

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

**Rendered to:**

**MI WINDOWS AND DOORS, INC.**

**SERIES/MODEL: 5500**

**TYPE: Single Hung Window**

<b>Summary of Test Results</b>			
<b>Data File No.</b>	<b>Glazing (Nominal Dimensions)</b>	<b>STC</b>	<b>OITC</b>
B5026.01	3/4" IG (1/8" annealed exterior, 3/8" air space, 1/4" [0.030"Q] laminated interior), Glass temperature 75°F	33	28

Reference should be made to Architectural Testing, Inc. Report No. B5026.01-113-11 for complete test specimen description. The complete test results are listed in Appendix B.

## ACOUSTICAL PERFORMANCE TEST REPORT

Rendered to:

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

Report No: B5026.01-113-11  
Revision 1: 01/19/12  
Test Date: 12/05/11  
Report Date: 12/14/11  
Record Retention End Date: 12/05/15

### **Test Sample Identification:**

**Series/Model:** 5500

**Type:** Single Hung Window

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

**Glazing (Nominal Dimensions):** 3/4" IG (1/8" Annealed Exterior, 3/8" Air Space, 1/4" [0.030"Q] Laminated Interior), Glass Temperature 75°F

**Project Scope:** Architectural Testing, Inc. was contracted by MI Windows and Doors, Inc. to conduct a sound transmission loss test on a Series/Model 5500, single 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 tests were 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 these tests meets the requirements of ASTM E 90. The microphones were calibrated before conducting sound transmission loss tests. 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 reduce the test opening size. The reducing element consisted of two separate 2x6 wood frame 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 sash was 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. 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:**

	<b>Frame</b>
<b>Size</b>	47-1/4" by 59"
<b>Thickness</b>	2-3/4"
<b>Corners</b>	Mitered
Fasteners	Welds
Seal Method	None
<b>Material</b>	Vinyl
Reinforcement	Aluminum / Keeper rail
Thermal Break Material	N/A
<b>Daylight Opening Size</b>	44-1/8" by 26-7/16"

*N/A-Non Applicable*

Sample Descriptions: (Continued)

Sash Construction:

		Active Sash
<b>Size</b>	44-15/16" by 29-11/16"	
<b>Thickness</b>	1"	
<b>Corners</b>	Mitered	
	Fasteners	Welds
	Seal Method	None
<b>Material</b>	Vinyl	
	Reinforcement	Aluminum / Lock rail
	Thermal Break Material	N/A
<b>Daylight Opening Size</b>	41-11/16" by 26-7/16"	

Glazing:

<b>Measured Overall Insulation Glass Unit Thickness</b>	0.724"
<b>Spacer Type</b>	Polycarbonate reinforced butyl

	Exterior Sheet	Gap	Interior Sheet
<b>Measured Thickness</b>	0.115"	0.371"	0.104", 0.030", 0.104"
<b>Muntin Pattern</b>	N/A	N/A	N/A
<b>Material</b>	Annealed	Air*	Laminated
<b>Laminate Material</b>	N/A	N/A	Saflex® Q series acoustic interlayer*

<b>Glazing Method</b>	Exterior
<b>Glazing Material</b>	Double-sided adhesive foam tape
<b>Glazing Bead Material</b>	Vinyl

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

**Sample Descriptions:** (Continued)

**Components:**

TYPE	QUANTITY	LOCATION
<b>Weatherstrip</b>		
0.187" by 0.250" Weep slot	1 Row	Sash perimeter and keeper rail
<b>Hardware</b>		
Block and tackle balance	2	Jambs
Cam lock	1	Lock rail
Keeper	1	Keeper rail
<b>Drainage</b>		
1-1/4" by 1/4" Weep slot with cover	2	Sill face
1-1/4" by 1/4" Weep slot	2	Sill hollow
1" by 3/16" Weep slot	2	Sill hollow
1/4" by 3/16" Weep slot	2	Sill track
1/2" by 1/8" Weep slot	2	Sill hollow

**Comments:** The weight of the sample was 92 lbs. The client did not supply drawings on the Series/Model 5500, single 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 5500, single hung window is listed below.

