

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

Rendered to:

MI WINDOWS AND DOORS, LLC

SERIES/MODEL: 9770 Polyvinyl Chloride (PVC)

**This product also is labeled under the following names:
9770DSPW, 9770DST, CTCASEDSPW, CTCASEDST,
1675DSPW, 9660DSPW, CTAWN DSPW, 1665DSPW***

TYPE: Fixed (Direct Set) Window

Summary of Test Results			
Data File No.	Glazing Option (Nominal Dimensions)	STC	OITC
D0319.01A	3/4" IG (1/8" annealed, 1/2" air space, 1/8" annealed), (P1-S) Duralite Spacer	29	24
D0319.01B	1" IG (1/8" annealed exterior, 5/8" air space, [2.7 mm / 0.030" "Q" / 2.7 mm] laminated interior), (P1-S) Duralite Spacer, Glass temperature 75°F	35	28

Reference should be made to Architectural Testing, Inc. Report No. D0319.01-113-11 for complete test specimen description. The complete test results are listed in Appendix B.

* - Stated per Client/Manufacturer

ACOUSTICAL PERFORMANCE TEST REPORT

Rendered to:

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

Report No: D0319.01-113-11
Test Date: 08/09/13
Report Date: 09/27/13
Record Retention End Date: 09/27/17

Test Sample Identification:

Series/Model: 9770 Polyvinyl Chloride (PVC)

Type: Fixed (Direct Set) Window

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

Glazing (Nominal Dimensions):

Option A: 3/4" IG (1/8" Annealed, 1/2" Air Space, 1/8" Annealed), (P1-S) Duralite Spacer

Option B: 1" IG (1/8" Annealed Exterior, 5/8" Air Space, [2.7 mm / 0.030" "Q" / 2.7 mm] Laminated Interior), (P1-S) Duralite Spacer, Glass Temperature 75°F

Project Scope: Architectural Testing, Inc. was contracted by MI Windows and Doors, LLC to conduct sound transmission loss tests on Series/Model 9770 Polyvinyl Chloride (PVC), fixed (direct set) windows. 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 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 (Reapproved 2012), *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 frames filled with concrete to adjust 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.

Test Procedure: The sound transmission loss tests were conducted in accordance with 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		47-1/4" by 59"
Thickness		3-1/4"
Corners		Mitered
	Fasteners	Welds
	Seal Method	None
Material		Vinyl
	Reinforcement	N/A
	Thermal Break Material	N/A
Daylight Opening Size		40-3/4" by 52-1/4"

N/A-Non Applicable

Note: There was 2-1/2" by 3/8" open cell foam located on the perimeter of the frame.

Sample Descriptions: (Continued)

Glazing Option A:

Measured Overall Insulation Glass Unit Thickness	0.730"
Spacer Type	Polycarbonate butyl composite (P1-S) Duralite*

	Exterior Sheet	Gap	Interior Sheet
Measured Thickness	0.116"	0.498"	0.116"
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 with 1/8" leaf gasket

Glazing Option B:

Measured Overall Insulation Glass Unit Thickness	0.962"
Spacer Type	Polycarbonate butyl composite (P1-S) Duralite*

	Exterior Sheet	Gap	Interior Sheet
Measured Thickness	0.116"	0.600"	0.108", 0.030", 0.108"
Muntin Pattern	N/A	N/A	N/A
Material	Annealed	Air*	Laminated
Laminate Material	N/A	N/A	Saflex [®] Q series acoustic interlayer*

Glazing Method	Exterior
Glazing Material	Silicone
Glazing Bead Material	Vinyl with 1/8" leaf gasket

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

Sample Descriptions: (Continued)

Components:

TYPE	QUANTITY	LOCATION
Weatherstrip		
No weatherstrip		
Hardware		
No hardware		
Drainage		
1/2" by 1/8" Weep slot	2	Sill glazing bead

Comments: The weight of Option A was 72 lbs. The weight of Option B was 92 lbs. The client did not supply report drawings on the Series/Model 9770 Polyvinyl Chloride (PVC), fixed (direct set) window. The fixed (direct set) 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 9770 Polyvinyl Chloride (PVC), fixed (direct set) window is listed below.

