

**ASTM E 90 SOUND TRANSMISSION LOSS
TEST REPORT**

Rendered to:

VEKA INC.

SERIES/MODEL: DH93WW

TYPE: Double Hung Window

Summary of Test Results			
Data File No.	Glazing Option (Nominal Dimensions)	STC	OITC
B7338.01A	31.8 mm (1-1/4") IG [6.4 mm (1/4") annealed, 19 mm (3/4") air space, 6.4 mm (1/4") laminated], Glass temperature 23.8°C (75°F)	36	31
B7338.01B	31.8 mm (1-1/4") IG [6.4 mm (1/4") laminated, 19 mm (3/4") air space, 6.4 mm (1/4") laminated], Glass temperature 23.8°C (75°F)	37	31

Reference should be made to Architectural Testing, Inc. Report No. B7338.01-113-11 for complete test specimen description. The complete test results are listed in Appendix B.

ACOUSTICAL PERFORMANCE TEST REPORT

Rendered to:

VEKA INC.
100 Veka Drive
Fombell, Pennsylvania 16123

Report No: B7338.01-113-11

Test Date: 04/02/12

Report Date: 04/16/12

Record Retention End Date: 04/16/16

Test Sample Identification:

Series/Model: DH93WW

Type: Double Hung Window

Overall Size: 1198.6 mm (47-3/16") by 1498.6 mm (59")

Glazing Option A (Nominal Dimensions): 31.8 mm (1-1/4") IG [6.4 mm (1/4") annealed, 19 mm (3/4") air space, 6.4 mm (1/4") laminated], Glass temperature 23.8°C (75°F)

Glazing Option B (Nominal Dimensions): 31.8 mm (1-1/4") IG [6.4 mm (1/4") laminated, 19 mm (3/4") air space, 6.4 mm (1/4") laminated], Glass temperature 23.8°C (75°F)

Project Scope: Architectural Testing, Inc. was contracted by Veka Inc. to conduct a sound transmission loss test on a Series/Model DH93WW, double hung window. A summary of the results is listed in the Test Results section, and the complete test data is included as Appendix B of this report. The samples were provided by the client.

Test Methods: The acoustical test was conducted in accordance with the following:

ASTM E 90-09, *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.*

ASTM E 413-10, *Classification for Rating Sound Insulation.*

ASTM E 1332-10a, *Standard Classification for Rating Outdoor-Indoor Sound Attenuation.*

ASTM E 2235-04e1, *Standard Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods.*

Test Equipment: The equipment used to conduct this test meets the requirements of ASTM E 90. The microphones were calibrated before conducting the sound transmission loss test. The test equipment and test chamber descriptions are listed in Appendix A.

Sample Installation: Sound transmission loss tests were initially performed on a filler wall that was designed to test window specimens. The filler wall achieved an STC rating of 67.

A filler wall reducing element was used to reduce the test opening size. The reducing element consisted of two separate 51 mm (2") by 152 mm (6") wood frames filled with concrete to reduce the test opening size to accommodate the test specimen. A dense neoprene gasket was placed between the two wood and concrete frames. The window was placed on an isolation pad in the new test opening. Duct seal was used to seal the perimeter of the window to the test opening on both sides. The interior side of the window frame, when installed, was approximately 6.4 mm (1/4") from being flush with the receiving room side of the filler wall. A stethoscope was used to check for any abnormal air leaks around the test specimen prior to testing. The sash were opened and closed at least five times prior to testing.

Test Procedure: The window was closed and locked for this test. The sound transmission loss tests were conducted in accordance with the ASTM E 90 test method using a single direction of measurement. One background noise sound pressure level and five sound absorption measurements were conducted at each of five microphone positions. Two sound pressure level measurements were made simultaneously in both rooms, at each of five microphone positions. The air temperature and relative humidity conditions were monitored and recorded during the background, absorption, source, and receive room measurements.

