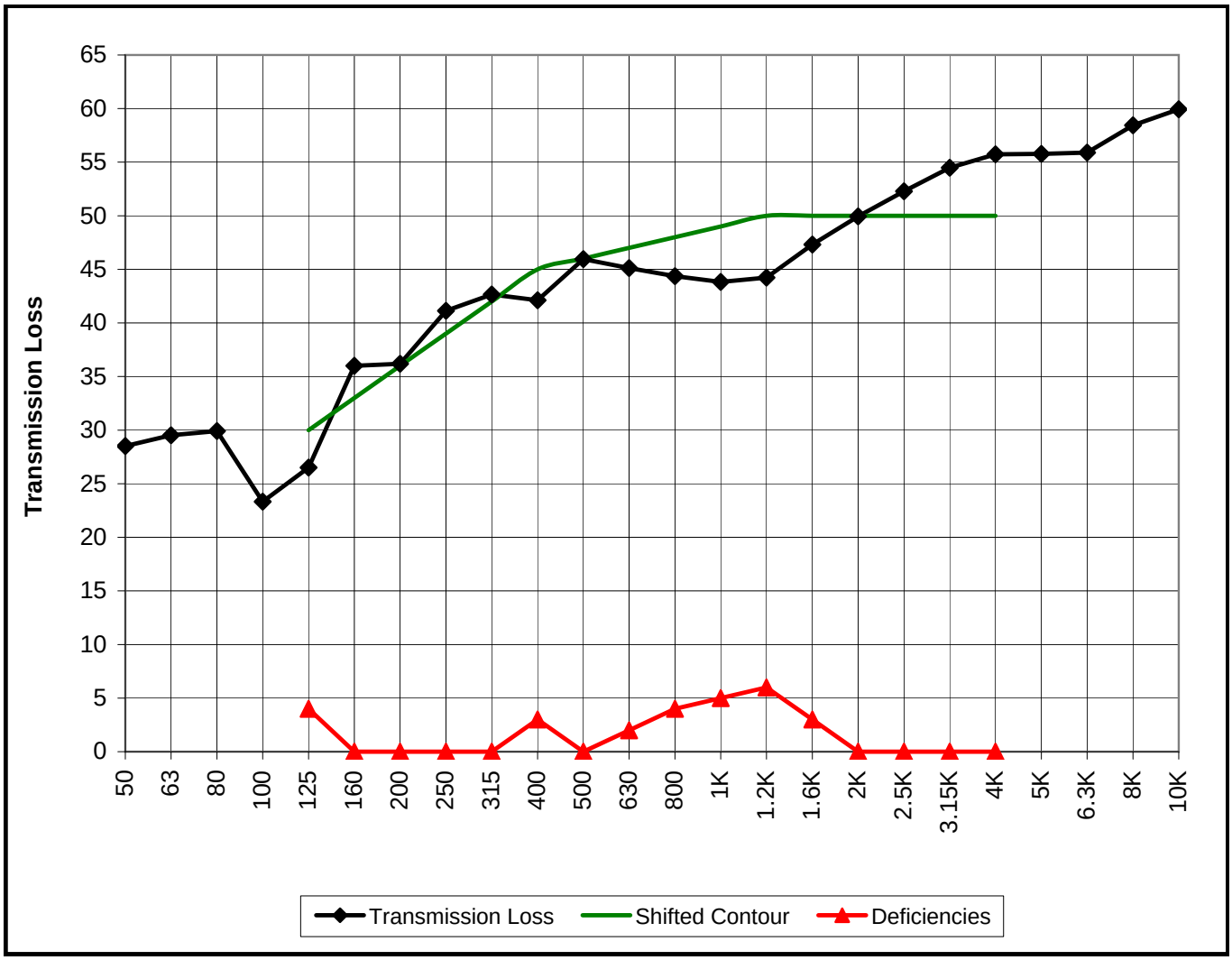
NWAA Labs, Inc.

