F3232.01-113-11-R0
ACOUSTICAL PERFORMANCE TEST REPORT
ASTM E90

Rendered to:

MI WINDOWS AND DOORS, LLC

Series/Model: 1685

Type: Horizontal Sliding Window

Summary of Test Results			
Data File No.	**Glazing (Nominal Dimensions)**	**STC**	**OITC**
F3232.01A	3/4" IG (1/8" annealed, 1/2" air space, 1/8" annealed)	29	24
F3232.01B	7/8" IG (3/32" annealed, 19/64" air space, 3/32" annealed, 19/64" air space, 3/32" annealed)	28	23
F3232.01C	7/8" IG (1/8" annealed, 9/16" air space, 3/16" annealed)	32	27

Reference should be made to Intertek-ATI Report No. F3232.01-113-11 for complete test specimen description. This page alone is not a complete report. Flanking limit tests and reference specimen tests are available upon request.

Acoustical Performance Test Report

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

Report No	F3232.01-113-11
Test Date	11/24/15
Report Date	12/11/15

Project Scope
Architectural Testing, Inc., an Intertek company ("Intertek-ATI"), was contracted to conduct a sound transmission loss test. The complete test data is included as Appendix B of this report. The client provided the test specimen.

Test Methods
Testing for this project was conducted in accordance with the following standards. The equipment listed in the attachments meets the requirements of the following standards.

ASTM E90-09, *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements*
ASTM E413-10, Classification for Rating Sound Insulation
ASTM E1332-10a, *Standard Classification for Rating Outdoor-Indoor Sound Attenuation*
ASTM E2235-04 (2012), *Standard Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods*

Test Procedure
All measurements were conducted in the HT test chambers at Intertek-ATI located in York, Pennsylvania. The sensitivity of the microphones was checked before measurements were conducted.

The transmission loss values were obtained for a single direction of measurement. Two background noise sound pressure level and five sound absorption measurements were conducted at each of five microphone positions.

Two sound pressure levels were made simultaneously in the receive and source rooms at each of five microphone positions.

The air temperature and relative humidity conditions were monitored and recorded during all measurements.

Specimen Installation
A sound transmission loss test was initially performed on a filler wall.

The specimen plug was removed from the filler wall assembly. A filler wall-reducing element was used to adjust the test opening size to accommodate the test specimen. The reducing element consisted of a double 2x4 wood stud wall construction with three layers of 5/8" drywall on both sides. The stud cavities in the wall were insulated with two layers of R-13 fiberglass insulation. The specimen was placed in the custom test opening. Duct seal was used to seal the perimeter of the specimen to the test opening on both sides. The interior side of the specimen, when installed, was approximately 1/4" from being flush with the receive room side of the filler wall. A stethoscope was used to check for any abnormal air leaks around the test specimen prior to testing. Operable portions of the test specimen, if any, were cycled at least five times prior to testing.

Test Calculations
Transmission loss (TL) at each 1/3 octave frequency is the average source room sound pressure level minus the average receive room sound pressure level, plus, 10 times the log of the specimen area divided by the sound absorption of the receive room with the sample in place.

STC Rating
To obtain the Sound Transmission Class (STC), read the TL of the contour curve at 500 Hz. The sum of the deficiencies below the contour curve must not exceed 32. The maximum deficiency at any one frequency must not exceed 8.

OITC Rating
The Outdoor-Indoor Transmission Class (OITC) is calculated by subtracting the logarithmic summation of the TL values from the logarithmic summation of the A-weighted transportation noise spectrum stated in ASTM E1332.

