

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

Rendered to:

MI WINDOWS AND DOORS, INC.

SERIES/MODEL: 390FR-EC190

TYPE: Sliding Glass Door

Summary of Test Results			
Data File No.	Glazing Option (Nominal Dimensions)	STC	OITC
B4362.01A	7/8" IG (1/8" tempered, 5/8" air space, 1/8" tempered)	27	22
B4362.01B	7/8" IG (1/8" tempered exterior, 1/2" air space, 1/4" laminated interior), Glass temperature 75°F	34	27
B4362.01C	7/8" IG (1/4" laminated, 3/8" air space, 1/4" laminated), Glass temperature 75°F	37	30

Reference should be made to Architectural Testing, Inc. Report No. B4362.01-113-11 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: B4362.01-113-11
Test Date: 11/02/11
Report Date: 11/15/11
Record Retention End Date: 11/02/15

Test Sample Identification:

Series/Model: 390FR-EC190

Type: Sliding Glass Door

Overall Frame Size: 72" by 80"

Glazing (Nominal Dimensions):

Option A: 7/8" IG (1/8" Tempered, 5/8" Air Space, 1/8" Tempered)

Option B: 7/8" IG (1/8" Tempered Exterior, 1/2" Air Space, 1/4" Laminated Interior), Glass Temperature 75°F

Option C: 7/8" IG (1/4" Laminated, 3/8" Air Space, 1/4" Laminated), Glass Temperature 75°F

Project Scope: Architectural Testing, Inc. was contracted by MI Windows and Doors, Inc. to conduct sound transmission loss tests on Series/Model 390FR-EC190, sliding glass doors. 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, 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 40" by 86" and 80" by 86" test specimens. The filler wall achieved an STC rating of 68.

A filler wall reducing element was used to reduce the test opening size to 72" wide by 80" high. 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 sliding glass door was placed on a foam isolation pad in the new test opening. Duct seal was used to seal the perimeter of the test specimen to the test opening on both sides. The interior side of the door 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 panels were opened and closed at least five times prior to testing.

Test Procedure: The sliding glass door 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:

Frame Construction:

		Frame
Size		72" by 80"
Thickness		5-1/2"
Corners		Coped / Mitered
	Fasteners	Screws / Welds
	Seal Method	Sealant
Material		Vinyl
	Reinforcement	None
	Thermal Break Material	N/A

Note: The hollows of all frame members where filled with Foam-XTD.

Panel Construction:

		Interior Active Panel	Exterior Fixed Panel
Size		36-7/8" by 77"	36-5/8" by 77"
Thickness		1-5/8"	1-5/8"
Corners		Coped	Coped
	Fasteners	Screws	Screws
	Seal Method	None	None
Material		Vinyl	Vinyl
	Reinforcement	Aluminum located in stiles and bottom rail	Aluminum located in stiles and bottom rail
	Thermal Break Material	None	None
Daylight Opening Size		29-3/4" by 68-1/4"	29-3/4" by 68-1/4"

N/A-Non Applicable

Note: The hollows of all panel members where filled with Foam-XTD.

Sample Descriptions: (Continued)

Glazing Option A:

Measured Overall Insulation Glass Unit Thickness	0.846"
Spacer Type	Steel U-shaped

	Exterior Sheet	Gap	Interior Sheet
Measured Thickness	0.123"	0.600"	0.123"
Muntin Pattern	N/A	N/A	N/A
Material	Tempered	Air*	Tempered
Laminate Material	N/A	N/A	N/A

Glazing Method	Exterior
Glazing Material	Silicone
Glazing Bead Material	Vinyl

Glazing Option B:

Measured Overall Insulation Glass Unit Thickness	0.887"
Spacer Type	Steel U-shaped

	Exterior Sheet	Gap	Interior Sheet
Measured Thickness	0.123"	0.524"	0.105", 0.030", 0.105"
Muntin Pattern	N/A	N/A	N/A
Material	Tempered	Air*	Laminated
Laminate Material	N/A	N/A	Saflex® Q Series

Glazing Method	Exterior
Glazing Material	Silicone
Glazing Bead Material	Vinyl

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

Sample Descriptions: (Continued)

Glazing Option C:

Measured Overall Insulation Glass Unit Thickness	0.900"
Spacer Type	Steel U-shaped