90 Tower Blvd,
Elma, WA 98541
(253)-973-1018

Test #	**NWTL120808-07**
Test Date:	**8-Aug-12**
Area Tested: M²	**2.43**
Temperature: ºC	**23**
Barometer: pa	**101800**
Humidity: %	**69**

STC	**46**
OITC	**36**
DEF	**27**

Soundproof Windows 175CG-10 operable



NWAA Labs

90 Tower Blvd, Elma, WA 98541, Phone:(253) 973-1018
Email address: audio_ron@msn.com

AIRBORNE SOUND TRANSMISSION LOSS
TEST REPORT #: NWTL120809-02

Client: Soundproof Windows, Inc.
4673 Aircenter Circle
Reno, NV 89501

Test Date: 9 August, 2012
Report Date: 15 August 2012
Test Specimen: Door, 175CG-529

INTRODUCTION

The methods and procedures used in this test conform to the provisions and requirements of ASTM Procedure E 90-09, *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements* and E413-10 *Classification for Rating Sound Insulation*. Copies of the test standards are available at www.astm.org. The receive room test chamber is a cuboid, 12.79 m (42.0 ft) long by 10.75 m (35.3 ft) wide by 5.31 m (17.4 ft) high, and volume is 737.4 m^3 (26041.0 ft^3). There are six fixed surfaces in the receive room. The source room test chamber is a cuboid, 10.67 m (35.0 ft) long by 8.85 m (29.0 ft) wide by 6.86 m (22.5 ft) high. There are six fixed basic wall surfaces in the source room. The source room also has 7 fixed reflecting/ absorbing shapes on the walls. A small rectangular niche is in a corner that is 1.84 m (6.0 ft) long by 1.52 m (5.0 ft) wide by 6.86 m (22.5FT) high. Together, they have a total volume of 667.0 m^3 (23654.9 ft^3). There are thirty two sources: two Renkus-Heinz ST94s, each in a separate corner, and two mid frequency cabinets containing four conic sources in each cabinet. The room also contains twelve mid/high frequency horns, six of each located near the ceiling and facing opposite walls and splayed, and sixteen SHF drivers, two of each mounted on aluminum plates and then mounted near the ceiling and splayed randomly across the room. A test opening in the common walls is 3.17 m (10.4 ft) high by 3.78 m (12.4 ft) wide by 81.28 cm (32 in) deep. This test report relates only to the item(s) tested. Any advertisement that utilizes this test report or test data must not imply product certification or endorsement by NWAA Labs and has to include all pages of the report.

DESCRIPTION OF TEST SPECIMEN

The test specimen was a door assembly with overall dimensions of 109.9 cm (43.25 in) wide by 221.0 cm (87.00 in) high by 13.3 cm (5.25 in) deep. The door leaf measured 94.0 cm (37 in) wide by 212.7cm (83.75 in) high by 4.4 cm (1.75 in) deep. This door had a 12.7cm (5.0 in) wide by 73.66cm (29.0 in) high vision lite centered vertically at eye height in the door. The door had three cam-lift hinges mounted to a grout filled frame. The door frame weight was 49.0kg (108 lbs){after grout filling} and the door leaf weight was 134.72 kg (297 lbs) for an overall weight of 183.70 kg (405 lbs). The net surface weight of the assembly was 67.4 kg/m^2 (13.8 $lbs/ft^{2)}$.

The design of the interior door components is proprietary and the overall glazing thickness is 6.35cm (2.5 in) and protrudes outward from the surface of the door panel. The doors and the frame were fitted in the field with bulb gaskets.

A filler wall was constructed out of 20.3 cm (8 in) thick solid concrete blocks stacked together without grout or sealer between the blocks on the source room side and 3 layers of 1.6 cm (5/8in) thick gypsum board screwed to 2 x 4 wood framing on the receive room side. The cavity between the concrete blocks and gypsum board was filled with fiberglass batt insulation. The perimeters of both walls were sealed with acoustic caulk and putty. The door frame was installed on the source room side of the opening. All exposed edges were then sealed with acoustic seal.

The STC is 53

Test results are on the following pages.

Submitted by,
NWAA Labs Inc

Ron Sauro
NWAA Labs Inc

NWAA Labs, Inc.