Specimen Descriptions

		Frame	Interior Panel	Exterior Panel
Size		59" by 47.125"	28.75" by 43.75"	28.75" by 43.75"
Thickness		4"	1.25"	1.5"
	Corners	Mitered	Mitered	Mitered
	Fasteners	Welds	Welds	Welds
	Seal Method	N/A	N/A	N/A
Material		Vinyl	Vinyl	Vinyl
	Reinforcement	N/A	Fiberglass in lock stile	N/A
	Thermal Break Material	N/A	N/A	N/A
Daylight Opening Size		N/A	25.25" by 40.125"	25.25" by 40.125"

Option A

Measured Overall Insulation Glass Unit Thickness	0.738"
Spacer Type	Duralite/P1-S

	Exterior Sheet	Gap	Interior Sheet
Measured Thickness	0.121"	0.491"	0.126"
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-Not Applicable*

Specimen Descriptions (Continued)

Option B

Measured Overall Insulation Glass Unit Thickness	0.879"
Spacer Type	Duralite/P1-S

	Exterior Sheet	Gap	Center Sheet	Gap	Interior Sheet
Measured Thickness	0.086"	0.308"	0.096"	0.305"	0.084"
Muntin Pattern	N/A	N/A	N/A	N/A	N/A
Material	Annealed	Air*	Annealed	Air*	Annealed
Laminate Material	N/A	N/A	N/A	N/A	N/A

Glazing Method	Exterior
Glazing Material	Silicone
Glazing Bead Material	Vinyl

Option C

Measured Overall Insulation Glass Unit Thickness	0.856"
Spacer Type	Duralite/P1-S

	Exterior Sheet	Gap	Interior Sheet
Measured Thickness	0.116"	0.560"	0.180"
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-Not Applicable*

Specimen Descriptions (Continued)

Components

Type	Quantity	Location
Weatherstrip		
0.125" Polypile with center fin	3 Rows	Frame perimeter
0.50" Co-extruded kerf mounted foam-filled leaf gasket	1 Row	Jamb stiles
0.25" Polypile with center fin	2 Rows	Top and bottom rails
0.125" Polypile with center fin	1 Row	Keeper rail
0.25" Polypile with center fin	1 Row	Lock rail
0.75" by 1" Polypile pad	1	Corner of lock rail and bottom rail
Hardware		
Lock	2	Lock rail
Keeper	2	Keeper rail
Roller wheel assembly	2	Bottom rail
Drainage		
1" by 0.125" Weep slot with cover	2	Sill

Test Option	**Total Weight** (lbs)	**Average Weight** (lbs/ft^2)
A	78	4.02
B	82	4.23
C	89	4.59

Comments

The client did not supply a report drawing of the test specimen. Intertek-ATI will store samples of test specimens for four years.

Intertek-ATI 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 Intertek-ATI for the entire test record retention period. The test record retention period ends four years after the test date.

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 is intended to help in the client's quality assurance program, but it does not represent a continuous or exhaustive evaluation of the specimen tested or of other products or materials that were not evaluated. The statements and data provided herein do not constitute approval, disapproval, certification, or acceptance of performance or materials.

For INTERTEK-ATI:

Digitally Signed by: Sean Close

Sean G Close
Technician - Acoustical Testing

Digitally Signed by: Todd D. Kister

Todd D. Kister
Laboratory Supervisor – Acoustical Testing

SGC:jmcs

Attachments (pages): This report is complete only when all attachments listed are included.

- Appendix A: Equipment description (1)
- Appendix B: Complete test results (6)
- Appendix C: Photographs (1)

Revision Log

Rev. #	Date	Page(s)	Revision(s)
R0	12/11/15	N/A	Original Report Issue

Appendix A

Instrumentation:

Instrument	Manufacturer	Model	Description	ATI Number	Date of Calibration
Data Acquisition Unit	National Instruments	PXI-1033	Data Acquisition card	65127	04/14 *
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	65586	02/15
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	65617	05/15
Source Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	65320	08/15
Source Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64340	07/15
Source Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifer	65319	10/15
Receive Room Microphone	PBC Piezotronics	378B20	Microphone and Preamplifier	64907	12/15
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64908	12/15
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64909	12/15
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	65318	10/15
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64911	12/15
Receive Room Environmental Indicator	Comet	T7510	Receive Room	64915	02/15
Source Room Environmental Indicator	Comet	T7510	Source Room	64914	02/15
Microphone Calibrator	Norsonic	1251	Pistonphone Calibrator	65105	04/15

**- 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-Not Applicable

Appendix B

Complete Test Results

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AIRBORNE SOUND TRANSMISSION LOSS