Sample Descriptions:

Frame Construction:

		Frame
Size		1198.6 mm (47-3/16") by 1498.6 mm (59")
Thickness		114.3 mm (4-1/2")
Corners		Mitered
	Fasteners	Welds
	Seal Method	None
Material		Vinyl
	Reinforcement	N/A
	Thermal Break Material	N/A

N/A-Non Applicable

Sample Descriptions: (Continued)

Sash Construction:

	Bottom Sash	Top Sash
Size	1114.4 mm (43-7/8") by 741.4 mm (29-3/16")	1089 mm (42-7/8") by 741.4 mm (29-3/16")
Thickness	44.5 mm (1-3/4")	44.5 mm (1-3/4")
Corners	Mitered	Mitered
Fasteners	Welds	Welds / Screws
Seal Method	None	None
Material	Vinyl	Vinyl
Reinforcement	Aluminum located in all members	Aluminum located in all members
Thermal Break Material	N/A	N/A
Daylight Opening Size	1019.2 mm (40-1/8") by 644.5 mm (25-3/8")	993.8 mm (39-1/8") by 644.5 mm (25-3/8")

Glazing Option A:

Measured Overall Insulation Glass Unit Thickness	31.69 mm (1.248")		
Spacer Type	Aluminum		
	Exterior Sheet	Gap	Interior Sheet
Measured Thickness	5.59 mm (0.220")	19.33 mm (0.761")	2.67 mm, 1.52 mm, 2.59 mm (0.105", 0.060", 0.102")
Muntin Pattern	N/A	N/A	N/A
Material	Annealed	Air*	Laminated
Laminate Material	N/A	N/A	PVB
Glazing Method	Exterior		
Glazing Material	Double-sided adhesive foam tape, silicone in corners		
Glazing Bead Material	Vinyl		

* - Stated per Client/Manufacturer, N/A-Non Applicable

Sample Descriptions: (Continued)

Glazing Option B:

Measured Overall Insulation Glass Unit Thickness	32.96 mm (1.298")		
Spacer Type	Aluminum		
	Exterior Sheet	Gap	Interior Sheet
Measured Thickness	2.59 mm, 1.52 mm, 2.64 mm (0.102", 0.060", 0.104")	19.51 mm (0.768")	2.51 mm, 1.52 mm, 2.67 mm (0.099", 0.060", 0.105")
Muntin Pattern	N/A	N/A	N/A
Material	Laminated	Air*	Laminated
Laminate Material	PVB	N/A	PVB
Glazing Method	Exterior		
Glazing Material	Double-sided adhesive foam tape, silicone in corners		
Glazing Bead Material	Vinyl		

Components:

	TYPE	QUANTITY	LOCATION
Weatherstrip			
	4.75 mm by 7.37 mm (0.187" by 0.290") Polypile with center fin	3 Rows	Jambs and top rail
	4.75 mm by 11.94 mm (0.187" by 0.470") Polypile with center fin	2 Rows	Top sash meeting rail
	4.75 mm by 7.37 mm (0.187" by 0.290") Polypile with center fin	1 Row	Top sash meeting rail
	4.75 mm by 6.86 mm (0.187" by 0.270") Polypile with center fin	1 Row	Bottom sash meeting rail, sill track
	4.88 mm (0.192") Foam-filled bulb gasket	1 Row	Bottom rail
	25.4 mm by 19.05 mm (1" by 3/4") Polypile pad with center fin	2	Top sash meeting rail corners

* - Stated per Client/Manufacturer, N/A-Non Applicable

Sample Descriptions: (Continued)

Components: (Continued)

Hardware		
Cam lock	2	Bottom sash meeting rail
Metal keeper	2	Top sash meeting rail
Metal tilt bar	4	Bottom rails
Plastic tilt latch	4	Top rails
Drainage		
25.4 mm by 6.35 mm (1" by 0.25") Weepslot with plastic flap cover	2	Sill face

Sample Weights:

Overall Sample Area:	m ²	ft ²
	1.796	19.33

Sample Identification:	Total Weight		Weight Per Unit Area	
	kg	lbs	kg / m ²	lbs / ft ²
A	60.78	134	33.84	6.93
B	61.69	136	34.35	7.03

Comments: The client did not supply drawings on the Series/Model DH93WW, double hung window. The window was disassembled, and the components will be retained by Architectural Testing for four years. Photographs of the test specimen are included in Appendix C.