90 Tower Blvd,
Elma, WA 98541
(253)-973-1018

Test #	NWTL120809-02
Test Date:	9-Aug-12
Area Tested: M²	2.43
Temperature: ºC	23
Barometer: pa	101800
Humidity: %	73

STC	53
OITC	38
DEF	23

Soundproof Windows 175CG-view w_bulb operable

Frequency (Hz)	Transmission Loss	Shifted Contour	Deficiencies	S/N Ratio	Notes
50Hz	25			0.0	2
63Hz	25			0.0	2
80Hz	22			0.0	
100Hz	24			0.0	
125Hz	33	37	4	0.0	2
160Hz	44	40	0	0.0	1
200Hz	44	43	0	0.0	2
250Hz	46	46	0	0.0	2
315Hz	47	49	2	0.0	2
400Hz	48	52	4	0.0	2
500Hz	50	53	3	0.0	2
630Hz	53	54	1	0.0	2
800Hz	53	55	2	0.0	
1000Hz	53	56	3	0.0	2
1250Hz	54	57	3	0.0	
1600Hz	56	57	1	0.0	
2000Hz	57	57	0	0.0	
2500Hz	57	57	0	0.0	
3150Hz	58	57	0	0.0	2
4000Hz	57	57	0	0.0	
5000Hz	54			0.0	
6300Hz	53			0.0	
8000Hz	55			0.0	2
10000Hz	58			0.0	2

Note 1: Flanking noise limited. True value of Transmission Loss is greater than shown.

Note 2: Flanking noise correction applied.

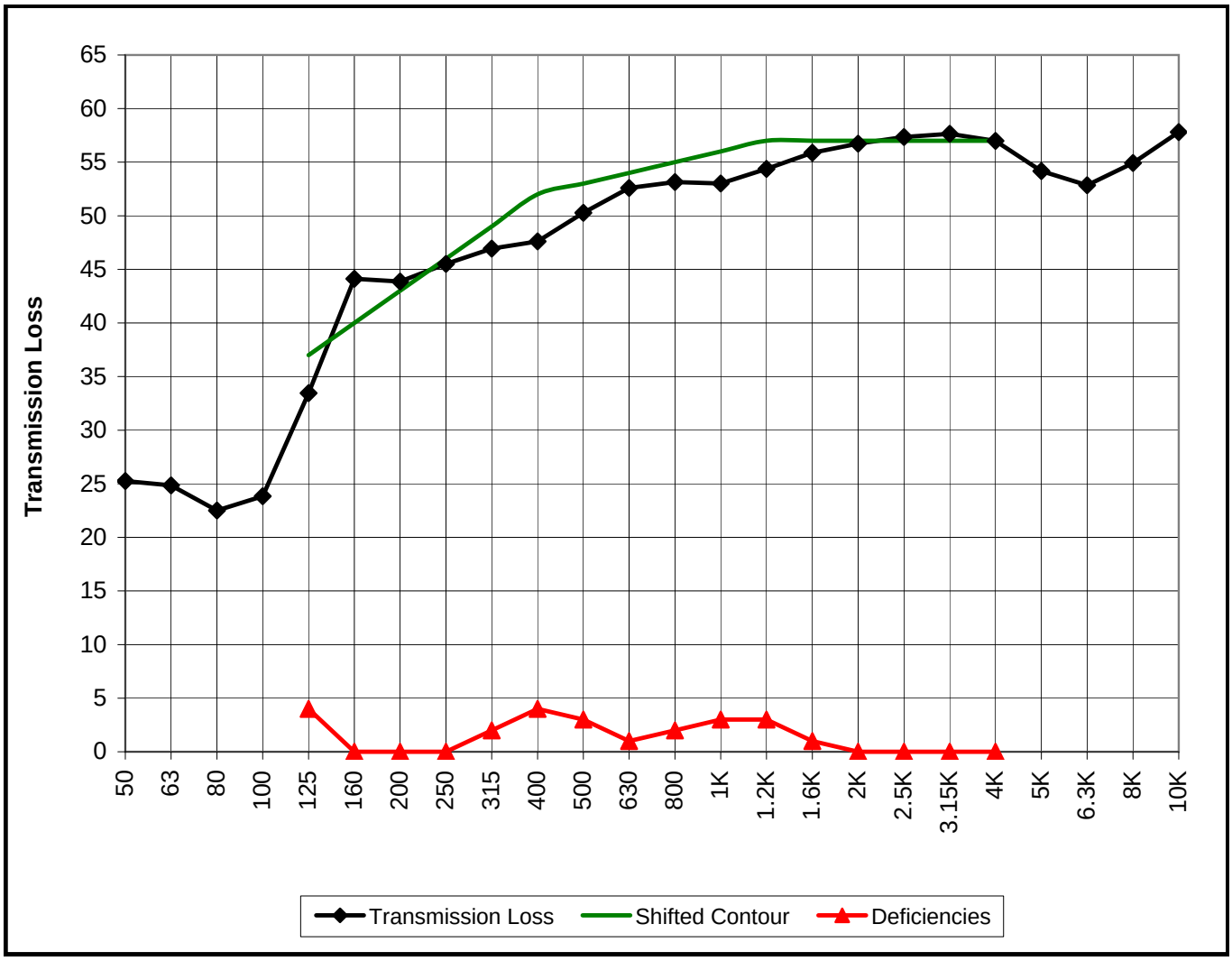
NWAA Labs, Inc.

