Architectural Testing

AAMA 1801 SOUND TRANSMISSION LOSS TEST REPORT

Rendered to:

MI WINDOWS AND DOORS, INC.

SERIES/MODEL: 188/3188

TYPE: Horizontal Sliding Window

Summary of Test Results					
ATI Data File No.	**Glazing Option (Nominal Dimensions)**	**Operating Force**	**Air Infiltration**	**STC**	**OITC**
71962.01A	5/16" laminated Glass temperature - 75°F	Pass	Pass	32	28
71962.01B	5/8" IG (1/8" annealed exterior, 1/4" air space, 1/4" laminated interior) Glass temperature - 75°F	Pass	Pass	32	28

Reference should be made to ATI Report No. 71962.01-113-11 for complete test specimen description. The complete test results are listed in Appendix B.

130 Derry Court
York, PA 17406-8405
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Architectural Testing

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:	71962.01-113-11
Test Date:	04/24/07
Report Date:	05/10/07
Expiration Date:	04/24/11

Test Sample Identification:

Series/Model: 188/3188

Type: Horizontal Sliding Window

Performance Class: Residential

Overall Size: 72" by 48"

Glazing Option A (Nominal Dimensions): 5/16" Laminated

Glazing Option B (Nominal Dimensions): 5/8" IG (1/8" Annealed Exterior, 1/4" Air Space, 1/4" Laminated Interior)

Project Scope: Architectural Testing, Inc. (ATI) was contracted by MI Windows and Doors, Inc. to conduct operating force, air leakage, and sound transmission loss tests on a Series/Model 188/3188, horizontal sliding 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.

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

AAMA 1801-97, *Acoustical Rating of Windows, Doors, and Glazed Wall Sections.*

ASTM E 1425-91 (Re-approved 1999), *Standard Practice for Determining the Acoustical Performance of Exterior Windows and Doors.*

ASTM E 90-04, *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions*.

ASTM E 413-04, *Classification for Rating Sound Insulation*.

ASTM E 1332-90 (Re-approved 2003), *Standard Classification for Determination of Outdoor-Indoor Transmission Class.*

ASTM E 283-04, *Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.*

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

ASTM E 2068-00, *Standard Test Method for Determination of Operating Force of Sliding Windows and Doors.*

Test Equipment: The equipment used to conduct these tests meets the requirements of ASTM E 90. The microphones were calibrated before conducting the 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 63.

The 72" by 48" plug was removed from the filler wall assembly. The window was placed on a foam isolation pad in the test opening. Duct seal was used to seal the perimeter of the window to the test opening on both sides. The window frame was installed using the brick mold to attach to the source 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:

Operating Force Test - The Type B method, which utilizes a force gage, was used to determine the breakaway and operating forces required to open and close both sash.

Air Leakage Test - The sash were closed and locked for this test. A negative pressure of 1.57 psf was applied inside the chamber that was placed around the interior side of the window. The total air leakage and extraneous air leakage measurements were used to calculate the specimen air leakage. Barometric pressure corrections were applied to the air leakage calculations.

Sound Transmission Loss Test - The sash were closed and locked for this test. 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		72" by 48"	35-3/8" by 45-1/2"
Thickness		2-3/16"	7/8"
Corners		Coped	Coped
	Fasteners	Screws	Screws
	Seal Method	Sealant	Sealant
Material		Aluminum	Aluminum
	Reinforcement	N/A	N/A
	Thermal Break Material	N/A	N/A
Daylight Opening Size		34-1/8" by 44-7/8"	32" by 42-7/8"

Sample Descriptions: (Continued)

Glazing Option A:

Measured Overall Glass Thickness	0.336"

Measured Thickness	0.120" - 0.096" - 0.120"
Muntin Pattern	N/A
Material	Laminated
Laminate Material	MDCA Saflex

Glazing Method	Exterior
Glazing Material	Silicone
Glazing Bead Material	Vinyl

Glazing Option B:

Measured Overall Insulation Glass Unit Thickness	0.634"
Spacer Type	Reinforced Butyl

	Exterior Sheet	**Gap**	**Interior Sheet**
Measured Thickness	0.119"	0.255"	0.087" - 0.086" - 0.087"
Muntin Pattern	N/A	N/A	N/A
Material	Annealed	Air*	Laminated
Laminate Material	N/A	N/A	MDCA Saflex

Glazing Method	Exterior
Glazing Material	Silicone
Glazing Bead Material	Aluminum

Sample Descriptions: (Continued)

