Architectural Testing

ASTM E 90 SOUND TRANSMISSION LOSS TEST REPORT

Rendered to:

VELUX AMERICA INC.

SERIES/MODEL: VS S06 2004

TYPE: Venting Deck Mounted Skylight

Summary of Test Results			
Data File No.	**Glazing (Nominal Dimensions)**	**STC**	**OITC**
B0236.01	11/16" IG (1/8" tempered exterior, 11/32" argon, 7/32" laminated interior), Glass temperature 75°F	33	28

Reference should be made to Architectural Testing, Inc. Report No. B0236.01-113-11 for complete test specimen description. The complete test results are listed in Appendix B.

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Architectural Testing

ACOUSTICAL PERFORMANCE TEST REPORT

Rendered to:

VELUX AMERICA INC.
P.O. Box 5001
Greenburg, South Carolina 29648-5001

Report No: B0236.01-113-11
Test Date: 06/09/11
Report Date: 07/21/11
Expiration Date: 06/09/15

Test Sample Identification:

Series/Model: VS S06 2004

Type: Venting Deck Mounted Skylight

Overall Size: 45-3/8" by 47-1/4""

Glazing (Nominal Dimensions): 11/16" IG (1/8" Tempered Exterior, 11/32" Argon, 7/32" Laminated Interior), Glass Temperature 75°F

Project Scope: Architectural Testing, Inc. was contracted by VELUX America Inc. to conduct a sound transmission loss test on a Series/Model VS S06 2004, venting deck mounted skylight. 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 sample was 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 2235-04, *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.

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Sample Installation: Sound transmission loss tests were initially performed on a filler wall that was designed to test 48" by 72" and 72" by 48" test specimens. The filler wall achieved an STC rating of 68.

The 72" by 48" plug was removed from the filler wall assembly and a 24" by 48" filler wall, reducing element was installed. The reducing element utilized the same construction as the filler wall. A split 2x6 wood frame was placed into the 48" by 48" opening. A dense neoprene gasket and duct seal were used to seal the wood frame to the inside perimeter of the filler wall opening. The test specimen was then fastened to the exterior of the wood frame opening with drywall screws. Duct seal was used to seal the skylight perimeter to the wood frame on both sides. The interior side of the skylight frame, when installed was flush with the source room side of the filler wall. A stethoscope was used to check for any abnormal air leaks before the test.

Test Procedure: The window was closed and locked for this test. The sound transmission loss test consisted of the following measurements: One background noise sound pressure level and five sound absorption measurements were conducted at each of the five microphone positions. Two sound pressure level measurements were made simultaneously in both rooms, at each of the 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		45-3/8" by 47-1/4"
Thickness		3-3/8"
Corners		Mortise & Tenon Joint / Mitered Aluminum Cladding
	Fasteners	Nailed and glued / Crimped and folded
	Seal Method	None
Material		Wood / Aluminum
	Reinforcement	None
	Thermal Break Material	None

Sample Descriptions: (Continued)

Vent Construction:

		Vent
Size		44-3/4" by 46-3/16"
Thickness		3"
Corners		Mortise & Tenon Joint / Mitered Aluminum Cladding
	Fasteners	Nailed and glued / Keyed
	Seal Method	None
Material		Wood / Aluminum
	Reinforcement	None
	Thermal Break Material	None
Daylight Opening Size		39-1/2" by 39-3/4"

Vent Glazing:

Measured Overall Insulation Glass Unit Thickness	0.730"
Spacer Type	Stainless steel box spacer system

	Exterior Sheet	Gap	Interior Sheet
Measured Thickness	0.118"	0.346"	0.118", 0.030", 0.118"
Muntin Pattern	N/A	N/A	N/A
Material	Tempered	Argon*	Laminated
Laminate Material	N/A	N/A	PVB

Glazing Method	Exterior
Glazing Material	EPDM frame gaskets, silicone
Glazing Bead Material	Aluminum

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

Sample Descriptions: (Continued)

Components:

TYPE	QUANTITY	LOCATION
Weatherstrip		
Deck seal	1 Row	Nail flange perimeter
Frame gasket	1 Row	Perimeter of frame
FTSA gasket	1 Row	Jambs and sill
BSGA gasket	1 Row	Sill
TGS gasket	1 Row	Head
FSS gasket	1 Row	Jambs
Hardware		
Metal rotary crank with manual chain drive	1	Midspan of the sill
Extruded aluminum hinge	1	Head
Drainage		
Condensation weep holes		Frame sill

Comments: The weight of the sample was 96 lbs. The client supplied drawings on the Series/Model VS S06 2004, venting deck mounted skylight, but they were not included in this report. 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 VS S06 2004, venting deck mounted skylight is listed below.