ASTM E 90

Test Date	11/24/15					
Data File No.	F3232.01A					
Client	MI Windows and Doors, LLC					
Description	Series/Model: 1685, Horizontal sliding window with 3/4" IG (1/8" annealed, 1/2" air space, 1/8" annealed)					
Specimen Area	1.80 m²	Receive Temp.	20.2 °C		Source Temp.	20.3 °C
Technician	Sean G. Close	Receive Humidity	53%		Source Humidity	51%

Freq (Hz)	**Background SPL** (dB)	**Absorption** (m²)	**Source SPL** (dB)	**Receive SPL** (dB)	**Specimen TL** (dB)	**95% Confidence Limit**	**Number of Deficiencies**
80	38.1	4.1	104	81	19.8	2.09	-
100	34.1	4.9	104	77	22.3	1.74	-
125	38.1	5.5	104	80	19.7	1.28	0
160	42.4	5.1	105	76	24.1	0.92	0
200	41.1	5.3	106	80	21.3	0.88	0
250	35.3	5.8	105	85	14.8	0.79	7
315	28.7	6.1	98	76	17.2	0.41	8
400	23.7	6.4	96	68	21.8	0.40	6
500	19.2	6.7	96	63	28.2	0.25	1
630	17.6	6.3	101	65	30.1	0.40	0
800	16.3	6.5	100	61	33.0	0.33	0
1000	11.6	6.6	96	57	34.3	0.16	0
1250	10.0	7.1	97	56	35.4	0.17	0
1600	8.0	7.5	102	60	35.2	0.32	0
2000	5.9	8.0	95	53	35.0	0.19	0
2500	5.7	9.0	93	51	34.3	0.21	0
3150	5.8	10.7	94	54	32.2	0.18	1
4000	6.7	13.2	94	57	28.5	0.25	5
5000	7.5	16.6	92	51	31.4	0.23	-

STC Rating	**29**	*(Sound Transmission Class)*
Deficiencies	28	*(Sum of Deficiencies)*
OITC Rating	**24**	*(Outdoor-Indoor Transmission Class)*

Notes: *1) Receive Room levels less than 5 dB above the Background levels are highlighted in yellow.*
2) Specimen TL levels listed in red indicate the lower limit of the transmission loss.
3) Specimen TL levels listed in green indicate that there has been a filler wall correction applied