Summary of Test Results			
Data File No.	Glazing Option (Nominal Dimensions)	STC	OITC
D0319.01A	3/4" IG (1/8" annealed, 1/2" air space, 1/8" annealed), (P1-S) Duralite Spacer	29	24
D0319.01B	1" IG (1/8" annealed exterior, 5/8" air space, [2.7 mm / 0.030" "Q" / 2.7 mm] laminated interior), (P1-S) Duralite Spacer, Glass temperature 75°F	35	28

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:

Daniel P. Platts
Technician - Acoustical Testing

Eric J. Miller
Director - Acoustical Testing

DPP: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	09/27/13	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	06/15 *
Data Acquisition Unit	Agilent	34970A	Data Acquisition Unit	62211	07/13
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	HMW92	Temperature and Humidity Sensor	064286	05/13
Source Room Environmental Indicator	Vaisala	HMW60Y	Temperature and Humidity Sensor	Y002652	10/12
Weather Station	Davis Instruments	VantagePRO 6150C	Weather Station	Y003257	06/13

*- 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	08/09/13		
ATI No.	D0319.01A		
Client	MI Windows and Doors, LLC		
Specimen	Series/Model: 9770 Polyvinyl Chloride (PVC), fixed (direct set) window with 3/4" IG (1/8" annealed, 1/2" air space, 1/8" annealed), (P1-S) Duralite Spacer		
Operator	Daniel Platts/DBM		
Sample Area	1.80 m ²		
Filler Area	11.20 m ²		
	Source	Receive	Specimen
Temp C	22	22	22
RH %	44	46	45

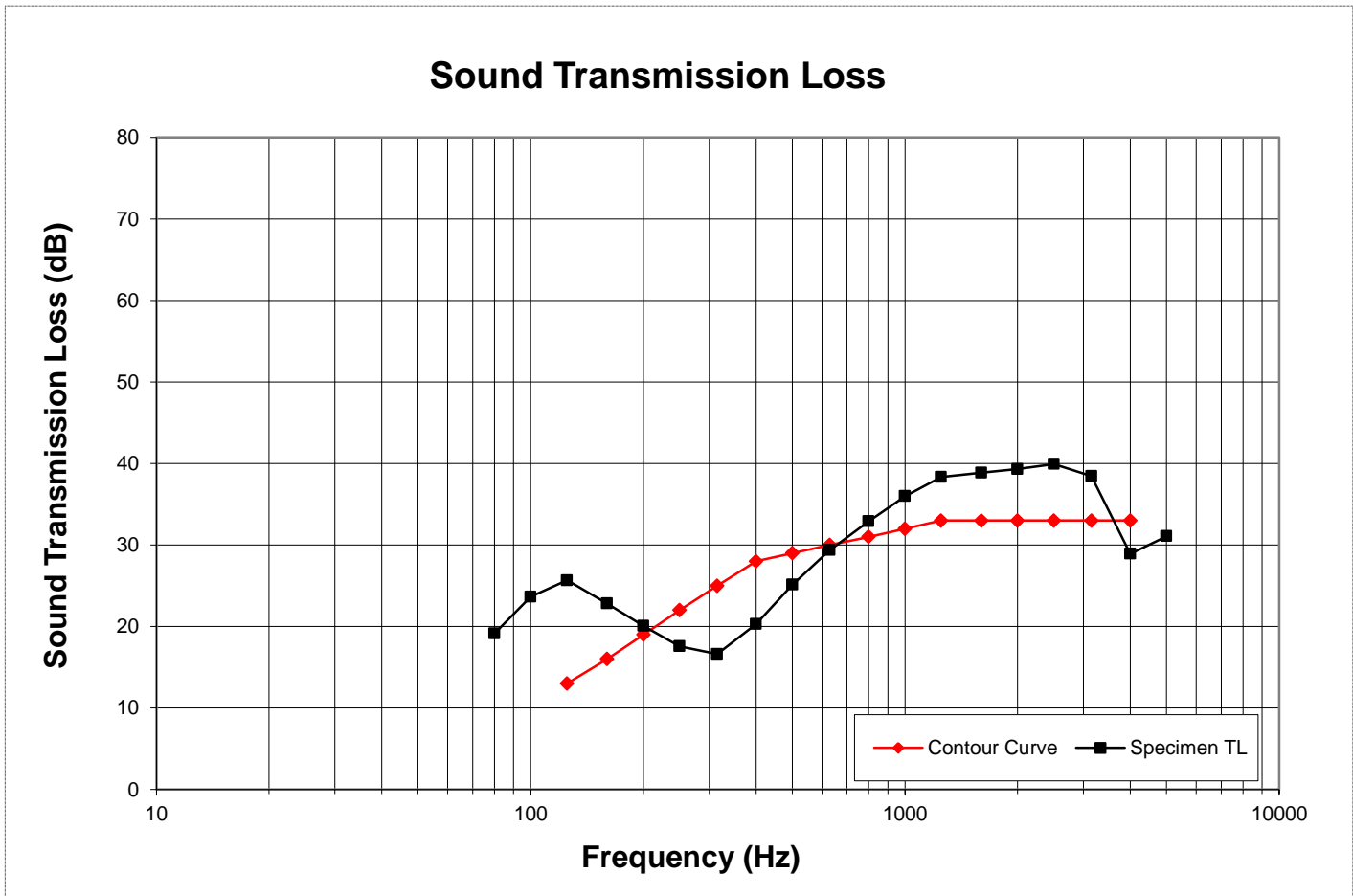
Freq (Hz)	Bkgrd SPL (dB)	Absorp (m ²)	Source SPL (dB)	Receive SPL (dB)	Filler TL (dB)	Specimen TL (dB)	95% Conf Limit	No. of Deficiencies	Trans Coef Diff
80	41	5.5	91	67	36	19	1.8	-	9.1
100	41	5.2	92	65	40	24	2.7	-	9.1
125	43	5.1	97	67	48	26	1.9	0	14.7
160	44	4.8	97	70	47	23	1.6	0	16.6
200	46	4.9	102	77	51	20	0.7	0	22.5
250	43	5.7	102	80	56	18	0.7	4	30.0
315	39	5.8	103	81	59	17	0.3	8	34.1
400	36	5.7	103	78	64	20	0.7	8	35.9
500	32	5.9	103	72	68	25	0.3	4	35.2
630	30	5.5	104	70	72	29	0.5	1	35.0
800	29	5.7	105	68	78	33	0.3	0	37.3
1000	27	5.9	106	65	83	36	0.6	0	38.8
1250	24	6.7	104	60	86	38	0.6	0	39.6
1600	19	6.8	107	62	89	39	0.4	0	41.8
2000	16	7.4	106	60	88	39	0.3	0	40.7
2500	12	8.5	105	59	86	40	0.3	0	38.4
3150	9	10.2	106	60	88	38	0.5	0	41.2
4000	7	12.4	106	69	88	29	0.4	4	50.9
5000	7	16.7	105	64	87	31	0.6	-	47.9

