

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

Rendered to:

MI WINDOWS AND DOORS, INC.

SERIES/MODEL: EC-147

**This product also is labeled under the following names:
Series HM-III 147 and BB-147**

TYPE: Casement Window

Summary of Test Results			
Data File No.	Glazing Option (Nominal Dimensions)	STC	OITC
C6463.01A	1-1/8" IG (1/8" annealed exterior, 13/16" air space, 3/16" annealed interior)	35	27
C6463.01B	1-1/8" IG (2.7 mm / 0.030" Solutia Q series / 2.7 mm laminated exterior, 11/16" air space, 3/16" annealed interior), Glass temperature 75°F	38	30

Reference should be made to Architectural Testing, Inc. Report No. C6463.01-113-11 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: C6463.01-113-11
Test Date: 03/07/13
Report Date: 04/15/13
Record Retention End Date: 04/15/17

Test Sample Identification:

Series/Model: EC-147

Type: Casement Window

Overall Size: 23-5/8" by 59"

Glazing (Nominal Dimensions):

Option A: 1-1/8" IG (1/8" Annealed Exterior, 13/16" Air Space, 3/16" Annealed Interior)

Option B: 1-1/8" IG (2.7 mm / 0.030" Solutia Q Series / 2.7 mm Laminated Exterior, 11/16" Air Space, 3/16" Annealed 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 EC-147, casement 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 samples were 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 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 24-1/8" 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 vent 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 tests were 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:

	Frame
Size	23-5/8" by 59"
Thickness	3-1/4"
Corners	Mitered
Fasteners	Welds
Seal Method	None
Material	Vinyl
Reinforcement	Aluminum / Head and sill*
Thermal Break Material	N/A

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

Sample Descriptions: (Continued)

Vent Construction:

		Vent
Size		21-5/8" by 57"
Thickness		2-1/4"
Corners		Mitered
	Fasteners	Welds
	Seal Method	None
Material		Vinyl
	Reinforcement	Aluminum / Bottom and top rail*
	Thermal Break Material	N/A
Daylight Opening Size		16-3/4" by 52-1/8"

Vent Glazing Option A:

Measured Overall Insulation Glass Unit Thickness	1.118"
Spacer Type	Silicone foam (Premium Enhanced)*

	Exterior Sheet	Gap	Interior Sheet
Measured Thickness	0.115"	0.822"	0.181"
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	Double-sided adhesive foam tape
Glazing Bead Material	Vinyl

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

Sample Descriptions: (Continued)

Vent Glazing Option B:

Measured Overall Insulation Glass Unit Thickness	1.104"
Spacer Type	Silicone foam (Premium Enhanced)*

	Exterior Sheet	Gap	Interior Sheet
Measured Thickness	0.105", 0.026", 0.105" (2.67 mm, 0.66 mm, 2.67 mm)	0.687"	0.181"
Muntin Pattern	N/A	N/A	N/A
Material	Laminated	Air*	Annealed
Laminate Material	Solutia Q series*	N/A	N/A

Glazing Method	Exterior
Glazing Material	Double-sided adhesive foam tape
Glazing Bead Material	Vinyl

Components:

	TYPE	QUANTITY	LOCATION
Weatherstrip			
	1/4" Diameter foam-filled bulb gasket	2 Rows	Frame perimeter
	0.187" by 0.310" Polypile	1 Row	Vent perimeter
Hardware			
	Roto-crank operating system	1	Sill
	Multi-point locking system	1	Lock jamb
	Keeper	3	Keeper stile
	Multi-point hinge	2	Head and sill
	Snubber set	1	Hinge jamb
Drainage			
	1" by 1/4" Weep slot with cover	2	Bottom rail

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

Comments: The total weight of the sample with glazing Option A was 50 lbs. The total weight of the sample with glazing Option B was 60 lbs. The client did not supply drawings on the Series/Model EC-147, casement 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 EC-147, casement window is listed below.