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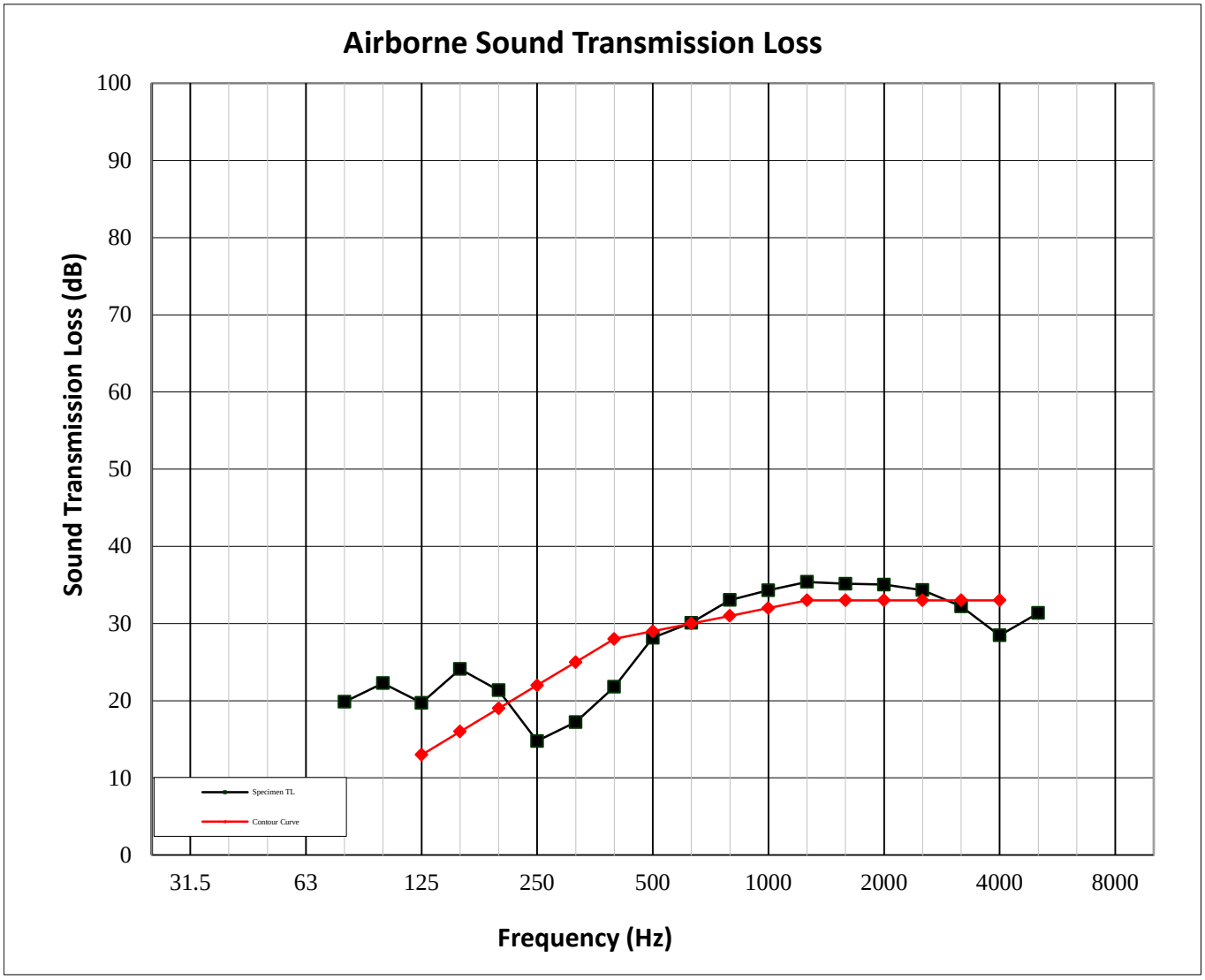
AIRBORNE SOUND TRANSMISSION LOSS

ASTM E 90

Test Date	11/24/15					
Data File No.	F3232.01A					
Client	MI Windows and Doors, LLC					
Description	Series/Model: 1685, Horizontal sliding window with 3/4" IG (1/8" annealed, 1/2" air space, 1/8" annealed)					
Specimen Area	1.80 m²	Receive Temp.	20.2 °C		Source Temp.	20.3 °C
Technician	Sean G. Close	Receive Humidity	53%		Source Humidity	51%



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AIRBORNE SOUND TRANSMISSION LOSS

ASTM E 90

Test Date	11/24/15					
Data File No.	F3232.01B					
Client	MI Windows and Doors, LLC					
Description	Series/Model: 1685, Horizontal sliding window with 7/8" IG (3/32" annealed, 19/64" air space, 3/32" annealed, 19/64" air space, 3/32" annealed)					
Specimen Area	1.80 m²	Receive Temp.	20.2 °C		Source Temp.	20.3 °C
Technician	Sean G. Close	Receive Humidity	53%		Source Humidity	51%

Freq (Hz)	Background SPL (dB)	Absorption (m²)	Source SPL (dB)	Receive SPL (dB)	Specimen TL (dB)	95% Confidence Limit	Number of Deficiencies
80	36.3	4.2	104	80	20.1	2.18	-
100	33.5	4.8	104	77	22.3	1.89	-
125	38.2	5.8	104	77	21.6	1.28	0
160	42.6	4.6	104	76	24.0	1.09	0
200	41.2	4.9	106	82	19.4	0.87	0
250	35.5	5.6	105	83	17.2	0.71	4
315	28.6	6.1	98	77	16.3	0.59	8
400	24.1	6.8	96	71	18.7	0.47	8
500	20.1	6.7	96	66	24.4	0.25	4
630	17.9	6.3	101	68	27.2	0.37	2
800	16.2	6.6	100	64	30.2	0.35	0
1000	11.8	6.7	96	58	33.0	0.19	0
1250	9.3	7.2	97	56	35.1	0.15	0
1600	8.0	7.5	102	60	35.3	0.28	0
2000	5.9	8.0	95	53	35.2	0.15	0
2500	5.6	9.1	93	52	33.6	0.20	0
3150	5.8	10.8	94	53	33.1	0.14	0
4000	6.6	13.4	94	51	33.6	0.28	0
5000	7.3	17.3	92	49	33.1	0.23	-