Test Results: The STC (Sound Transmission Class) rating was calculated in accordance with ASTM E 413. The OITC (Outdoor-Indoor Transmission Class) was calculated in accordance with ASTM E 1332. A summary of the sound transmission loss test results on the Series/Model DH93WW, double hung window is listed below.

Summary of Test Results			
Data File No.	Glazing Option (Nominal Dimensions)	STC	OITC
B7338.01A	31.8 mm (1-1/4") IG [6.4 mm (1/4") annealed, 19 mm (3/4") air space, 6.4 mm (1/4") laminated], Glass temperature 23.8°C (75°F)	36	31
B7338.01B	31.8 mm (1-1/4") IG [6.4 mm (1/4") laminated, 19 mm (3/4") air space, 6.4 mm (1/4") laminated], Glass temperature 23.8°C (75°F)	37	31

Note: Due to the calculations and sample size, transmission loss coefficient differences between 6 and 15 indicate there has been a filler wall correction applied. On each data sheet listed in Appendix B, cells highlighted in green indicate transmission loss values affected in this way.

The complete test results are listed in Appendix B. Flanking limit tests and reference specimen tests are available upon request.

Architectural Testing will service this report for the entire test record retention period. Test records, such as detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation, will be retained by Architectural Testing for the entire test record retention period.

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. It is the exclusive property of the client so named herein and relates only to the specimen tested. This report may not be reproduced, except in full, without the written approval of Architectural Testing.

For ARCHITECTURAL TESTING, INC:


Bradley D. Hunt
Project Manager - Acoustical Testing

Todd D. Kister
Laboratory Supervisor - Acoustical Testing

BDH:jmcs

Attachments (pages): This report is complete only when all attachments listed are included.

- Appendix-A: Equipment description (1)
- Appendix-B: Complete test results (4)
- Appendix-C: Photographs (1)

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Revision Log

<u>Rev. #</u>	<u>Date</u>	<u>Page(s)</u>	<u>Revision(s)</u>
0	04/16/12	N/A	Original Report Issue

Appendix A

Instrumentation:

Instrument	Manufacturer	Model	Description	ATI Number	Date of Calibration
Analyzer	Hewlett Packard	HP35670A	Real time analyzer	Y002929	06/14/11 *
Data Acquisition Unit	Agilent	34970A	Data Acquisition Unit	62211	07/13/11
Receive Room Microphone	GRAS	40 AR	1/2" Microphone	Y003246	08/22/11
Source Room Microphone	GRAS	40 AR	1/2" Microphone	Y003245	08/22/11
Receive Room Preamplifier	GRAS	26 AK	1/2" Preamplifier	Y003249	08/22/11
Source Room Preamplifier	GRAS	26 AK	1/2" Preamplifier	Y003248	08/22/11
Microphone Calibrator	Bruel & Kjaer	Type 4228	Pistonphone Calibrator	Y002816	02/09/12
Noise Source	Delta Electronics	SNG-1	Noise Generator	Y002181	N/A
Equalizer	Rane	RPE 228	Programmable Equalizer	Y002180	N/A
Power Amplifiers	Crown	Xti 2000	Two, Amplifiers	005769 005770	N/A
Receive Room Loudspeakers	Renkus-Heinz Inc.	Trap Jr./9	Two, Loudspeakers	Y001784 Y001785	N/A
Source Room Loudspeakers	Renkus-Heinz Inc.	Trap Jr./9	Two, Loudspeakers	Y002649 Y002650	N/A
Receive Room Environmental Indicator	Vaisala	HMW60Y	Temperature and Humidity Sensor	Y002652	09/26/11
Source Room Environmental Indicator	Vaisala	HMW60Y	Temperature and Humidity Sensor	005066	09/07/11
Weather Station	Davis Instruments	VantagePRO 6150C	Weather Station	Y003257	05/16/11

*- Note: The calibration frequency for this equipment is every two years per the manufacturer's recommendation.