Summary of Test Results			
Data File No.	Glazing Option (Nominal Dimensions)	STC	OITC
C6463.01A	1-1/8" IG (1/8" annealed exterior, 13/16" air space, 3/16" annealed interior)	35	27
C6463.01B	1-1/8" IG (2.7 mm / 0.030" Solutia Q series / 2.7 mm laminated exterior, 11/16" air space, 3/16" annealed interior), Glass temperature 75°F	38	30

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:

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 (4)

Appendix-C: Photographs (1)

Revision Log

<u>Rev. #</u>	<u>Date</u>	<u>Page(s)</u>	<u>Revision(s)</u>
0	04/15/13	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	07/11 *
Data Acquisition Unit	Agilent	34970A	Data Acquisition Unit	62211	07/12
Receive Room Microphone	GRAS	40 AR	1/2" Microphone	Y003246	08/12
Source Room Microphone	GRAS	40 AR	1/2" Microphone	Y003245	08/12
Receive Room Preamplifier	GRAS	26 AK	1/2" Preamplifier	Y003249	08/12
Source Room Preamplifier	GRAS	26 AK	1/2" Preamplifier	Y003248	08/12
Microphone Calibrator	Bruel & Kjaer	Type 4228	Pistonphone Calibrator	Y002816	02/13
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	HMW60Y	Temperature and Humidity Sensor	005066	09/12
Source Room Environmental Indicator	Vaisala	HMW60Y	Temperature and Humidity Sensor	Y002653	03/12
Weather Station	Davis Instruments	VantagePRO 6150C	Weather Station	Y003257	05/12

*- 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

SOUND TRANSMISSION LOSS
ASTM E 90

Test Date	03/07/13		
ATI No.	C6463.01A		
Client	MI Windows and Doors, Inc.		
Specimen	Series/Model: EC-147, casement window with 1-1/8" IG (1/8" annealed exterior, 13/16" air space, 3/16" annealed interior)		
Operator	Kurt Golden - Craig Fox		
Sample Area	0.90 m ²		
Filler Area	12.09 m ²		
	Source	Receive	Specimen
Temp C	22	21	21
RH %	48	47	47