STC Rating **28** *(Sound Transmission Class)*

Deficiencies 26 *(Sum of Deficiencies)*

OITC Rating **23** *(Outdoor-Indoor Transmission Class)*

Notes: *1) Receive Room levels less than 5 dB above the Background levels are highlighted in yellow.*
2) Specimen TL levels listed in red indicate the lower limit of the transmission loss.
3) Specimen TL levels listed in green indicate that there has been a filler wall correction applied

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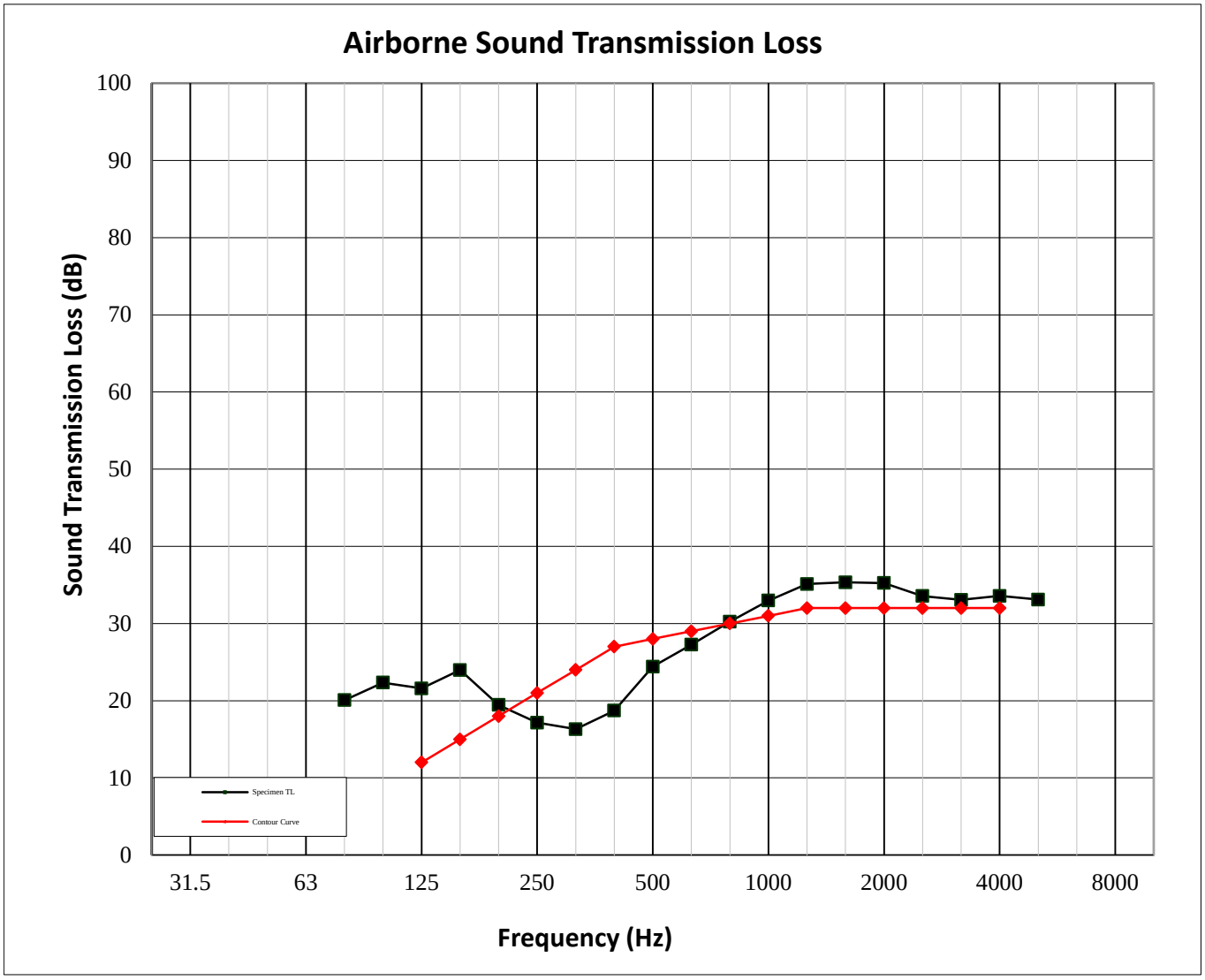
AIRBORNE SOUND TRANSMISSION LOSS

