Architectural Testing

ASTM E 90 SOUND TRANSMISSION LOSS TEST REPORT

Rendered to:

MI WINDOWS AND DOORS, LLC

SERIES/MODEL: 1650 Polyvinyl Chloride (PVC)

This product also is labeled under the following Series/Model names: 1555, 1655, BMDH3, NCDH3

TYPE: Double Hung Window

Summary of Test Results			
Data File No.	**Glazing (Nominal Dimensions)**	**STC**	**OITC**
D8200.01	7/8" IG (1/8" annealed exterior, 9/16" air space, 3/16" annealed interior) (P1-S) Duralite Spacer	33	28

Reference should be made to Architectural Testing, Inc. Report No. D8200.01-113-11 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:

MI WINDOWS AND DOORS, LLC
P.O. Box 370
650 West Market Street
Gratz, Pennsylvania 17030-0370

Report No:	D8200.01-113-11
Test Date:	05/27/14
Report Date:	06/11/14
Record Retention End Date:	05/27/18

Test Sample Identification:

Series/Model: 1650 Polyvinyl Chloride (PVC)

Type: Double Hung Window

Overall Size: 47-1/4" by 59"

Glazing (Nominal Dimensions): 7/8" IG (1/8" Annealed Exterior, 9/16" Air Space, 3/16" Annealed Interior) (P1-S) Duralite Spacer

Project Scope: Architectural Testing, Inc. was contracted by MI Windows and Doors, LLC to conduct a sound transmission loss test on a Series/Model 1650 Polyvinyl Chloride (PVC), 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 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 (Reapproved 2012), *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 68.

A filler wall-reducing element was used to adjust the test opening size. The reducing element consisted of two separate 2x6 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 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 sashes 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 test was 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	47-1/4" by 59"
Thickness	3-7/8"
Corners	Mitered
Fasteners	Welds
Seal Method	None
Material	Vinyl
Reinforcement	None
Thermal Break Material	N/A

N/A-Non Applicable

***Note**: There was 2-1/2" by 1/2" open cell foam tape located on the outside of the jambs.*

Sample Descriptions: (Continued)

Sash Construction:

		Bottom Sash	Top Sash
Size		43-13/16" by 28-13/16"	43-3/16" by 28-1/8"
Thickness		1-1/2"	1-1/4"
Corners		Mitered	Mitered
	Fasteners	Welds	Welds
	Seal Method	None	None
Material		Vinyl	Vinyl
	Reinforcement	Steel located in bottom rail and lock rail	Steel located in keeper rail
	Thermal Break Material	N/A	N/A
Daylight Opening Size		40-5/16" by 25-3/16"	40-1/4" by 25-1/8"

Glazing Option:

Measured Overall Insulation Glass Unit Thickness	0.862"
Spacer Type	Polycarbonate Butyl Composite (P1-S) Duralite Spacer

	Exterior Sheet	Gap	Interior Sheet
Measured Thickness	0.115"	0.570"	0.177"
Muntin Pattern	N/A	N/A	N/A
Material	Annealed	Air*	Annealed
Laminate Material	N/A	N/A	N/A

Glazing Method	Exterior
Glazing Material	Silicone
Glazing Bead Material	Vinyl

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

Sample Descriptions: (Continued)

Components:

TYPE	QUANTITY	LOCATION
Weatherstrip		
0.187" by 0.210" Polypile with center fin	1 Row	Top rail, lock rail, sill, head
0.187" by 0.210" Polypile with center fin	2 Rows	Stiles
0.187" by 0.150" Polypile with center fin	1 Row	Keeper rail
1/4" Diameter foam-lined hollow bulb gasket with dual 1/8" fin	2 Rows	Bottom rail
1" by 1/2" Polypile pad	2	Lock rail
Hardware		
Constant force balance	4	Jambs
Cam lock	2	Lock rail
Keeper	2	Keeper rail
Plastic tilt latch	4	Top rail and lock rail
Metal tilt bar	4	Bottom rail and keeper rail
Child safety latch	2	Top sash stiles
Drainage		
Sloped sill		
1" by 3/16" Weep notch	2	Sill screen track

Comments: The weight of the test sample was 84 lbs. The client did not supply report drawings on the Series/Model 1650 Polyvinyl Chloride (PVC), 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 1650 Polyvinyl Chloride (PVC), double hung window is listed below.