Summary of Test Results			
Data File No.	Glazing (Nominal Dimensions)	STC	OITC
B5026.01	3/4" IG (1/8" annealed exterior, 3/8" air space, 1/4" [0.030"Q] laminated interior), Glass temperature 75°F	33	28

*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.

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. 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:

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Kurt A. Golden  
Senior Technician - Acoustical Testing

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Todd D. Kister  
Laboratory Supervisor - Acoustical Testing


KAG:jmc

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)

	<p>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.</p>
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### Revision Log

<u>Rev. #</u>	<u>Date</u>	<u>Page(s)</u>	<u>Revision(s)</u>
0	12/14/11	N/A	Original Report Issue
1	01/19/12	Page 3	Changed PVB under exterior sheet to Saflex® Q series acoustic interlayer
1	01/19/12	Cover Page, Pages 1 and 5, Appendix B	Changed interlayer of exterior glass measurement from 0.029" to 0.030" Included [0.030"Q] in laminate description

## 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	02/17/11
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	Y002653	03/01/11
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 <sup>3</sup> (8291.3 ft <sup>3</sup> )	Rotating vane and stationary diffusers Temperature and humidity controlled Isolation pads under the floor
Source Room	206.6 m <sup>3</sup> (7296.3 ft <sup>3</sup> )	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

<b>ATI No.</b>	B5026.01	<b>Date</b>	12/05/11
<b>Client</b>	MI Windows and Doors, Inc.		
<b>Specimen</b>	Series/Model: 5500, single hung window with 3/4" IG (1/8" annealed exterior, 3/8" air space, 1/4" [0.030"Q] laminated interior), Glass temperature 75°F		
<b>Specimen Area</b>	1.80 Square Meters		
<b>Filler Area</b>	11.20 Square Meters		
<b>Operator</b>	Kurt Golden		

	Bkgrd	Absorp	Source	Receive	Filler	Specimen
Temp C	22.8	23.3	23.2	23.6	23.0	23.2
RH %	45.5	44.0	42.4	43.3	43.7	43.8

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 Deficiencies	Trans Coef Diff
80	42.5	5.4	95.8	72.9	35.8	19	3.75	0	9.7
100	41.5	5.6	98.9	70.0	41.2	24	4.07	0	9.4
125	41.0	4.9	102.3	70.2	47.8	28	3.68	0	12.1
160	39.1	4.4	102.4	72.0	47.0	27	3.72	0	12.5
200	35.4	5.3	107.1	78.5	52.1	24	2.38	0	20.2
250	34.2	5.6	106.0	77.9	54.8	23	2.58	3	23.7
315	30.5	5.4	104.3	77.7	55.7	22	2.28	7	26.0
400	28.0	5.6	104.4	73.8	61.2	26	1.33	6	27.6
500	23.6	5.9	103.8	69.4	67.5	29	0.95	4	30.3
630	22.2	5.7	105.2	67.6	72.6	33	0.70	1	32.1
800	18.9	5.7	105.0	64.4	73.3	36	0.51	0	29.8
1000	15.4	6.2	104.1	62.6	75.9	36	0.51	0	31.8
1250	12.1	6.5	103.4	60.4	77.5	37	0.47	0	32.2
1600	9.6	6.9	105.1	64.3	84.6	35	0.50	2	41.7
2000	7.3	7.3	104.8	64.1	83.3	35	0.64	2	40.7
2500	6.4	8.2	104.8	61.8	83.0	36	0.64	1	38.6
3150	6.5	9.9	105.9	61.5	83.0	37	0.61	0	38.0
4000	7.9	11.9	105.7	60.6	81.5	37	0.67	0	36.6
5000	7.4	15.2	104.4	58.3	81.6	37	0.71	0	36.9