STC Rating **29** *(Sound Transmission Class)*
Deficiencies **29** *(Number of deficiencies versus contour curve)*
OITC Rating **24** *(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	08/09/13		
ATI No.	D0319.01A		
Client	MI Windows and Doors, LLC		
Specimen	Series/Model: 9770 Polyvinyl Chloride (PVC), fixed (direct set) window with 3/4" IG (1/8" annealed, 1/2" air space, 1/8" annealed), (P1-S) Duralite Spacer		
Operator	Daniel Platts/DBM		
Sample Area	1.80 m ²		
Filler Area	11.20 m ²		
	Source	Receive	Sample
Temp C	22	22	22
RH %	44	46	45



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 deficiency at any one frequency cannot exceed 8.

SOUND TRANSMISSION LOSS
ASTM E 90

Test Date	08/09/13		
ATI No.	D0319.01B		
Client	MI Windows and Doors, LLC		
Specimen	Series/Model: 9770 Polyvinyl Chloride (PVC), fixed (direct set) window with 1" IG (1/8" annealed exterior, 5/8" air space, [2.7 mm / 0.030" "Q" / 2.7 mm] laminated interior), (P1-S) Duralite Spacer, Glass temperature 75°F		
Operator	Daniel Platts/DBM		
Sample Area	1.80 m ²		
Filler Area	11.20 m ²		
	Source	Receive	Specimen
Temp C	21	22	22
RH %	54	52	52