Components:

TYPE	QUANTITY	LOCATION
Weatherstrip		
1/4" Diameter hollow bulb gasket	1 Row	Active sash: jamb stile
0.187" by 0.230" Poly pile with center fin	1 Row	Active sash: top and bottom rail Frame: meeting stile and active jamb
0.187" by 0.250" Poly pile strip	2	Active sash: meeting stile corners
Hardware		
Roller assembly set	2	Bottom rail
Sweep lock	2	Lock rail
Drainage		
1-1/2" by 1/4" Weep slot with cover	2	Sill
1-1/2" by 1/4" Weep slot	2	Sill

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

Comments: The weight of the sample with glazing option A was 98 lbs. The weight of the sample with glazing option B was 112 lbs. The client did not supply drawings on the Series/Model 188/3188, horizontal sliding window. The window was disassembled, and the components will be retained by ATI 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 operating force, air leakage, and sound transmission loss test results on the Series/Model 188/3188, horizontal sliding window is listed below.

ATI Data File No.	Glazing Option (Nominal Dimensions)	* Operating Force Pass/Fail	** Air Infiltration	STC	OITC
71962.01A	5/16" laminated Glass temperature was 75°F	Pass	Pass	32	28
71962.01B	5/8" IG (1/8" annealed exterior,1/4" air space, 1/4" laminated interior) Glass temperature was 75°F	Pass	Pass	32	28

* *The maximum allowable operating force, according to AAMA/NWWDA 101/I.S.2-97, is 20 lbs for Residential / Light Commercial / Commercial / Heavy Commercial / Architectural performance class, dual horizontal sliding windows.*

** *The maximum allowable air leakage rate, according to AAMA/NWWDA 101/I.S.2-97, is 0.3 cfm/ft^2 when the test pressure is 1.57 psf for performance class, dual horizontal sliding windows.*

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, Inc. 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(s) tested. This report may not be reproduced, except in full, without the written approval of Architectural Testing, Inc.

For ARCHITECTURAL TESTING, INC:

Digitally Signed by: Kurt A. Golden

Kurt A. Golden
Senior Technician - Acoustical Testing

Digitally Signed by: Todd D. Kister

Todd D. Kister
Laboratory Supervisor - Acoustical Testing

KAG:crc

Attachments (pages): This report is complete only when all attachments listed are included.
- Appendix-A: Equipment description (1)
- Appendix-B: Complete test results (8)
- Appendix-C: Photographs (1)

Revision Log

Rev. #	Date	Page(s)	Revision(s)
0	05/10/07	N/A	Original Report Issue

Appendix A

Instrumentation:

Instrument	Manufacturer	Model	Description	ATI Number
Analyzer	Agilent Technologies	35670A	Dynamic signal analyzer	Y002929
Receive Room Microphone	G.R.A.S.	40AR	1/2", pressure type, condenser microphone	Y003246
Source Room Microphone	ACO Pacific	7047	1/2", pressure type, condenser microphone	Y002820
Receive Room Preamp	Norsonic	N-1201	1/2" preamplifier	Y003240
Source Room Preamp	ACO Pacific	4012	1/2" preamplifier	Y002185
Microphone Calibrator	Bruel & Kjaer	4228	Pistonphone calibrator	Y002816
Noise Source	Delta Electronics	SNG-1	Two, non-coherelated "Pink" noise signals	Y002181
Equalizer	Rane	RPE228	Programmable EQ	Y002180
Power Amplifiers	Renkus-Heinz	P2000	2 - Amplifiers	Y002179 Y001779
Receive Room Loudspeakers	Renkus-Heinz	Trap Jr/9"	2 - Loudspeakers	Y001784 Y001785
Source Room Loudspeakers	Renkus-Heinz	Trap Jr/9"	2 - Loudspeakers	Y002649 Y002650
Lab Pack	ATI	N/A	Air leakage apparatus	Y000370
Force Gage	Chatillon	DPP50	Force gage	Y004774

Test Chamber:

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

	Maximum Size	Description
TL Test Opening	14 ft wide by 10 ft high	Vibration break between source and receive rooms.