Test Chamber:

	Volume	Description
Receive Room	234 m ³ (8291.3 ft ³)	Rotating vane and stationary diffusers Temperature and humidity controlled Isolation pads under the floor
Source Room	206.6 m ³ (7296.3 ft ³)	Stationary diffusers only Temperature and humidity controlled

	Maximum Size	Description
TL Test Opening	4.27 m (14 ft) wide by 3.05 m (10 ft) high	Vibration break between source and receive rooms

N/A-Non Applicable

Appendix B
Complete Test Results



SOUND TRANSMISSION LOSS

ASTM E 90

Architectural Testing

ATI No.	B7338.01A	Date	04/02/12
Client	Veka Inc.		
Specimen	Series/Model: DH93WW, double hung window with 31.8 mm (1-1/4") IG [6.4 mm (1/4") annealed, 19 mm (3/4") air space, 6.4 mm (1/4") laminated], Glass temperature 23.8°C (75°F)		
Specimen Area	1.80 Square Meters		
Filler Area	11.20 Square Meters		
Operator	Bradlay Hunt		

	Bkgrd	Absorp	Source	Receive	Filler	Specimen
Temp C	21.8	22.5	24.0	22.1	23.0	22.6
RH %	46.9	44.3	46.3	45.5	43.7	45.7

Freq (Hz)	Bkgrd SPL (dB)	Absorp (Square Meters)	Source SPL (dB)	Receive SPL (dB)	Filler TL (dB)	Specimen TL (dB)	95% Conf Limit	No. of Deficiencies	Trans Coef Diff
80	42.6	5.4	89.4	63.2	35.8	23	2.45	0	6.5
100	36.3	5.9	89.4	64.3	41.2	20	2.84	0	13.3
125	37.5	4.9	94.8	64.7	47.8	26	2.69	0	14.2
160	37.9	4.6	95.4	70.0	47.0	21	2.19	2	17.8
200	35.7	4.7	101.0	65.0	52.1	32	1.04	0	12.3
250	32.8	5.1	100.5	67.3	54.8	29	1.46	0	18.2
315	30.0	5.4	101.2	66.1	55.7	30	1.10	2	17.5
400	28.2	5.8	101.5	64.0	61.2	32	0.74	3	20.8
500	23.8	5.9	102.5	65.0	67.5	32	0.74	4	27.1
630	21.5	5.8	104.4	64.7	72.6	35	0.32	2	30.1
800	17.9	5.5	104.7	64.3	73.3	35	0.65	3	29.8
1000	14.7	6.1	104.6	63.5	75.9	36	0.48	3	32.1
1250	13.2	6.7	103.2	60.7	77.5	37	0.24	3	32.8
1600	11.4	6.7	105.7	62.4	84.6	38	0.41	2	39.1
2000	8.5	7.2	104.8	61.2	83.3	38	0.27	2	37.8
2500	8.0	8.2	104.5	61.2	83.0	37	0.24	3	38.4
3150	8.2	9.8	105.5	59.0	83.0	39	0.39	1	35.8
4000	8.9	11.8	105.8	57.3	81.5	40	0.47	0	33.2
5000	8.6	15.2	104.3	53.3	81.6	42	0.64	0	31.9

STC Rating = 36 (Sound Transmission Class)
Deficiencies = 30 (Number of deficiencies versus contour curve)
OITC Rating = 31 (Outdoor/Indoor Transmission Class)

Notes:

- 1) The acoustical chambers are qualified for measurements down to 80 hertz. Data reported below 80 hertz is for reference only.
- 2) Transmission loss coefficient differences less than 6 indicate the lower limit of the transmission loss for this specimen. These cells are highlighted red.
- 3) Transmission loss coefficient differences between 6 and 15 indicate there has been a filler wall correction applied. These cells are highlighted green.
- 4) Receive Room levels less than 5dB above the Background levels are highlighted in yellow.