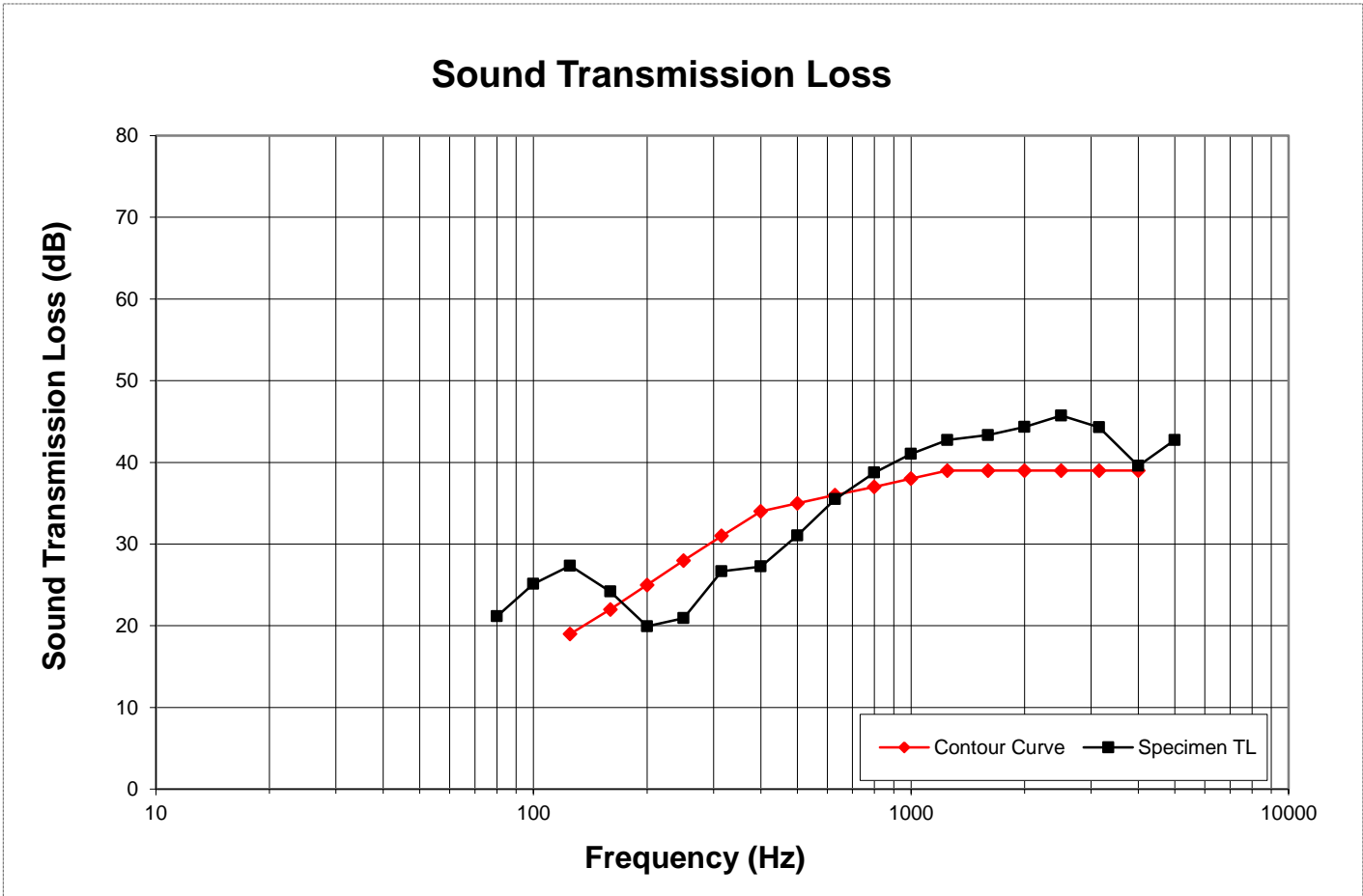
Freq (Hz)	Bkgd SPL (dB)	Absorp (m ²)	Source SPL (dB)	Receive SPL (dB)	Filler TL (dB)	Specimen TL (dB)	95% Conf Limit	No. of Deficiencies	Trans Coef Diff
80	41	5.3	90	65	36	21	1.7	-	7.4
100	41	5.8	92	63	40	25	2.9	-	7.8
125	43	4.6	96	65	48	27	2.1	0	13.1
160	46	4.8	97	68	47	24	1.9	0	15.3
200	45	4.8	101	77	51	20	1.0	5	22.7
250	38	5.5	102	76	56	21	0.9	7	26.6
315	34	5.5	103	71	59	27	0.3	4	24.1
400	33	5.4	103	71	64	27	0.5	7	29.0
500	30	5.7	103	66	68	31	0.4	4	29.2
630	26	5.4	104	64	72	35	0.3	1	28.8
800	25	5.7	106	62	78	39	0.3	0	31.5
1000	22	6.0	106	60	83	41	0.7	0	33.7
1250	19	6.5	104	55	86	43	0.4	0	35.2
1600	12	6.8	107	58	89	43	0.3	0	37.3
2000	8	7.1	106	55	88	44	0.2	0	35.7
2500	8	8.1	105	53	86	46	0.4	0	32.6
3150	7	9.8	107	55	88	44	0.4	0	35.4
4000	7	11.7	106	59	88	40	0.2	0	40.2
5000	7	15.4	105	53	87	43	0.6	-	36.2

STC Rating **35** *(Sound Transmission Class)*
Deficiencies **28** *(Number of deficiencies versus contour curve)*
OITC Rating **28** *(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	08/09/13		
ATI No.	D0319.01B		
Client	MI Windows and Doors, LLC		
Specimen	Series/Model: 9770 Polyvinyl Chloride (PVC), fixed (direct set) window with 1" IG (1/8" annealed exterior, 5/8" air space, [2.7 mm / 0.030" "Q" / 2.7 mm] laminated interior), (P1-S) Duralite Spacer, Glass temperature 75°F		
Operator	Daniel Platts/DBM		
Sample Area	1.80 m ²		
Filler Area	11.20 m ²		
	Source	Receive	Sample
Temp C	21	22	22
RH %	54	52	52



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 deficiency at any one frequency cannot exceed 8.

Appendix C

Photographs



Receive Room View of Installed Specimen



Source Room View of Installed Specimen