Summary of Test Results			
Data File No.	**Glazing (Nominal Dimensions)**	**STC**	**OITC**
D8200.01	7/8" IG (1/8" annealed exterior, 9/16" air space, 3/16" annealed interior) (P1-S) Duralite Spacer	33	28

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:

Digitally Signed by: Zachary Golden

Zachary Golden
Technician - Acoustical Testing

Digitally Signed by: Todd D. Kister

Todd D. Kister
Laboratory Supervisor - Acoustical Testing

ZPG: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	06/11/14	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	06/13 *
Data Acquisition Unit	Agilent	34970A	Data Acquisition Unit	62211	07/13
Receive Room Microphone	GRAS	40 AR	1/2" Microphone	Y003247	02/14
Source Room Microphone	GRAS	40 AR	1/2" Microphone	Y003239	02/14
Receive Room Preamplifier	GRAS	26 AK	1/2" Preamplifier	Y003251	09/13
Source Room Preamplifier	GRAS	26 AK	1/2" Preamplifier	005656	06/13
Microphone Calibrator	Cirrus	CRL 511E	Pistonphone Calibrator	Y001777	06/13
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	HMW92	Temperature and Humidity Sensor	064286	05/13
Source Room Environemental Indicator	Vaisala	HMW60Y	Temperature and Humidity Sensor	Y002653	05/13
Weather Station	Davis Instruments	VantagePRO 6150C	Weather Station	Y003257	06/13

**- 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

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ACCREDITED TL-144

SOUND TRANSMISSION LOSS

ASTM E 90

Test Date	05/27/14
ATI No.	D8200.01
Client	MI Windows and Doors, LLC
Specimen	Series/Model: 1650 Polyvinyl Chloride (PVC), Double hung window, with 7/8" IG (1/8" annealed exterior, 9/16" air space, 3/16" annealed interior) (P1-S) Duralite Spacer
Operator	Zachary Golden
Sample Area	1.80 m^2
Filler Area	11.20 m^2

	Source	Receive	Specimen
Temp C	22	22	22
RH %	47	45	45

Freq (Hz)	**Bkgrd SPL** (dB)	**Absorp** (m^2)	**Source SPL** (dB)	**Receive SPL** (dB)	**Filler TL** (dB)	**Specimen TL** (dB)	**95% Conf Limit**	**No. of Defi-ciencies**	**Trans Coef Diff**
80	40	5.4	90	67	34	19	2.3	-	7.3
100	38	5.4	93	66	40	23	3.5	-	10.0
125	39	5.1	96	67	47	24	2.0	0	15.3
160	40	4.6	96	68	47	25	1.1	0	14.1
200	39	5.2	102	76	51	21	1.2	2	21.9
250	36	5.9	102	78	54	19	1.0	7	27.1
315	32	5.3	102	71	57	26	0.6	3	23.2
400	27	5.8	102	70	63	27	0.9	5	27.4
500	22	5.8	103	67	68	31	0.6	2	29.0
630	19	5.7	105	66	72	34	0.6	0	30.1
800	18	5.8	105	64	76	36	0.3	0	31.7
1000	16	6.2	105	62	81	37	0.5	0	35.2
1250	14	6.8	103	59	82	38	0.3	0	36.0
1600	11	6.8	106	62	83	39	0.3	0	35.8
2000	8	7.4	105	60	80	39	0.3	0	33.2
2500	7	8.4	105	62	83	36	0.3	1	38.4
3150	7	10.2	106	63	82	35	0.4	2	38.4
4000	7	12.4	106	65	84	33	0.6	4	43.2
5000	7	16.7	105	61	83	34	0.8	-	41.1

STC Rating	**33**	*(Sound Transmission Class)*
Deficiencies	26	*(Number of deficiencies versus contour curve)*
OITC Rating	**28**	*(Outdoor Indoor Transmission Class)*

Notes:

1) Transmission loss coefficient differences less than 6 indicate the lower limit of the transmission loss for this specimen. These cells are highlighted red.

2) Transmission loss coefficient differences between 6 and 15 indicate there has been a filler wall correction applied. These cells are highlighted green.

3) Receive Room levels less than 5 dB above the background levels are highlighted in yellow.