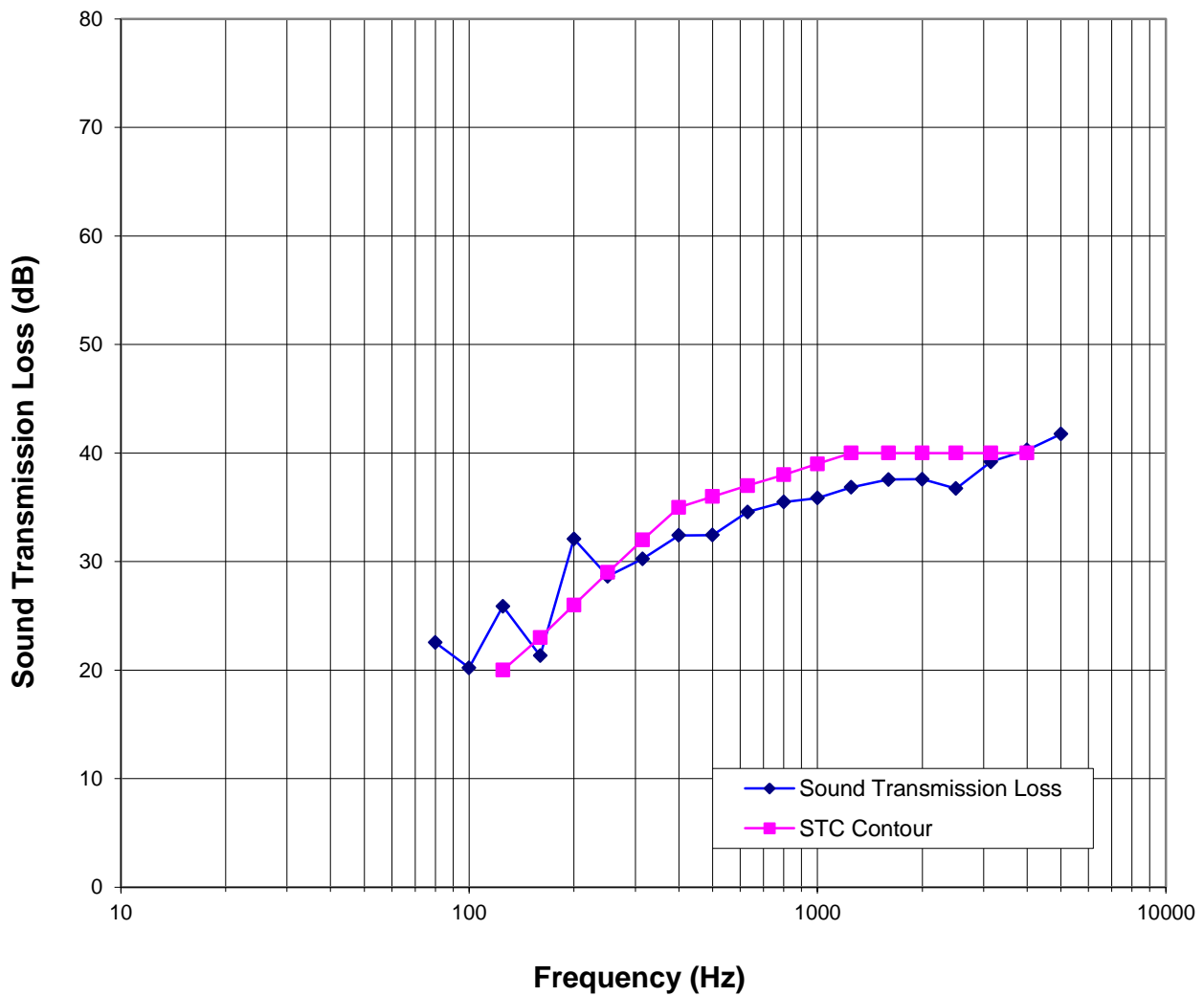
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Architectural Testing