90 Tower Blvd,
Elma, WA 98541
(253)-973-1018

Test #	**NWTL120809-02**
Test Date:	**9-Aug-12**
Area Tested: M²	**2.43**
Temperature: ºC	**23**
Barometer: pa	**101800**
Humidity: %	**73**

STC	**53**
OITC	**38**
DEF	**23**

Soundproof Windows 175CG-view w_bulb operable



NWAA Labs

90 Tower Blvd, Elma, WA 98541, Phone:(253) 973-1018
Email address: audio_ron@msn.com

AIRBORNE SOUND TRANSMISSION LOSS
TEST REPORT #: NWTL120809-01

Client: Soundproof Windows, Inc.
4673 Aircenter Circle
Reno, NV 89501

Test Date: 9 August, 2012
Report Date: 15 August 2012
Test Specimen: Door, 175CG-10 operable seal 2

INTRODUCTION

The methods and procedures used in this test conform to the provisions and requirements of ASTM Procedure E 90-09, *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements* and E413-10 *Classification for Rating Sound Insulation*. Copies of the test standards are available at www.astm.org. The receive room test chamber is a cuboid, 12.79 m (42.0 ft) long by 10.75 m (35.3 ft) wide by 5.31 m (17.4 ft) high, and volume is 737.4 m^3 (26041.0 ft^3). There are six fixed surfaces in the receive room. The source room test chamber is a cuboid, 10.67 m (35.0 ft) long by 8.85 m (29.0 ft) wide by 6.86 m (22.5 ft) high. There are six fixed basic wall surfaces in the source room. The source room also has 7 fixed reflecting/ absorbing shapes on the walls. A small rectangular niche is in a corner that is 1.84 m (6.0 ft) long by 1.52 m (5.0 ft) wide by 6.86 m (22.5FT) high. Together, they have a total volume of 667.0 m^3 (23654.9 ft^3). There are thirty two sources: two Renkus-Heinz ST94s, each in a separate corner, and two mid frequency cabinets containing four conic sources in each cabinet. The room also contains twelve mid/high frequency horns, six of each located near the ceiling and facing opposite walls and splayed, and sixteen SHF drivers, two of each mounted on aluminum plates and then mounted near the ceiling and splayed randomly across the room. A test opening in the common walls is 3.17 m (10.4 ft) high by 3.78 m (12.4 ft) wide by 81.28 cm (32 in) deep. This test report relates only to the item(s) tested. Any advertisement that utilizes this test report or test data must not imply product certification or endorsement by NWAA Labs and has to include all pages of the report.

DESCRIPTION OF TEST SPECIMEN

The test specimen was a door assembly with overall dimensions of 109.9 cm (43.25 in) wide by 221.0 cm (87.00 in) high by 13.3 cm (5.25 in) deep. The door leaf measured 94.0 cm (37 in) wide by 212.7cm (83.75 in) high by 4.4 cm (1.75 in) deep. This door has a 58.42cm (23.0 in) wide by 165.10 cm (65.0 in) high vision lite centered in the door. The door had three cam-lift hinges mounted to a grout filled frame. The door frame weight was 49.0kg (108 lbs){after grout filling} and the door leaf weight was 143.34 kg (316 lbs) for an overall weight of 192.32 kg (424 lbs). The net surface weight of the assembly was 71.77kg/m^2 (14.7 lbs/$ft^{2)}$.