Appendix B

Complete Test Results

Architectural Testing

SOUND TRANSMISSION LOSS

ASTM E90

ATI No.	71962.01A	**Date**	04/24/07
Client	MI Windows and Doors, Inc.		
Specimen	Series/Model: 188/3188, horizontal sliding window with 5/16" laminated, Glass temperature 75F		
Specimen Area	24.00 Sq Ft		
Filler Area	116.00 Sq Ft		
Operator	Kurt A. Golden		

	Bkgrd	Absorp	Source	Receive	Filler	Specimen
Temp F	77.5	77.5	75.9	77.5	71.8	77.1
RH %	62.3	62.3	58.3	62.2	62.9	61.3

Freq (Hz)	Bkgrd SPL (dB)	Absorp (Sabines /Sq Ft)	Source SPL (dB)	Receive SPL (dB)	Filler TL (dB)	Specimen TL (dB)	95% Conf Limit	No. of Defici-encies	Trans Coef Diff
80	39.1	56.2	86.1	60.4	36.1	23	2.32	0	7.3
100	39.8	58.2	89.0	64.5	39.3	21	3.28	0	11.8
125	39.6	50.4	92.9	64.5	45.7	25	2.04	0	13.6
160	43.5	52.1	95.0	67.1	45.8	25	1.10	0	14.3
200	44.6	52.4	98.9	70.3	48.9	25	0.46	0	16.8
250	40.1	56.2	100.0	72.2	51.4	24	0.94	1	20.4
315	37.8	61.3	98.2	68.2	54.0	26	0.52	2	21.3
400	36.0	59.6	98.6	67.4	57.4	27	0.60	4	23.2
500	32.7	64.5	100.2	68.1	60.4	28	0.35	4	25.7
630	26.4	61.6	102.2	69.3	65.4	29	0.39	4	29.9
800	26.9	65.9	102.0	68.0	66.4	30	0.25	4	30.0
1000	23.8	64.6	101.9	65.5	72.1	32	0.20	3	33.1
1250	23.9	69.3	105.7	66.7	77.8	34	0.22	2	36.7
1600	18.9	69.8	111.7	73.0	82.9	34	0.25	2	42.0
2000	14.8	76.3	107.1	69.1	82.2	33	0.34	3	42.4
2500	7.0	86.7	105.7	66.0	77.7	34	0.18	2	36.7
3150	7.9	103.0	107.0	64.9	80.1	36	0.25	0	37.5
4000	7.0	125.2	105.7	62.3	82.2	36	0.25	0	39.0
5000	7.3	166.1	104.2	58.1	80.8	38	0.42	0	36.3

STC Rating = **32** *(Sound Transmission Class)*
Deficiencies = **31** *(Number of deficiencies versus contour curve)*
OITC Rating = **28** *(Outdoor/Indoor Transmission Class)*

Note: *The acoustical chambers are qualified for measurements down to 80 hertz. Data reported below 80 hertz is for reference only.*