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

**Notes:**

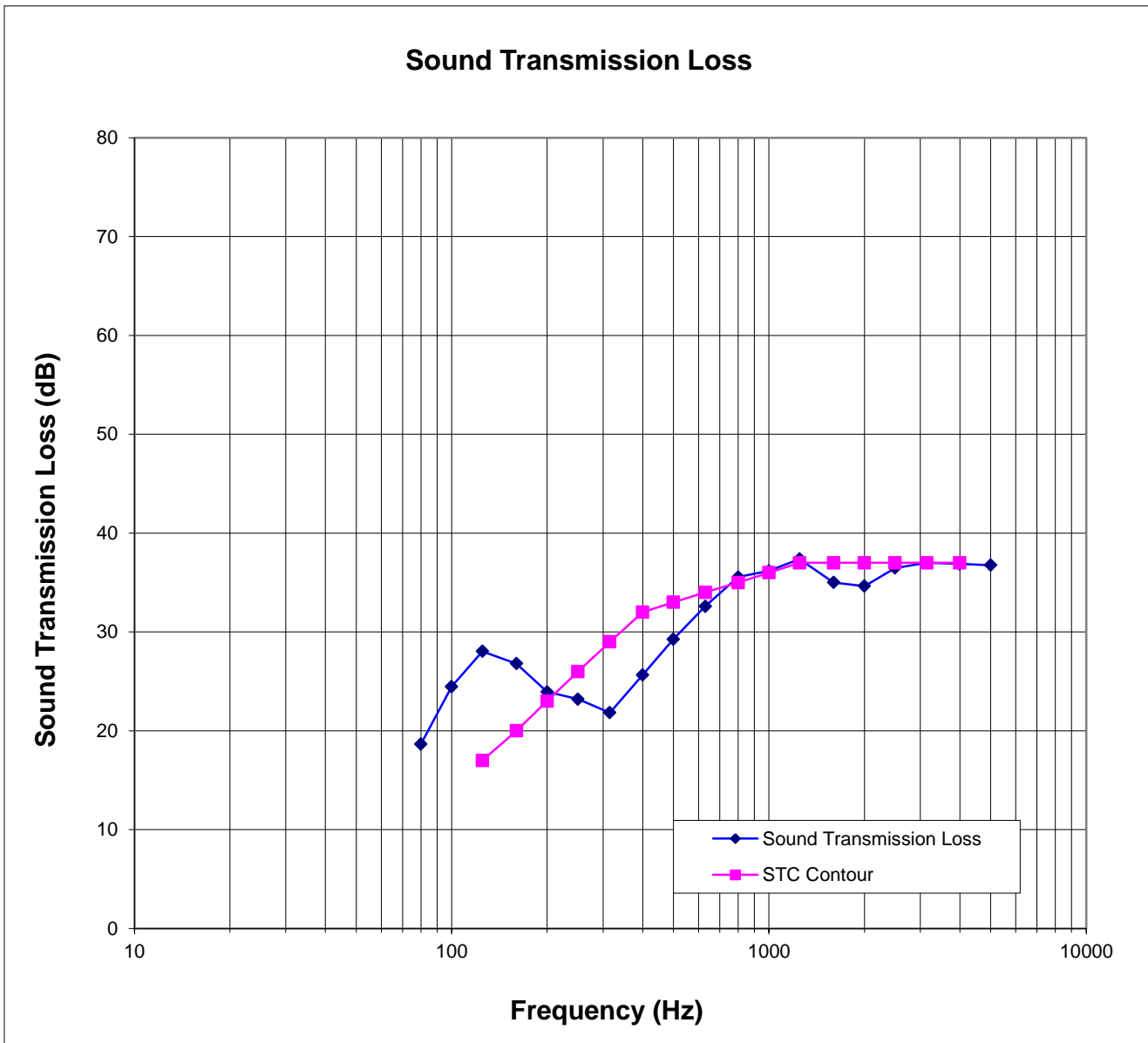
- 1) The acoustical chambers are qualified for measurements down to 80 hertz. Data reported below 80 hertz is for reference only.
- 2) Transmission loss coefficient differences less than 6 indicate the lower limit of the transmission loss for this specimen. These cells are highlighted red.
- 3) Transmission 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.

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### Architectural Testing

**ATI No.** B5026.01 **Date** 12/05/11  
**Client** MI Windows and Doors, Inc.  
**Specimen** Series/Model: 5500, single hung window with 3/4" IG (1/8" annealed exterior, 3/8" air space, 1/4" [0.030"Q] laminated interior), Glass temperature 75°F  
**Specimen Area** 1.80 Square Meters  
**Filler Area** 11.20 Square Meters  
**Operator** Kurt Golden



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**Appendix C**

**Photographs**



**Receive Room View of Installed Test Specimen**



**Receive Room View of Installed Test Specimen**