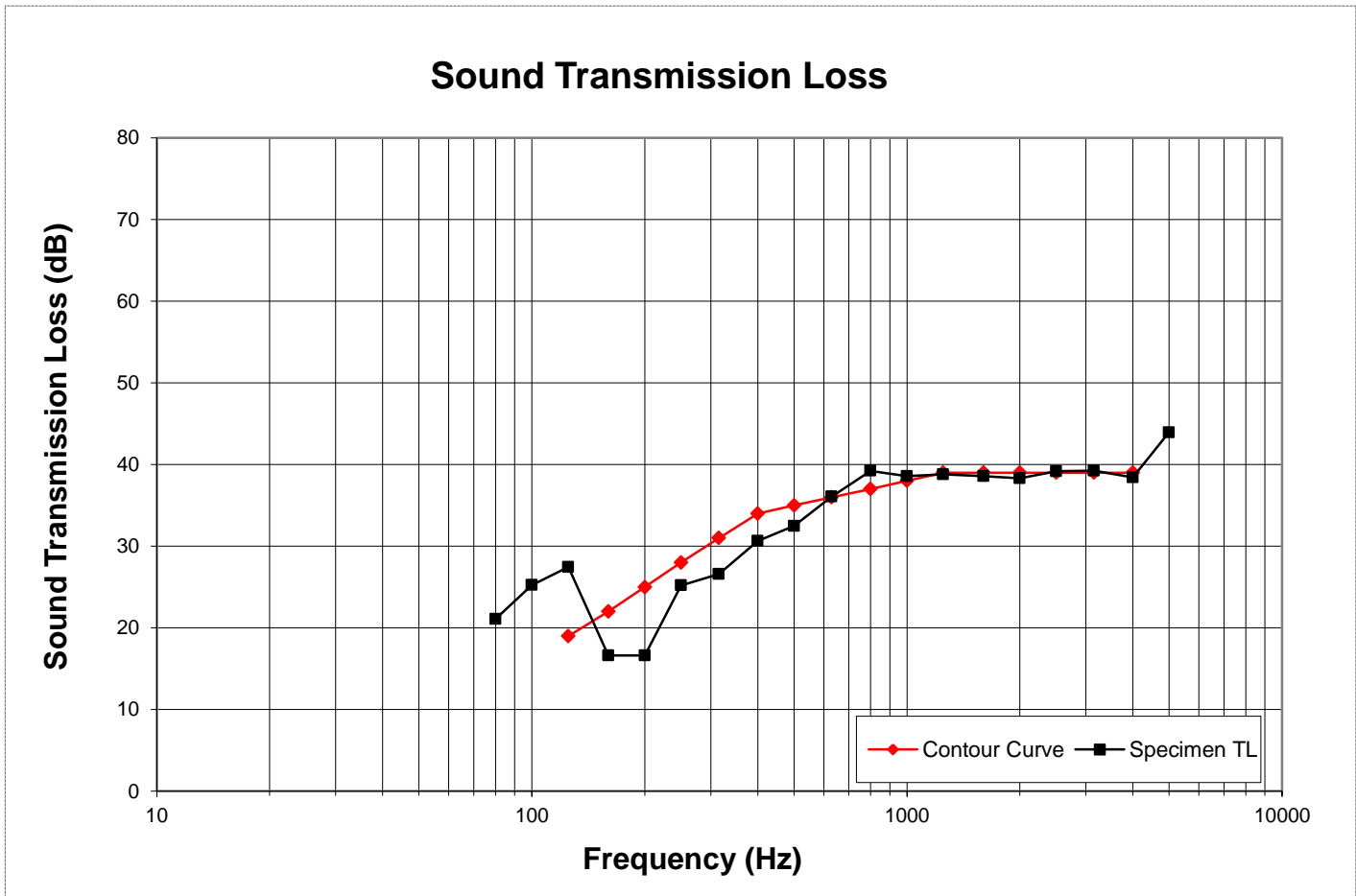
Freq (Hz)	Bkgrd SPL (dB)	Absorp (m ²)	Source SPL (dB)	Receive SPL (dB)	Filler TL (dB)	Specimen TL (dB)	95% Conf Limit	No. of Deficiencies	Trans Coef Diff
80	33	5.5	90	62	36	21	1.3	-	4.5
100	30	5.7	92	59	40	25	3.1	-	4.8
125	30	5.4	96	61	48	27	2.3	0	9.9
160	32	4.4	96	72	47	17	1.5	5	19.5
200	32	4.7	101	78	51	17	1.4	8	22.7
250	30	5.2	102	69	56	25	1.2	3	19.0
315	26	5.7	102	68	59	27	1.0	4	20.8
400	24	5.6	102	64	64	31	1.0	3	22.2
500	21	5.8	103	62	68	32	0.3	3	24.5
630	19	5.4	104	61	72	36	0.3	0	24.9
800	17	5.6	105	58	78	39	0.4	0	27.7
1000	12	6.0	105	58	83	39	0.6	0	32.8
1250	10	6.6	103	56	86	39	0.4	0	35.8
1600	7	6.8	106	59	89	39	0.6	0	38.8
2000	5	7.3	105	58	88	38	0.4	1	38.4
2500	5	8.0	105	56	86	39	0.4	0	35.8
3150	5	9.7	106	57	88	39	0.5	0	37.1
4000	6	11.8	106	56	88	38	0.3	1	38.0
5000	6	15.6	105	49	87	44	0.6	-	31.7

STC Rating **35** *(Sound Transmission Class)*
Deficiencies **28** *(Number of deficiencies versus contour curve)*
OITC Rating **27** *(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.