NVLAP LAB CODE 200361

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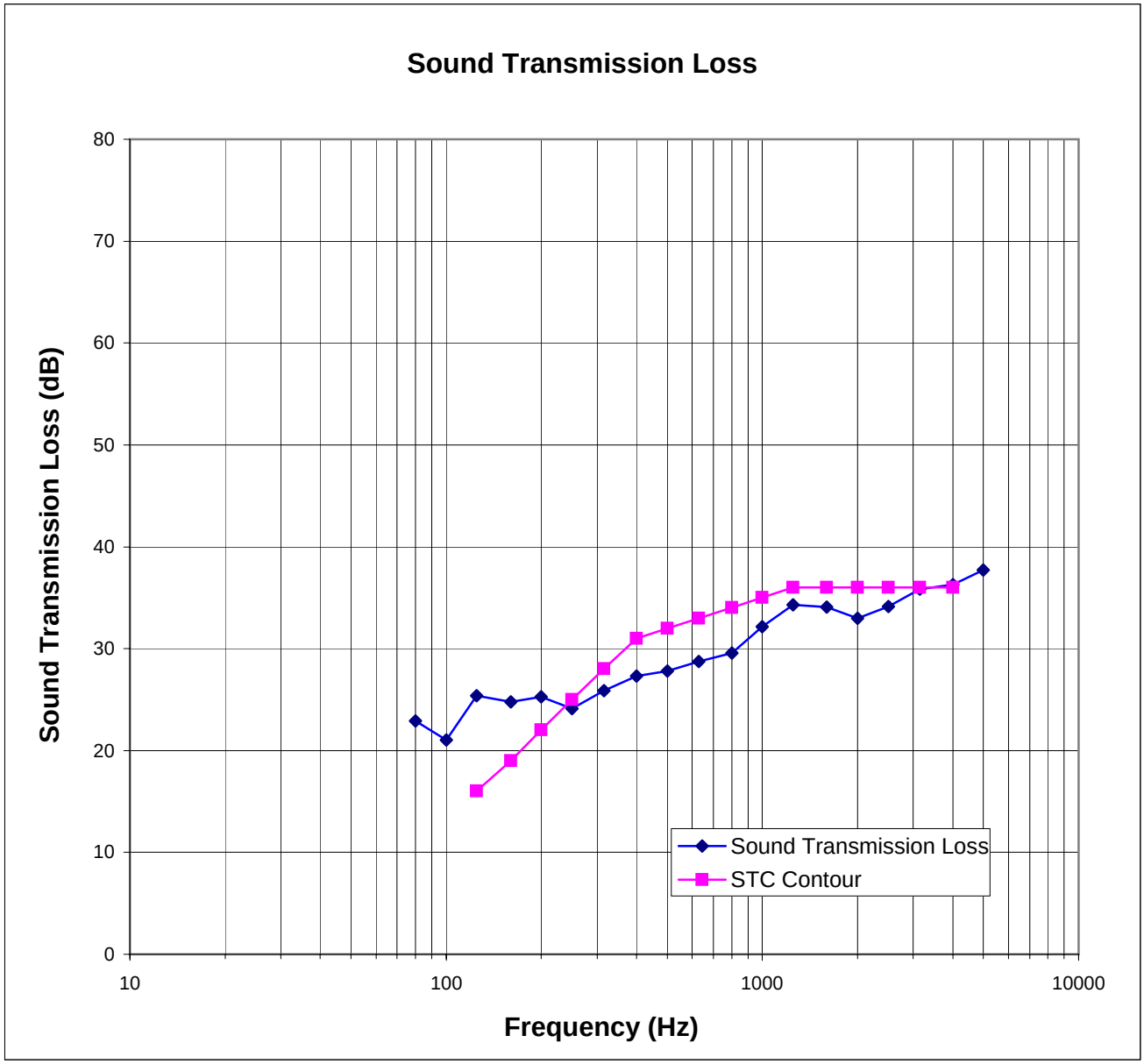
Architectural Testing

ATI No.	71962.01A	**Date**	04/24/07
Client	MI Windows and Doors, Inc.		
Specimen	Series/Model: 188/3188, horizontal sliding window with 5/16" laminated, Glass temperature 75F		
Specimen Area	24.00 Sq Ft		
Filler Area	116.00 Sq Ft		
Operator	Kurt A. Golden		



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SOUND TRANSMISSION LOSS

ASTM E90

ATI No.	71962.01B	**Date**	04/24/07
Client	MI Windows and Doors, Inc.		
Specimen	Series/Model: 188/3188, horizontal sliding window with 5/8" IG (1/8" annealed exterior, 1/4" air space, 1/4" laminated interior) Glass temperature 75F		
Specimen Area	24.00 Sq Ft		
Filler Area	116.00 Sq Ft		
Operator	Kurt A. Golden		

	Bkgrd	Absorp	Source	Receive	Filler	Specimen
Temp F	77.6	77.6	76.5	77.6	71.8	77.3
RH %	62.1	62.1	60.9	62.0	62.9	61.7

Freq (Hz)	Bkgrd SPL (dB)	Absorp (Sabines /Sq Ft)	Source SPL (dB)	Receive SPL (dB)	Filler TL (dB)	Specimen TL (dB)	95% Conf Limit	No. of Defici-encies	Trans Coef Diff
80	44.2	52.0	87.8	60.2	36.1	26	2.47	0	5.0
100	40.0	51.7	90.4	65.9	39.3	21	3.45	0	11.4
125	39.5	51.8	94.4	65.1	45.7	26	2.02	0	12.9
160	45.3	51.4	96.1	68.4	45.8	25	1.22	0	14.5
200	45.7	51.0	100.1	72.6	48.9	24	0.72	0	17.8
250	37.1	53.8	101.1	74.1	51.4	23	1.06	2	21.1
315	35.9	64.9	99.0	72.0	54.0	23	0.68	5	24.5
400	35.1	65.4	99.3	70.6	57.4	24	0.73	7	26.3
500	32.5	67.3	100.8	69.9	60.4	26	0.53	6	27.2
630	25.8	61.6	102.7	70.3	65.4	28	0.41	5	30.3
800	26.4	62.6	102.7	68.6	66.4	30	0.38	4	29.7
1000	23.1	66.2	102.4	65.4	72.1	33	0.29	2	32.6
1250	23.4	70.9	106.1	65.5	77.8	36	0.36	0	35.1
1600	18.2	72.3	112.1	70.7	82.9	37	0.37	0	39.4
2000	14.1	75.4	107.4	66.0	82.2	37	0.23	0	38.8
2500	6.6	87.4	105.8	61.6	77.7	39	0.21	0	32.3
3150	7.5	103.6	106.9	62.2	80.1	38	0.22	0	34.9
4000	6.8	126.6	105.9	62.1	82.2	37	0.28	0	38.8
5000	7.1	164.8	104.4	58.5	80.8	37	0.33	0	36.5