The design of the interior door components is proprietary and the overall glazing thickness is 6.35cm (2.5 in) and protrudes outward from the surface of the door panel. The doors and the frame were fitted in the field with seal 2 fin gaskets on both surfaces.

A filler wall was constructed out of 20.3 cm (8 in) thick solid concrete blocks stacked together without grout or sealer between the blocks on the source room side and 3 layers of 1.6 cm (5/8in) thick gypsum board screwed to 2 x 4 wood framing on the receive room side. The cavity between the concrete blocks and gypsum board was filled with fiberglass batt insulation. The perimeters of both walls were sealed with acoustic caulk and putty. The door frame was installed on the source room side of the opening. All exposed edges were then sealed with acoustic seal.

The STC is 47

Test results are on the following pages.

Submitted by,
NWAA Labs Inc

Ron Sauro
NWAA Labs Inc

NWAA Labs, Inc.

90 Tower Blvd,
Elma, WA 98541
(253)-973-1018

Test #	NWTL120809-01
Test Date:	9-Aug-12
Area Tested: M²	2.43
Temperature: ºC	24
Barometer: pa	101800
Humidity: %	70

STC	47
OITC	37
DEF	28

Soundproof Windows 175CG-10 operable seal2

Frequency (Hz)	Transmission Loss	Shifted Contour	Deficiencies	S/N Ratio	Notes
50Hz	28			0.0	1
63Hz	30			0.0	2
80Hz	30			0.0	2
100Hz	23			0.0	
125Hz	27	31	4	0.0	
160Hz	36	34	0	0.0	2
200Hz	37	37	0	0.0	
250Hz	42	40	0	0.0	2
315Hz	43	43	0	0.0	2
400Hz	43	46	3	0.0	
500Hz	47	47	0	0.0	2
630Hz	46	48	2	0.0	
800Hz	45	49	4	0.0	
1000Hz	44	50	6	0.0	
1250Hz	45	51	6	0.0	
1600Hz	48	51	3	0.0	
2000Hz	51	51	0	0.0	
2500Hz	54	51	0	0.0	
3150Hz	56	51	0	0.0	
4000Hz	57	51	0	0.0	
5000Hz	56			0.0	
6300Hz	56			0.0	
8000Hz	58			0.0	2
10000Hz	60			0.0	1

Note 1: Flanking noise limited. True value of Transmission Loss is greater than shown.

Note 2: Flanking noise correction applied.