Summary of Test Results			
Data File No.	**Glazing (Nominal Dimensions)**	**STC**	**OITC**
B0236.01	11/16" IG (1/8" tempered exterior, 11/32" argon, 7/32" laminated interior), Glass temperature 75°F	33	28

***Note**: Due to the calculations and sample size, transmission loss coefficient differences less than 6 indicate the lower limit of the transmission loss for this specimen. On each data sheet listed in Appendix B, cells highlighted in red indicate transmission loss values limited in this way. For 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.

Detailed drawings, data sheets, representative samples of test specimens, a copy of this report, or other pertinent project documentation will be retained by Architectural Testing for a period of four years from the original test date. At the end of this retention period, such materials shall be discarded without notice and the service life of this report will expire. Results obtained are tested values and were secured by using the designated test methods. 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:

Digitally Signed by: Daniel P. Platts

Daniel P. Platts
Technician - Acoustical Testing

Digitally Signed by: Todd D. Kister

Todd D. Kister
Laboratory Supervisor - Acoustical Testing

DPP:jmcs

Attachments (pages): This report is complete only when all attachments listed are included.
- Appendix-A: Equipment description (1)
- Appendix-B: Complete test results (2)
- Appendix-C: Photographs (1)

Revision Log

Rev. #	Date	Page(s)	Revision(s)
0	07/21/11	N/A	Original Report Issue

Appendix A

Instrumentation:

Instrument	Manufacturer	Model	Description	ATI Number	Date of Calibration
Analyzer	Hewlett Packard	HP35670A	Real time analyzer	004112	06/08/09 *
Data Acquisition Unit	Agilent	34970A	Data Acquisition Unit	62211	07/24/10
Receive Room Microphone	GRAS	40 AR	1/2" Microphone	Y003246	08/17/10
Source Room Microphone	GRAS	40 AR	1/2" Microphone	Y003245	08/17/10
Receive Room Preamplifier	GRAS	26 AK	1/2" Preamplifier	Y003249	08/17/10
Source Room Preamplifier	GRAS	26 AK	1/2" Preamplifier	Y003248	08/17/10
Microphone Calibrator	Bruel & Kjaer	Type 4228	Pistonphone Calibrator	Y002816	02/17/11
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	005066	08/20/10
Source Room Environemental Indicator	Vaisala	HMW60Y	Temperature and Humidity Sensor	Y002652	09/15/10
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

Architectural Testing

SOUND TRANSMISSION LOSS

ASTM E 90

ATI No.	B0236.01	**Date**	06/09/11
Client	VELUX America Inc.		
Specimen	Series/Model: VS S06 2004, venting deck mounted skylight with 11/16" IG (1/8" tempered exterior, 11/32" argon, 7/32" laminated interior), Glass temperature 75°F		
Specimen Area	1.38 Square Meters		
Filler Area	11.61 Square Meters		
Operator	Daniel P. Platts		

	Bkgrd	Absorp	Source	Receive	Filler	Specimen
Temp C	24.4	26.7	22.9	24.6	23.5	24.6
RH %	45.6	36.9	43.1	41.5	44.2	41.8

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 Defici-encies	Trans Coef Diff
80	43.0	5.1	89.8	58.0	34.4	27	2.41	0	-1.0
100	39.0	5.1	92.1	63.6	41.2	23	3.69	0	9.1
125	40.7	4.5	96.3	64.6	47.9	27	1.63	0	12.1
160	42.9	4.6	96.3	65.7	49.2	26	1.54	0	14.6
200	43.8	5.2	101.3	72.1	52.1	24	1.25	0	19.3
250	42.5	5.3	101.3	73.6	55.1	22	1.19	4	24.0
315	38.6	5.9	100.5	71.5	58.7	23	0.68	6	26.7
400	32.6	5.7	100.8	70.3	63.7	24	0.98	8	30.1
500	33.1	6.0	102.6	69.0	68.8	27	0.66	6	32.4
630	25.4	5.7	104.2	67.8	73.6	30	0.39	4	34.0
800	23.6	5.8	104.3	64.9	74.4	33	0.33	2	32.0
1000	23.3	6.0	103.8	62.7	76.9	35	0.70	1	32.8
1250	19.7	6.8	103.4	57.8	78.8	39	0.33	0	30.9
1600	14.6	6.9	105.5	57.5	86.1	41	0.27	0	35.8
2000	11.7	7.3	105.2	56.3	85.5	42	0.29	0	34.6
2500	9.7	8.4	105.2	57.1	84.9	40	0.29	0	35.4
3150	8.0	10.0	106.2	56.3	87.5	41	0.47	0	37.0
4000	7.2	12.7	106.0	53.8	87.9	43	0.27	0	36.1
5000	7.3	16.1	104.6	46.6	86.9	47	0.47	0	30.2

STC Rating =	**33**	*(Sound Transmission Class)*
Deficiencies =	**31**	*(Number of deficiencies versus contour curve)*
OITC Rating =	**28**	*(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.