STC Rating = **32** *(Sound Transmission Class)*
Deficiencies = **31** *(Number of deficiencies versus contour curve)*
OITC Rating = **28** *(Outdoor/Indoor Transmission Class)*

Note: *The acoustical chambers are qualified for measurements down to 80 hertz. Data reported below 80 hertz is for reference only.*

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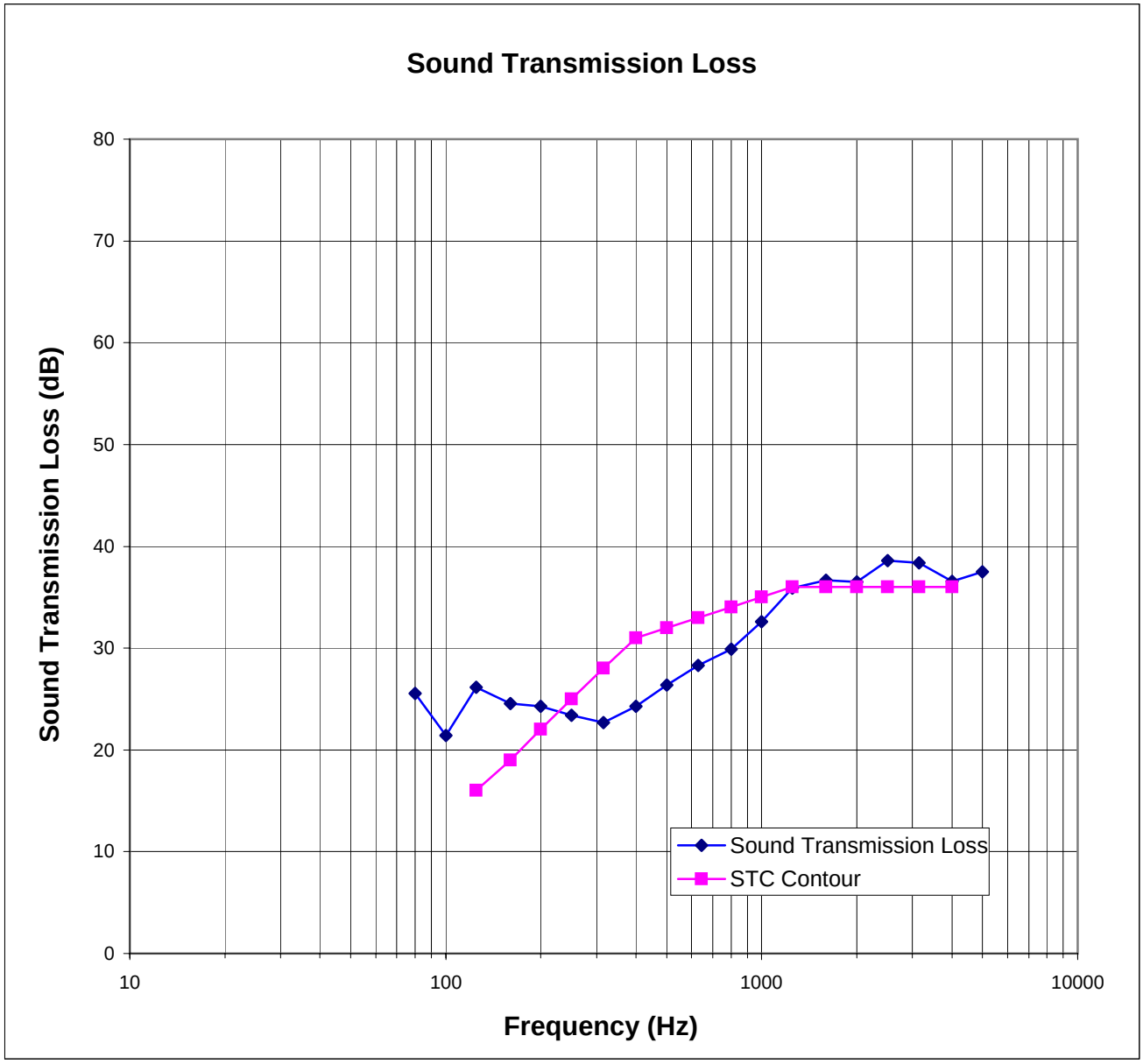
ATI No.	71962.01B	**Date**	04/24/07
Client	MI Windows and Doors, Inc.		
Specimen	Series/Model: 188/3188, horizontal sliding window with 5/8" IG (1/8" annealed exterior, 1/4" air space, 1/4" laminated interior) Glass temperature 75F		
Specimen Area	24.00 Sq Ft		
Filler Area	116.00 Sq Ft		
Operator	Kurt A. Golden		