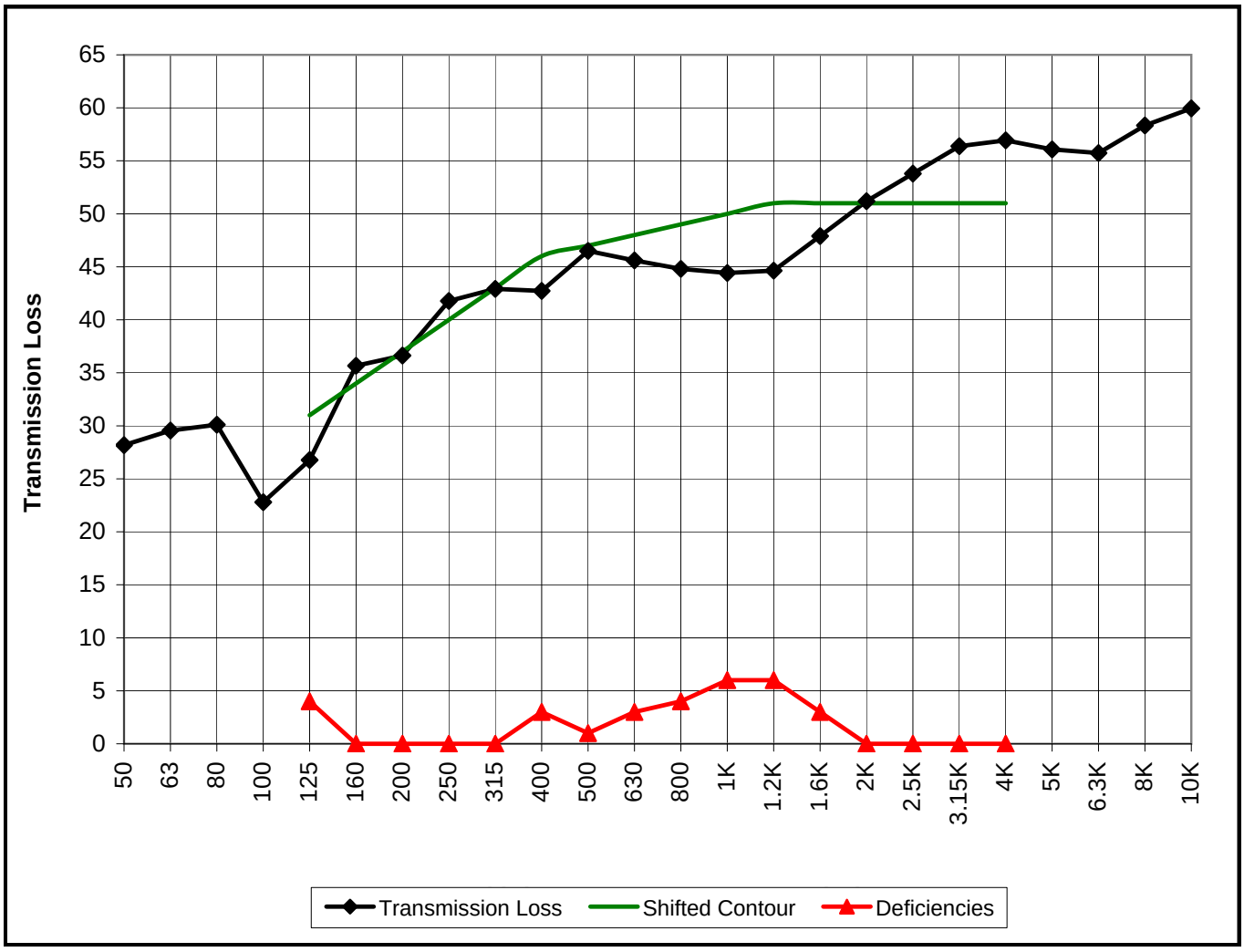
NWAA Labs, Inc.

90 Tower Blvd,
Elma, WA 98541
(253)-973-1018

Test #	**NWTL120809-01**
Test Date:	**9-Aug-12**
Area Tested: M²	**2.43**
Temperature: ºC	**24**
Barometer: pa	**101800**
Humidity: %	**70**

STC	**47**
OITC	**37**
DEF	**28**

Soundproof Windows 175CG-10 operable seal2



NWAA Labs
90 Tower Blvd, Elma, WA 98451, Phone:(253) 973-1018
Email address…Audio_Ron@msn.com

AIRBORNE SOUND TRANSMISSION LOSS
TEST REPORT #: NWTL111003-5 Rev.1

Client: Soundproof Windows, Inc
4673 Aircenter Circle
Reno, NV 89502

Test Date: 03 October 2011
Test Specimen: Soundproof Windows Door Model 175C

INTRODUCTION

The methods and procedures used in this test conform to the provisions and requirements of ASTM Procedure E 90-09, *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements* and E413-10 *Classification for Rating Sound Insulation*. Detailed test procedures, data for flanking limit tests, repeatability measurements and reference specimen tests are available on request. All transmission loss values are measured in a single direction only Copies of the test standards are available at www.astm.org. The receive room test chamber is a cuboid, 12.79 m (42.0 ft) long by 10.75 m (35.3 ft) wide by 5.31 m (17.4 ft) high, and volume is 737.4 m^3 (26041.0 ft^3). There are six fixed surfaces in the receive room. The source room test chamber is a cuboid, 10.67 m (35.0 ft) long by 8.85 m (29.0 ft) wide by 6.86 m (22.5 ft) high. There are six fixed basic wall surfaces in the source room. The source room also has 7 fixed reflecting/ absorbing shapes on the walls. A small rectangular niche is in a corner that is 1.84 m (6.0 ft) long by 1.52 m (5.0 ft) wide by 6.86 m (22.5FT) high. Together, they have a total volume of 667.0 m^3 (23654.9 ft^3). There are two sources, one in each corner, consisting of two Dodecahedron speakers. A test opening in the common walls is 3.17 m (10.4 ft) high by 3.78 m (12.4 ft) wide by 81.28 cm (32 in) deep . This test report relates only to the item(s) tested. Any advertisement that utilizes this test report or test data must not imply product certification or endorsement by NWAA Labs and has to include all pages of the report.