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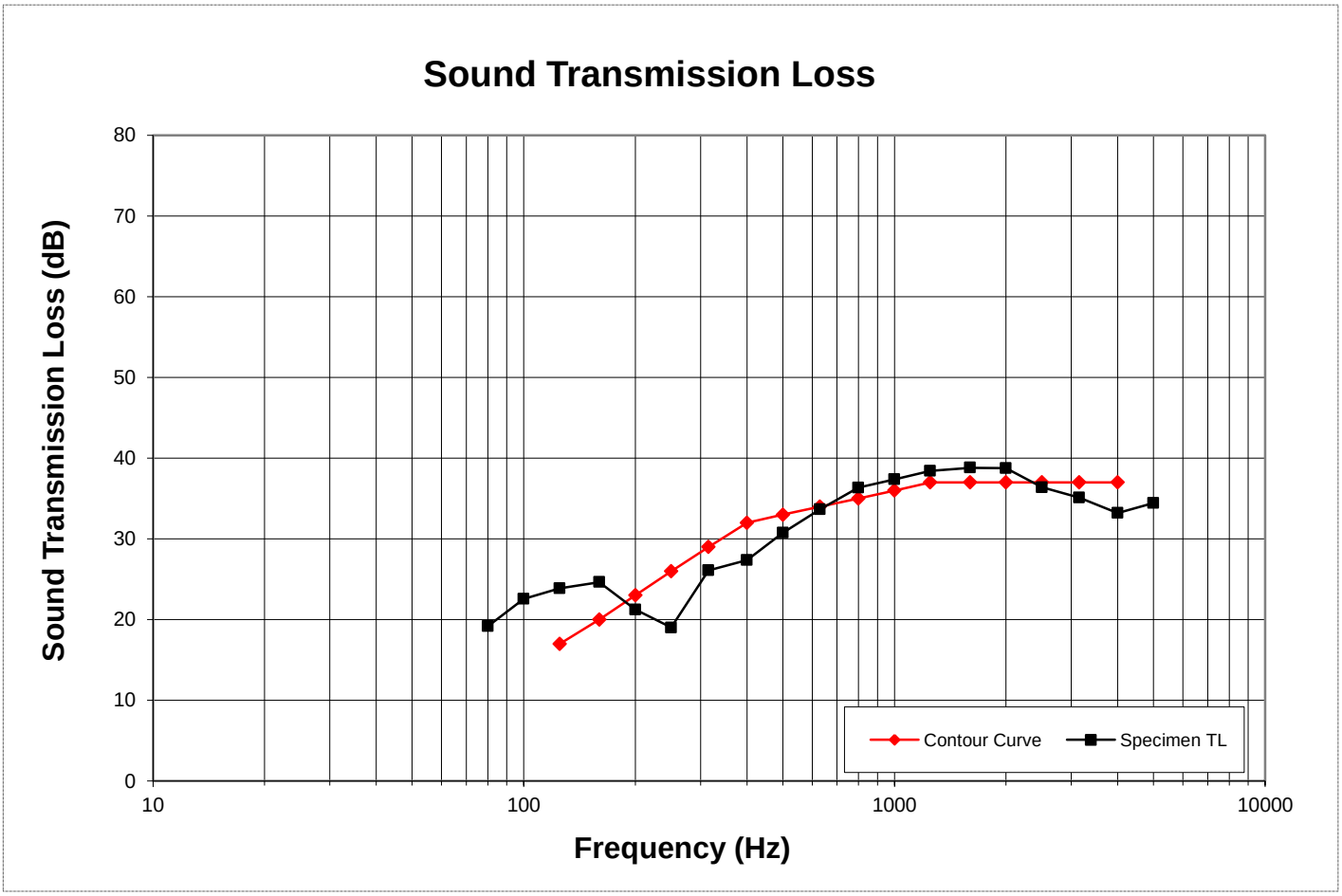
SOUND TRANSMISSION LOSS

ASTM E 90

Test Date	05/27/14		
ATI No.	D8200.01		
Client	MI Windows and Doors, LLC		
Specimen	Series/Model: 1650 Polyvinyl Chloride (PVC), Double hung window, with 7/8" IG (1/8" annealed exterior, 9/16" air space, 3/16" annealed interior) (P1-S) Duralite Spacer		
Operator	Zachary Golden		
Sample Area	1.80 m^2		
Filler Area	11.20 m^2		
	Source	Receive	Sample
Temp C	22	22	22
RH %	47	45	45



Note: To obtain the Sound Transmission Class (STC), read the Sound Transmission Loss of the contour curve at 500 Hz. The sum of the deficiencies below the contour curve cannot exceed 32. The maximum deficiency at any one frequency cannot exceed 8.

Appendix C

Photographs

Receive Room View of Installed Specimen

Source Room View of Installed Specimen