ASTM E 90

Test Date	11/24/15					
Data File No.	F3232.01B					
Client	MI Windows and Doors, LLC					
Description	Series/Model: 1685, Horizontal sliding window with 7/8" IG (3/32" annealed, 19/64" air space, 3/32" annealed, 19/64" air space, 3/32" annealed)					
Specimen Area	1.80 m²	Receive Temp.	20.2 °C		Source Temp.	20.3 °C
Technician	Sean G. Close	Receive Humidity	53%		Source Humidity	51%



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AIRBORNE SOUND TRANSMISSION LOSS

ASTM E 90

Test Date	11/24/15					
Data File No.	F3232.01C					
Client	MI Windows and Doors, LLC					
Description	Series/Model: 1685, Horizontal sliding window with 7/8" IG (1/8" annealed, 9/16" air space, 3/16" annealed)					
Specimen Area	1.80 m²	Receive Temp.	20.2 °C		Source Temp.	20.3 °C
Technician	Sean G. Close	Receive Humidity	53%		Source Humidity	51%

Freq (Hz)	Background SPL (dB)	Absorption (m²)	Source SPL (dB)	Receive SPL (dB)	Specimen TL (dB)	95% Confidence Limit	Number of Deficiencies
80	37.4	4.0	104	79	21.7	2.03	-
100	35.0	4.7	104	78	21.9	1.96	-
125	38.9	5.2	104	79	20.6	1.42	0
160	42.3	4.8	104	76	23.4	0.78	0
200	40.9	5.1	106	80	21.2	0.83	1
250	35.3	5.8	105	81	19.2	0.68	6
315	28.3	6.1	98	70	23.1	0.38	5
400	24.0	6.4	96	62	27.7	0.35	3
500	19.9	6.5	96	59	31.5	0.23	0
630	18.1	6.2	101	60	35.0	0.39	0
800	16.6	6.4	100	59	35.8	0.31	0
1000	12.1	6.7	96	54	36.7	0.14	0
1250	9.8	7.1	97	56	35.5	0.17	0
1600	8.1	7.5	102	60	35.2	0.26	1
2000	5.8	8.1	95	54	34.6	0.21	1
2500	5.7	9.2	93	52	33.1	0.21	3
3150	5.8	11.1	94	55	31.9	0.16	4
4000	6.6	13.9	94	53	31.3	0.25	5
5000	7.3	17.7	92	49	33.4	0.25	-

STC Rating	**32**	*(Sound Transmission Class)*
Deficiencies	29	*(Sum of Deficiencies)*
OITC Rating	**27**	*(Outdoor-Indoor Transmission Class)*

Notes: *1) Receive Room levels less than 5 dB above the Background levels are highlighted in yellow.*
2) Specimen TL levels listed in red indicate the lower limit of the transmission loss.
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AIRBORNE SOUND TRANSMISSION LOSS