DESCRIPTION OF TEST SPECIMEN

The test specimen was a Soundproof Windows, Inc. Model 175C acoustic single steel swing door assembly. The steel frame was concrete grouted for that portion that was inserted into the test chamber wall. The door frame had a 2" facing that was neoprene filled. The frame was a single rabbet 4" deep jamb and there was no corresponding jamb piece attaching from the opposite jamb side. The door frame was attached with 4 lag bolts thru each side of the jamb into the test chamber opening. The door frame was sealed at the head and jambs with a heavy duct seal putty on both sides. The door panel was a steel acoustic core door. Details of the internal construction are proprietary, but contain no lead or other hazardous undesirable materials. The door was hung on three Zero 9500 cam-lift

hinges. There was a single-point cylindrical passage latch with lever handles - Home Depot part #701888. At the head and jambs a Zero 188S bulb seal was installed on the stop. On the jamb in front of the stop and the Zero seal was installed DHSI #105 Frame Seals. At the front edge of the head and jamb DHSI #SA seals were installed. On the bottom of the door panel 3ea DHSI #SA Seals were installed - sealing the sill when the cam lift lowered the door panel. The sill used was the flat steel sill that is part of the test chamber opening. The overall dimensions of the door assembly was 1.02 m (40 inches) wide by 2.2 m (86 inches) high by 101.6 mm (4 inches) in depth. The door panel dimensions were 908 mm (35-3/4 inches) by 2.12 m (83-1/2 inches) high by 44.5 mm (1-3/4 inches) thick. The weight of the door assembly was 159.1kg (350.0 lbs.) for a calculated surface weight of 8.5kg/cm^2(103.6 lbs/ft^2). The door was opened and closed five times immediately prior to test.

MEASUREMENT RESULTS

The Sound Transmission Class rating was determined by using the ASTM E-413-04 and is STC-56. The detailed sound transmission loss results are charted and displayed in one-third octave increments on the following pages.

Submitted by,
NWAA Labs Inc

Ron Sauro
NWAA Labs Inc

NWAA Labs, Inc.

90 Tower Blvd,
Elma, WA 98541
(253)-973-1018

Test #	NWTL111003-5
Test Date:	3-Oct-11
Area Tested: M²	2.22
Temperature: ºC	24
Barometer: pa	100400
Humidity: %	65

STC	56
OITC	44
DEF	27

E90 Soundproof Windows model 175C Rev1					
Frequency (Hz)	Transmission Loss	Shifted Contour	Deficiencies	S/N Ratio	Notes
50Hz	28			0.0	1
63Hz	24			0.0	
80Hz	29			0.0	2
100Hz	32			0.0	2
125Hz	37	40	3	0.0	2
160Hz	44	43	0	0.0	1
200Hz	46	46	0	0.0	2
250Hz	47	49	2	0.0	2
315Hz	49	52	3	0.0	1
400Hz	52	55	3	0.0	2
500Hz	55	56	1	0.0	1
630Hz	54	57	3	0.0	1
800Hz	57	58	1	0.0	2
1000Hz	56	59	3	0.0	2
1250Hz	53	60	7	0.0	
1600Hz	59	60	1	0.0	1
2000Hz	60	60	0	0.0	1
2500Hz	61	60	0	0.0	2
3150Hz	63	60	0	0.0	2
4000Hz	61	60	0	0.0	2
5000Hz	56			0.0	2
6300Hz	55			0.0	2
8000Hz	58			0.0	1
10000Hz	61			0.0	1

Note 1: Flanking noise limited. True value of Transmission Loss is greater than shown.

Note 2: Flanking noise correction applied.

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