

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

Rendered to:

MI WINDOWS AND DOORS, INC.

SERIES/MODEL: 3500

TYPE: Single Hung Window

Summary of Test Results			
Data File No.	Glazing (Nominal Dimensions)	STC	OITC
A4978.01	7/8" IG (1/4" laminated exterior, 5/16" air space, 5/16" laminated interior), Glass temperature 74°F	34	28

Reference should be made to Architectural Testing, Inc. Report No. A4978.01-113-11 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: A4978.01-113-11
Test Date: 11/10/10
Report Date: 11/18/10
Record Retention End Date: 11/10/14

Test Sample Identification:

Series/Model: 3500

Type: Single Hung Window

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

Glazing (Nominal Dimensions): 7/8" IG (1/4" Laminated Exterior, 5/16" Air Space, 5/16" Laminated Interior), Glass Temperature 74°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 3500, 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 48" by 72" and 72" by 48" specimens. The filler wall achieved an STC rating of 69.

A filler wall reducing element was used to reduce the test opening size. The reducing element consisted of two separate 2x6 wood frames filled with concrete to reduce the test opening size to 47-3/4" wide by 59-1/2" high. 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 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:

Construction:

	Frame	Active Sash
Size	47-1/4" by 59"	45-5/16" by 28-7/8"
Thickness	2-13/16"	1-1/4"
Corners	Mitered	Coped
Fasteners	Welds	Welds
Seal Method	None	None
Material	Vinyl	Vinyl
Reinforcement	N/A	Steel / Bottom and lock rail
Thermal Break Material	N/A	N/A
Daylight Opening Size	43-5/16" by 25-15/16"	42-1/2" by 25-15/16"

N/A-Non Applicable

Sample Descriptions: (Continued)

Glazing:

Measured Overall Insulation Glass Unit Thickness	0.884"
Spacer Type	Reinforced butyl

	Exterior Sheet	Gap	Interior Sheet
Measured Thickness	0.105"- 0.028"- 0.105"	0.353"	0.118"- 0.057"- 0.118"
Muntin Pattern	N/A	N/A	N/A
Material	Laminated	Air*	Laminated
Laminate Material	PVB	N/A	PVB

Glazing Method	Interior
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 0.250" Poly pile with center fin	2 Rows	Stiles
0.187" by 0.250" Poly pile with center fin	1 Row	Lock rail and sill
1/8" Diameter kerf mounted foam-filled bulb gasket	1 Row	Keeper rail
5/16" Diameter kerf mounted foam-filled bulb gasket with single 1/8" leaf	1 Row	Bottom rail
Poly pile with center fin	1 Row	Sill
Hardware		
Constant force balance	2	Jambs
Cam lock	2	Lock rail
Keeper	2	Keeper rail
Tilt latch with tilt bar	2	Active sash corners
Drainage		
1/2" by 3/16" Weep slot	2	Sill
1" by 1/8" Weep slot	2	Sill face
1/2" by 3/16" Weep slot	4	Sill hollow

Comments: The weight of the sample was 122 lbs. The client did not supply drawings on the Series/Model 3500, 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 3500, single hung window is listed below.

Summary of Test Results			
Data File No.	Glazing (Nominal Dimensions)	STC	OITC
A4978.01	7/8" IG (1/4" laminated exterior, 5/16" air space, 5/16" laminated interior), Glass temperature 74°F	34	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 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:

Kurt A. Golden
Senior Technician - Acoustical Testing

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	11/18/10	N/A	Original Report Issue

Appendix A

Instrumentation:

Instrument	Manufacturer	Model	Description	ATI Number	Last Calibrated
Analyzer	Agilent Technologies	35670A	Dynamic signal analyzer	004112	06/08/09*
Data Acquisition Unit	Agilent Technologies	34970A	Data Acquisition Unit	62211	07/24/10
Receive Room Microphone	G.R.A.S.	40AR	1/2", Pressure type, condenser microphone	Y003246	08/17/10
Source Room Microphone	G.R.A.S.	40AR	1/2", Pressure type, condenser microphone	Y003245	08/17/10
Receive Room Preamp	G.R.A.S.	26AK	1/2" Preamplifier	Y003249	08/17/10
Source Room Preamp	G.R.A.S.	26AK	1/2" Preamplifier	Y003248	08/17/10
Microphone Calibrator	Bruel & Kjaer	4228	Pistonphone calibrator	Y002816	02/18/10
Noise Source	Delta Electronics	SNG-1	Two, Uncorrelated "Pink" noise signals	Y002181	N/A
Equalizer	Rane	RPE228	Programmable EQ	Y002180	N/A
Power Amplifiers	Crown	XTi 2000	Two, Amplifiers	005769 005770	N/A
Receive Room Loudspeakers	Renkus-Heinz	Trap Jr/9"	Two, Loudspeakers	Y001784 Y001785	N/A
Source Room Loudspeakers	Renkus-Heinz	Trap Jr/9"	Two, Loudspeakers	Y002649 Y002650	N/A
Receiving Room Environmental Indicator	Vaisala	HMW60Y	Temperature / Humidity Indicator	005066	08/20/10
Source Room Environmental Indicator	Vaisala	HMW60Y	Temperature / Humidity Indicator	Y002652	09/15/10
Weather Station	Davis Instruments	6150C	Laboratory Barometric Pressure, Temperature, and Humidity	Y003257	04/08/10

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

Test Chamber:

	Volume	Description
Receiving 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.	A4978.01	Date	11/10/10
Client	MI Windows and Doors, Inc.		
Specimen	Series/Model: 3500, single hung window with 7/8" IG (1/4" laminated exterior, 5/16" air space, 5/16" laminated interior), Glass temperature 74°F		
Specimen Area	1.80 Square Meters		
Filler Area	11.20 Square Meters		
Operator	Kurt Golden		

	Bkgrd	Absorp	Source	Receive	Filler	Specimen
Temp C	24.7	24.8	22.5	24.4	23.4	24.1
RH %	46.9	47.8	49.0	47.1	43.6	47.7

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	46.1	4.4	79.2	56.1	36.0	20	1.63	0	9.0
100	42.1	4.7	82.6	53.5	41.3	26	3.14	0	8.3
125	40.7	4.3	86.4	54.1	47.3	29	1.76	0	11.0
160	45.0	4.6	88.8	59.5	49.5	25	0.52	0	16.4
200	42.2	4.9	92.9	70.5	52.9	18	0.94	6	26.9
250	40.9	5.0	93.6	62.8	56.1	26	1.04	1	21.8
315	40.6	5.3	93.9	62.1	57.7	27	0.71	3	22.6
400	40.4	5.8	94.6	59.1	62.8	30	0.34	3	24.4
500	39.3	5.6	95.0	56.8	67.1	33	0.40	1	25.9
630	35.9	5.2	97.1	56.8	71.0	36	0.39	0	27.3
800	37.9	5.6	98.0	57.6	73.1	36	0.13	0	29.6
1000	35.0	5.7	97.7	57.2	76.4	35	0.38	2	33.0
1250	34.2	6.3	96.9	56.8	78.3	35	0.35	3	35.7
1600	31.5	6.7	98.8	60.0	83.2	33	0.27	5	42.1
2000	22.3	7.1	99.5	59.1	84.2	34	0.31	4	41.8
2500	13.8	8.1	100.0	57.8	85.7	36	0.28	2	42.1
3150	12.6	9.8	101.3	56.6	86.3	37	0.29	1	41.0
4000	10.2	11.5	100.7	53.5	87.2	39	0.24	0	40.0
5000	8.1	15.0	99.5	48.9	85.6	41	0.28	0	36.3

STC Rating = 34 *(Sound Transmission Class)*
Deficiencies = 31 *(Number of deficiencies versus contour curve)*
OITC Rating = 28 *(Outdoor/Indoor Transmission Class)*

Notes:

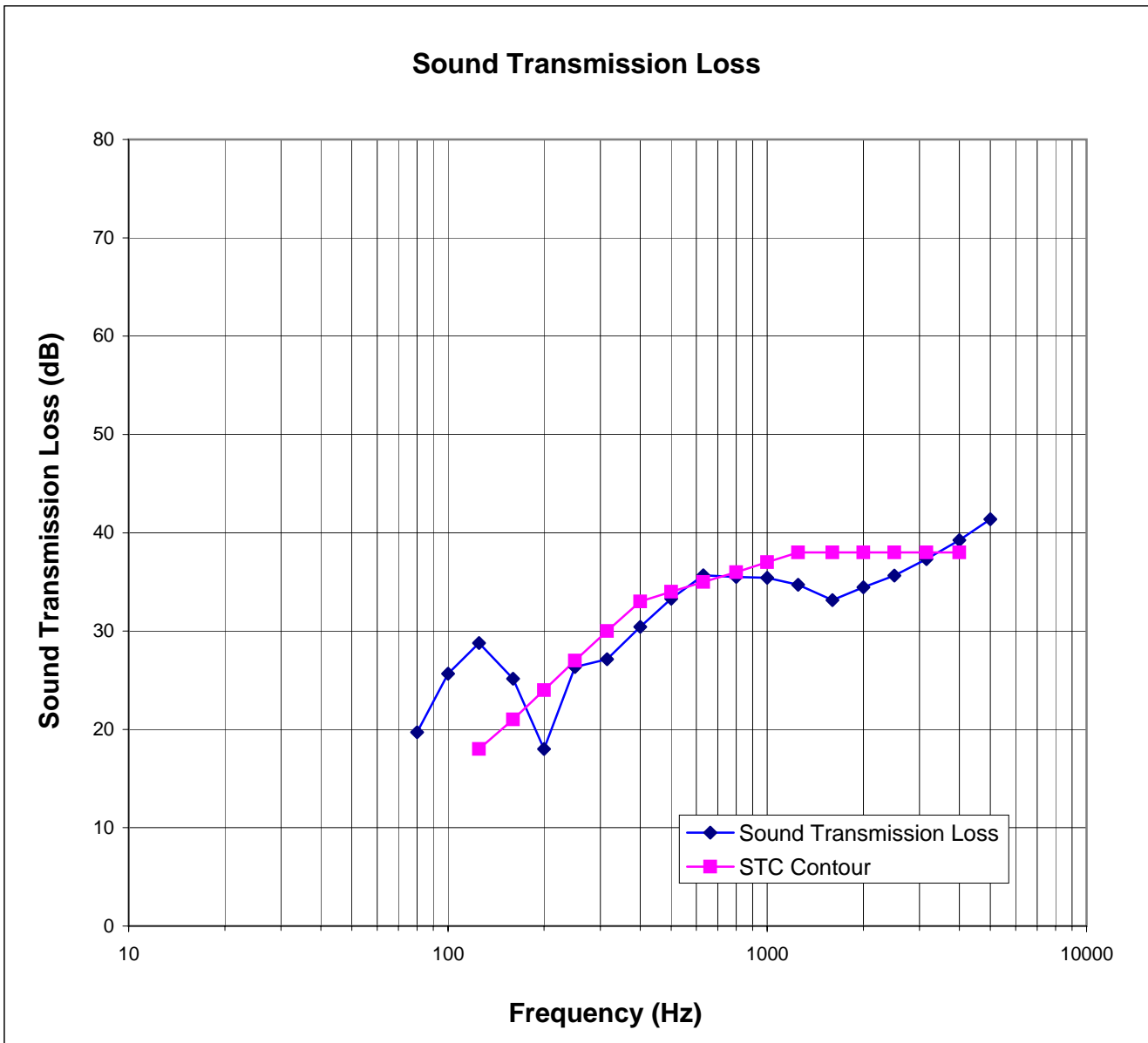
- 1) The acoustical chambers are qualified for measurements down to 80 hertz. Data reported below 80 hertz is for reference only.
- 2) Transmission loss coefficient differences less than 6 indicate the lower limit of the transmission loss for this specimen. These cells are highlighted red.
- 3) Transmission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

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Architectural Testing

ATI No. A4978.01 **Date** 11/10/10
Client MI Windows and Doors, Inc.
Specimen Series/Model: 3500, single hung window with 7/8" IG (1/4" laminated exterior, 5/16" air space, 5/16" laminated interior), Glass temperature 74°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 Specimen



Source Room View of Installed Specimen