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AAMA 1801 Data Sheets

ATI Job Number :	71962.01A
Client Name :	MI Windows and Doors, Inc.
Test Date :	4/24/2007
Tests Performed by:	Kurt Golden
Specimen Type :	Horizontal Sliding Window
Series/Model Number :	188/3188
Sample Size :	72" by 48"

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Air Leakage per ASTM test method ASTM E283

Total Air flow (ft^3/min) :	9.00		
Extraneous Leakage (ft3/min) :	6.25		
Temperature (^oF) at Specimen:	75		
Barometric Pressure at Specimen (in mbar):	1014	(Inches of Hg) :	29.94
Specimen Area in square feet :	24.00		
Density of air at reference standard conditions (lb/ft^3)	0.075		

Total air flow w/ air density correction (ft3/min)	Extraneous leakage with air density correction (ft3/min)	Air leakage through the specimen with air density correction (ft3/min)	Rate of air leakage per unit area (ft3/min)/sq.ft.
8.953	6.217	2.736	0.11

ATI Job Number : 71962.01A
Client Name : MI Windows and Doors, Inc.
Test Date : 39196
Tests Performed by: Kurt Golden
Specimen Type : Horizontal Sliding Window
Series/Model Number : 188/3188
Sample Size : 72" by 48"

Operating Force per ASTM test method E2068 Method B - Force Gauge

Active Sash

Trial No.	Opening Breakaway	Opening In-Motion	Closing Breakaway	Closing In-Motion
1	9	6	8	6
2	9	6	8	6
3	9	6	8	6

3 Trial Ave.	9.00	6.00	8.00	6.00
10% of 3 trial avg	0.9	0.6	0.8	0.6
8 Trial Average w/o high & low	9.0	6.0	8.0	6.0

AAMA 1801 Data Sheets

ATI Job Number :	71962.01B
Client Name :	MI Windows and Doors, Inc.
Test Date :	4/24/2007
Tests Performed by:	Kurt Golden
Specimen Type :	Horizontal Sliding Window
Series/Model Number :	188/3188
Sample Size :	72" by 48"

Architectural Testing

Air Leakage per ASTM test method ASTM E283

Total Air flow (ft^3/min) :	8.50		
Extraneous Leakage (ft3/min) :	6.50		
Temperature (^oF) at Specimen:	75		
Barometric Pressure at Specimen (in mbar):		1014	(Inches of Hg) : 29.94
Specimen Area in square feet :	24.00		
Density of air at reference standard conditions (lb/ft^3)	0.075		

Total air flow w/ air density correction (ft3/min)	Extraneous leakage with air density correction (ft3/min)	Air leakage through the specimen with air density correction (ft3/min)	Rate of air leakage per unit area (ft3/min)/sq.ft.
8.455	6.466	1.990	0.08

ATI Job Number : 71962.01B
Client Name : MI Windows and Doors, Inc.
Test Date : 39196
Tests Performed by: Kurt Golden
Specimen Type : Horizontal Sliding Window
Series/Model Number : 188/3188
Sample Size : 72" by 48"

Operating Force per ASTM test method E2068 Method B - Force Gauge

Active Sash

Trial No.	Opening Breakaway	Opening In-Motion	Closing Breakaway	Closing In-Motion
1	10	8	9	8
2	10	8	9	8
3	10	8	9	8

3 Trial Ave.	10.00	8.00	9.00	8.00
10% of 3 trial avg	1.0	0.8	0.9	0.8
8 Trial Average w/o high & low	10.0	8.0	9.0	8.0

Appendix C

Photographs

Receive Room View of Installed Specimen

Source Room View of Installed Specimen