SOUND TRANSMISSION LOSS
ASTM E 90

Test Date	03/07/13		
ATI No.	C6463.01A		
Client	MI Windows and Doors, Inc.		
Specimen	Series/Model: EC-147, casement window with 1-1/8" IG (1/8" annealed exterior, 13/16" air space, 3/16" annealed interior)		
Operator	Kurt Golden - Craig Fox		
Sample Area	0.90 m ²		
Filler Area	12.09 m ²		
	Source	Receive	Sample
Temp C	22	21	21
RH %	48	47	47



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 deficiencies at any one frequency cannot exceed 8.

SOUND TRANSMISSION LOSS
ASTM E 90

Test Date	03/07/13		
ATI No.	C6463.01B		
Client	MI Windows and Doors, Inc.		
Specimen	Series/Model: EC-147, casement window with 1-1/8" IG (2.7 mm / 0.030" Solutia Q series / 2.7 mm laminated exterior, 11/16" air space, 3/16" annealed interior), Glass temperature 75°F		
Operator	Kurt Golden - Craig Fox		
Sample Area	0.90 m ²		
Filler Area	12.09 m ²		
	Source	Receive	Specimen
Temp C	21	20	21
RH %	45	47	46

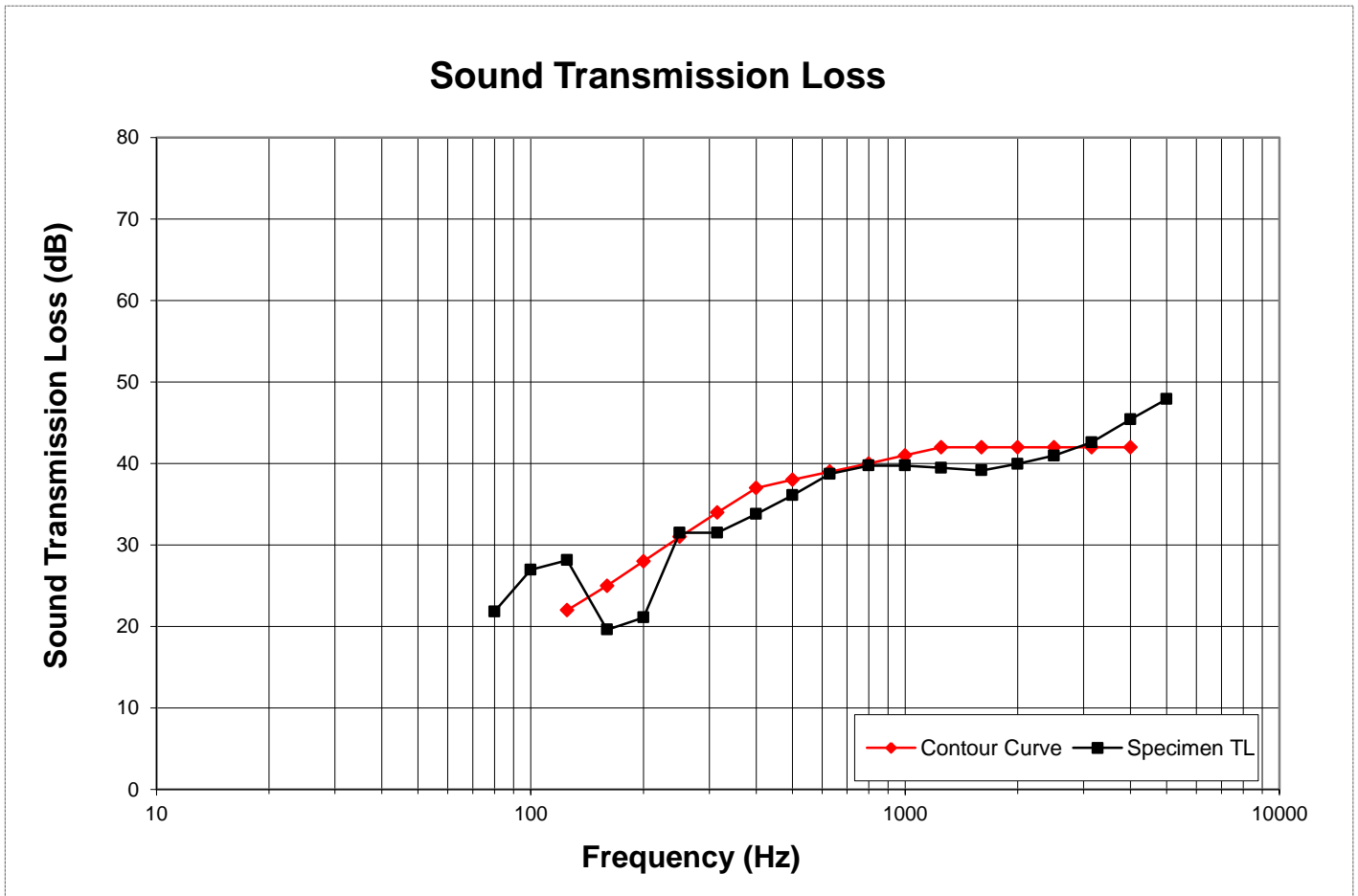
Freq (Hz)	Bkgrd SPL (dB)	Absorp (m ²)	Source SPL (dB)	Receive SPL (dB)	Filler TL (dB)	Specimen TL (dB)	95% Conf Limit	No. of Deficiencies	Trans Coef Diff
80	32	5.4	90	62	36	22	1.8	-	3.8
100	31	5.5	92	59	40	27	3.0	-	3.1
125	32	5.3	96	61	48	28	2.4	0	9.3
160	36	4.7	96	69	47	20	2.1	5	16.5
200	33	4.9	102	73	51	21	1.3	7	18.2
250	30	5.6	102	63	56	32	1.4	0	12.9