ASTM E 90

Test Date	11/24/15						
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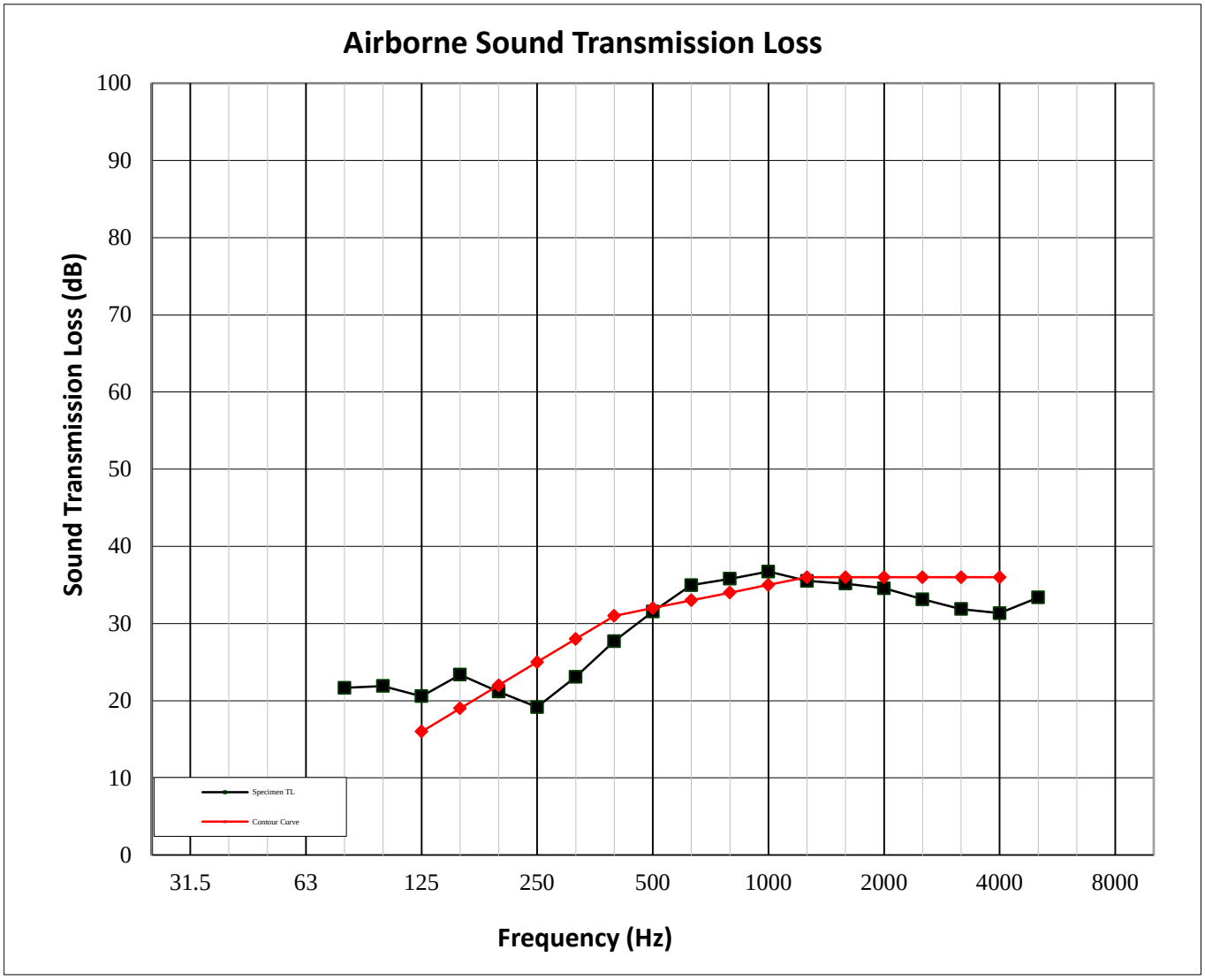
Client	MI Windows and Doors, LLC						
Description	Series/Model: 1685, Horizontal sliding window with 7/8" IG (1/8" annealed, 9/16" air space, 3/16" annealed)						
Specimen Area	1.80 m²	Receive Temp.	20.2 °C		Source Temp.	20.3 °C	
Technician	Sean G. Close	Receive Humidity	53%		Source Humidity	51%	



Appendix C

Photographs

Receive Room View of Installed Specimen

Source Room View of Installed Specimen