ATI No. B7338.01A **Date** 04/02/12
Client Veka Inc.
Specimen Series/Model: DH93WW, double hung window with 31.8 mm (1-1/4") IG [6.4 mm (1/4") annealed, 19 mm (3/4") air space, 6.4 mm (1/4") laminated], Glass temperature 23.8°C (75°F)
Specimen Area 1.80 Square Meters
Filler Area 11.20 Square Meters
Operator Bradlay Hunt

Sound Transmission Loss



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SOUND TRANSMISSION LOSS

ASTM E 90

Architectural Testing

ATI No.	B7338.01B	Date	04/02/12
Client	Veka Inc.		
Specimen	Series/Model: DH93WW, double hung window with 31.8 mm (1-1/4") IG [6.4 mm (1/4") laminated, 19 mm (3/4") air space, 6.4 mm (1/4") laminated], Glass temperature 23.8°C (75°F)		
Specimen Area	1.80 Square Meters		
Filler Area	11.20 Square Meters		
Operator	Bradlay Hunt		


	Bkgrd	Absorp	Source	Receive	Filler	Specimen
Temp C	22.3	22.7	23.2	22.7	23.0	22.7
RH %	43.1	41.6	47.4	41.7	43.7	43.4

Freq (Hz)	Bkgrd SPL (dB)	Absorp (Square Meters)	Source SPL (dB)	Receive SPL (dB)	Filler TL (dB)	Specimen TL (dB)	95% Conf Limit	No. of Deficiencies	Trans Coef Diff
80	44.5	5.2	89.3	63.3	35.8	22	2.05	0	6.5
100	37.4	5.6	89.6	64.2	41.2	21	1.71	0	12.8
125	38.4	5.3	96.3	70.0	47.8	22	2.83	0	18.2
160	38.1	4.6	95.8	65.1	47.0	27	1.38	0	12.5
200	36.0	4.9	100.8	69.4	52.1	27	0.90	0	17.2
250	34.9	5.2	100.8	63.3	54.8	33	1.53	0	14.0
315	33.5	5.3	101.5	64.7	55.7	32	1.00	1	15.7
400	31.2	5.6	101.8	63.0	61.2	34	0.96	2	19.4
500	27.7	5.8	102.5	62.9	67.5	35	0.49	2	25.0
630	26.1	5.7	104.5	63.2	72.6	36	0.51	2	28.4
800	22.8	5.9	104.7	63.5	73.3	36	0.48	3	29.2
1000	19.9	6.1	104.9	62.7	75.9	37	0.65	3	31.0
1250	18.9	6.8	103.2	59.6	77.5	38	0.47	3	31.8
1600	15.1	6.8	105.8	61.3	84.6	39	0.49	2	38.0
2000	15.4	7.2	104.9	59.9	83.3	39	0.20	2	36.4
2500	13.2	8.1	104.9	60.5	83.0	38	0.35	3	37.3
3150	12.6	9.8	105.7	58.9	83.0	39	0.62	2	35.6
4000	11.8	12.0	105.8	56.5	81.5	41	0.67	0	32.4
5000	10.9	15.2	104.6	52.1	81.6	43	0.59	0	30.5

STC Rating = 37 *(Sound Transmission Class)*
Deficiencies = 25 *(Number of deficiencies versus contour curve)*
OITC Rating = 31 *(Outdoor/Indoor Transmission Class)*

Notes:

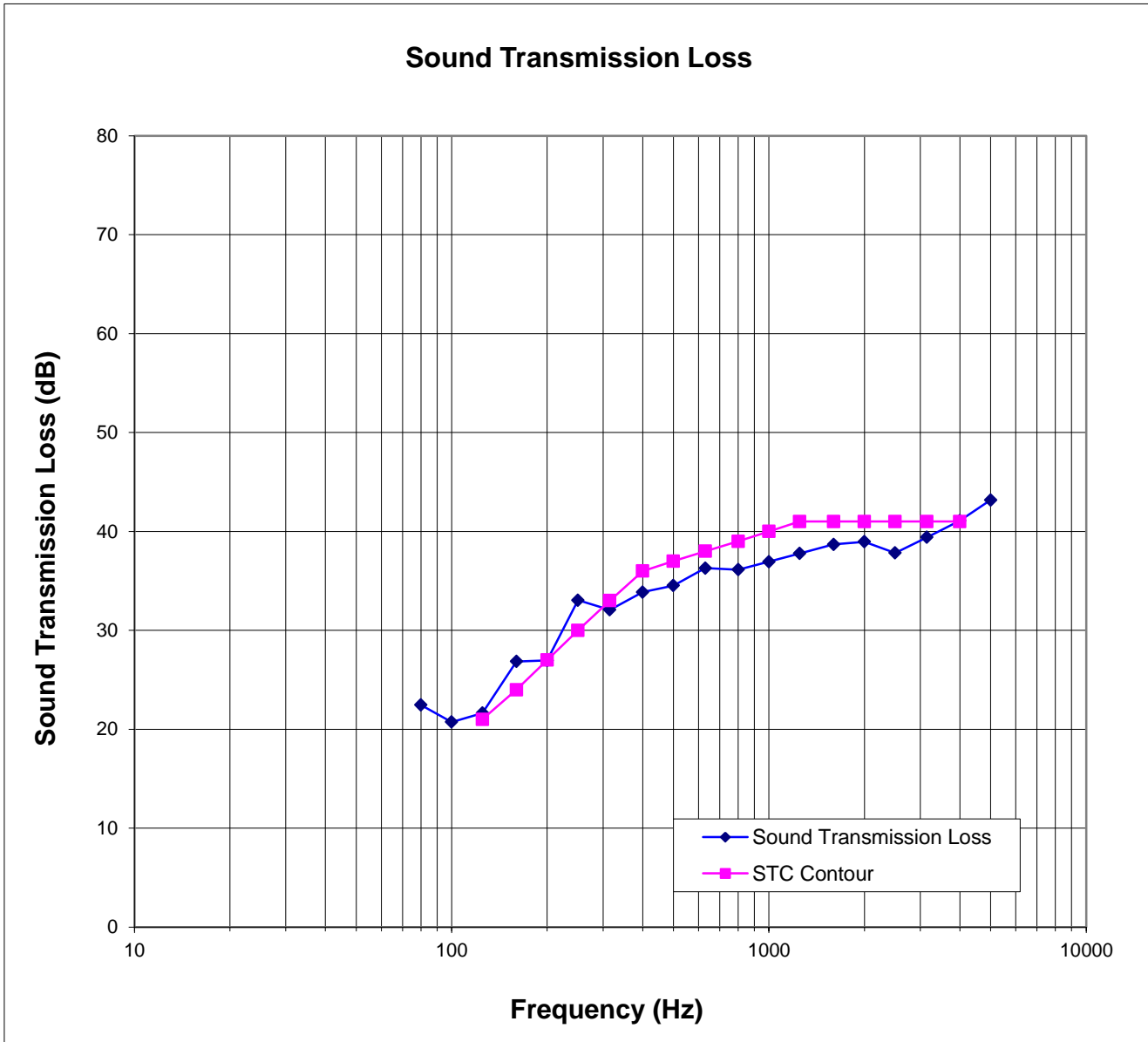
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Architectural Testing

ATI No. B7338.01B **Date** 04/02/12
Client Veka Inc.
Specimen Series/Model: DH93WW, double hung window with 31.8 mm (1-1/4") IG [6.4 mm (1/4") laminated, 19 mm (3/4") air space, 6.4 mm (1/4") laminated], Glass temperature 23.8°C (75°F)
Specimen Area 1.80 Square Meters
Filler Area 11.20 Square Meters
Operator Bradlay Hunt



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Appendix C
Photographs



Receive Room View of Specimen Installation



Source Room View of Specimen Installation