315	28	5.6	103	63	59	31	1.4	3	15.9
400	26	5.7	102	61	64	34	0.8	3	19.1
500	22	5.8	103	59	68	36	0.4	2	20.8
630	21	5.6	105	58	72	39	0.4	0	22.3
800	19	5.7	105	58	78	40	0.3	0	27.1
1000	13	5.9	105	57	83	40	0.7	1	31.7
1250	13	6.5	103	55	86	39	0.4	3	35.1
1600	9	6.8	106	58	89	39	0.7	3	38.2
2000	6	7.2	105	56	88	40	0.3	2	36.7
2500	6	8.3	105	54	86	41	0.2	1	34.0
3150	6	9.8	106	53	88	43	0.6	0	33.7
4000	6	12.0	106	49	88	45	0.3	0	31.1
5000	7	15.5	105	45	87	48	0.6	-	27.7

STC Rating **38** *(Sound Transmission Class)*
Deficiencies **30** *(Number of deficiencies versus contour curve)*
OITC Rating **30** *(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.

SOUND TRANSMISSION LOSS
ASTM E 90

Test Date	03/07/13		
ATI No.	C6463.01B		
Client	MI Windows and Doors, Inc.		
Specimen	Series/Model: EC-147, casement window with 1-1/8" IG (2.7 mm / 0.030" Solutia Q series / 2.7 mm laminated exterior, 11/16" air space, 3/16" annealed interior), Glass temperature 75°F		
Operator	Kurt Golden - Craig Fox		
Sample Area	0.90 m ²		
Filler Area	12.09 m ²		
	Source	Receive	Sample
Temp C	21	20	21
RH %	45	47	46



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 deficiencies at any one frequency cannot exceed 8.

Appendix C

Photographs



Receive Room View of Installed Specimen



Source Room View of Installed Specimen