ACCREDITED

Architectural Testing, Inc. is accredited by the International Accreditation Service, Inc. (IAS) under the specific test methods listed under lab code TL-144, in accordance with the recognized International Standard ISO/IEC 17025:2005. The laboratory's accreditation or test report in no way constitutes or implies product certification, approval, or endorsement by IAS. This test report applies only to the specimen that was tested.

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ATI No.	B0236.01	**Date**	06/09/11
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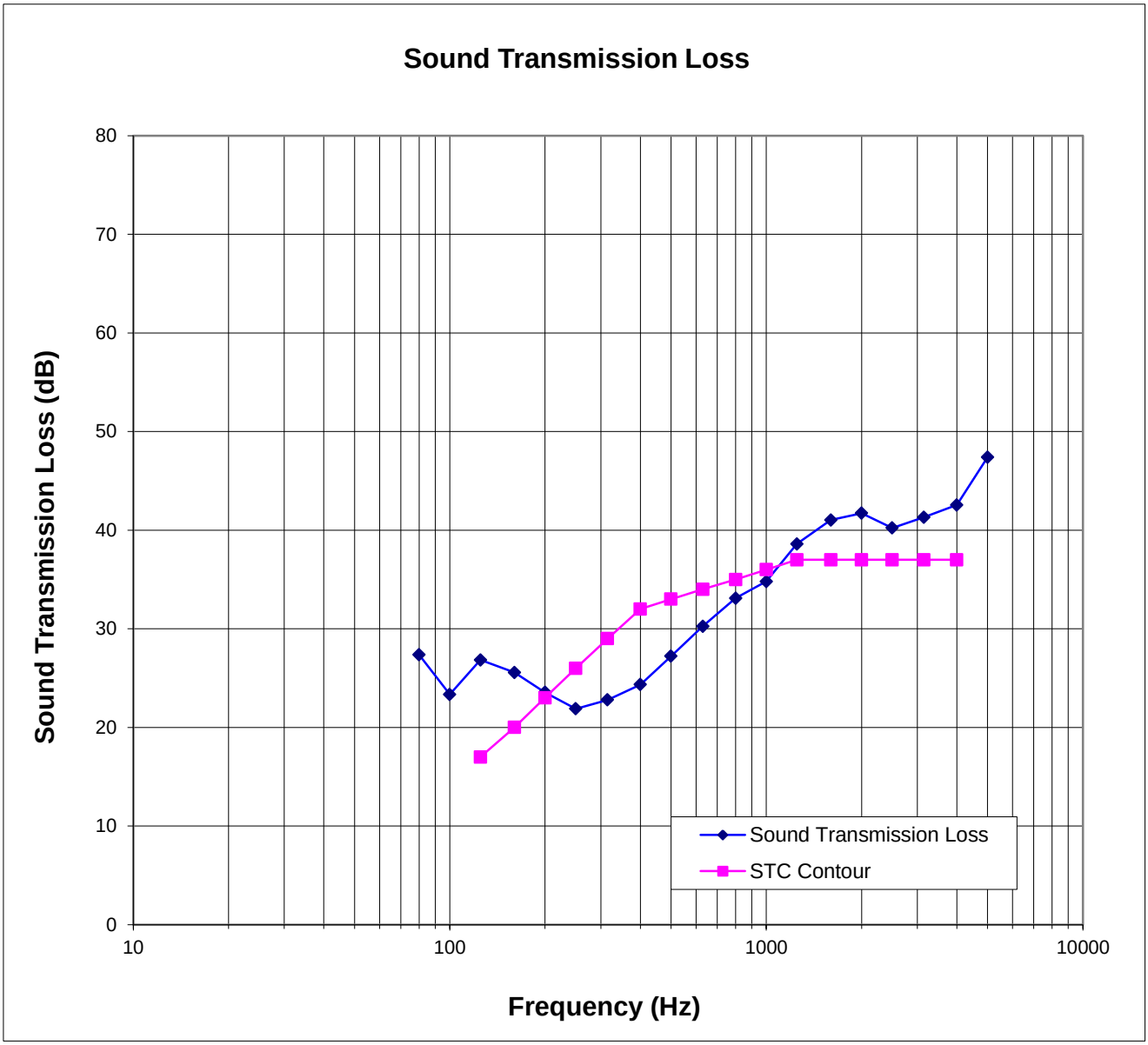
Operator	Daniel P. Platts		



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Appendix C

Photographs

Receive Room View of Installed Specimen

Source Room View of Installed Specimen