	Exterior Sheet	Gap	Interior Sheet
Measured Thickness	0.105", 0.030", 0.105"	0.420"	0.105", 0.030", 0.105"
Muntin Pattern	N/A	N/A	N/A
Material	Laminated	Air*	Laminated
Laminate Material	Saflex [®] Q Series	N/A	Saflex [®] Q Series

Glazing Method	Exterior
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 0.230" Polypile with center fin	2 Rows	Jambs, head
0.187" by 0.230" Polypile with center fin	1 Row	Meeting stiles, active bottom rail
2" by 1/2" Polypile pad	1	Sill at meeting stile
Hardware		
Roller assembly set	2	Active bottom rail
Handle with lock	1	Lock stile
Keeper	1	Lock jamb
Drainage		
1-1/4" by 1/4" Weep notch	2	Sill Track
3/8" Diameter weep hole	2	Fixed panel support sill track
3/8" Diameter weep hole	2	Fixed panel support sill track hollow
1-3/4" by 1/4" Weep slot	2	Fixed panel support sill track hollow
1" by 1/4" Weep slot	2	Fixed panel support sill track hollow
1" by 3/16" Weep slot with flap cover	2	Fixed panel support sill track face
Sloped sill		

Comments: The total weight of Option A was 196 lbs. The total weight of Option B was 236 lbs. The total weight of Option C was 274 lbs. The design drawings (included in Appendix C) supplied by the client, accurately describe the Series/Model 390FR-EC190, sliding glass door. The dimensions on the drawings that are circled and/or checked were verified against the test specimen. The sliding glass door was disassembled, and the components will be retained by Architectural Testing for four years. Photographs of the test specimen are included in Appendix D.

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 390FR-EC190, sliding glass door is listed below.

Summary of Test Results			
Data File No.	Glazing Option (Nominal Dimensions)	STC	OITC
B4362.01A	7/8" IG (1/8" tempered, 5/8" air space, 1/8" tempered)	27	22
B4362.01B	7/8" IG (1/8" tempered exterior, 1/2" air space, 1/4" laminated interior), Glass temperature 75°F	34	27
B4362.01C	7/8" IG (1/4" laminated, 3/8" air space, 1/4" laminated), Glass temperature 75°F	37	30

Note: Due to the calculations and sample size, transmission loss coefficient differences less than 6 indicate the lower limit of the transmission loss for this specimen. On each data sheet listed in Appendix B, cells highlighted in red indicate transmission loss values limited in this way. For 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 specimens 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

Todd D. Kister
Laboratory Supervisor - Acoustical Testing

DPP: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: Complete drawings packet on file with Architectural Testing, Inc.

Appendix-D: Photographs (1)



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.

Revision Log

<u>Rev. #</u>	<u>Date</u>	<u>Page(s)</u>	<u>Revision(s)</u>
0	11/15/11	N/A	Original Report Issue

Appendix A

Instrumentation:

Instrument	Manufacturer	Model	Description	ATI Number	Date of Calibration
Analyzer	Hewlett Packard	HP35670A	Real time analyzer	Y002929	06/14/11 *
Data Acquisition Unit	Agilent	34970A	Data Acquisition Unit	62211	07/13/11
Receive Room Microphone	GRAS	40 AR	1/2" Microphone	Y003246	08/22/11
Source Room Microphone	GRAS	40 AR	1/2" Microphone	Y003245	08/22/11
Receive Room Preamplifier	GRAS	26 AK	1/2" Preamplifier	Y003249	08/22/11
Source Room Preamplifier	GRAS	26 AK	1/2" Preamplifier	Y003248	08/22/11
Microphone Calibrator	Bruel & Kjaer	Type 4228	Pistonphone Calibrator	Y002816	02/17/11
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	Y002653	03/01/11
Source Room Environmental Indicator	Vaisala	HMW60Y	Temperature and Humidity Sensor	005066	09/07/11
Weather Station	Davis Instruments	VantagePRO 6150C	Weather Station	Y003257	05/16/11

*- 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

Architectural Testing

ATI No.	B4362.01A	Date	11/02/11
Client	MI Windows and Doors, Inc.		
Specimen	Series/Model: 390FR-EC190, sliding glass door with 7/8" IG (1/8" tempered, 5/8" air space, 1/8" tempered)		
Specimen Area	3.71 Square Meters		
Filler Area	9.28 Square Meters		
Operator	Daniel P. Platts		


	Bkgrd	Absorp	Source	Receive	Filler	Specimen
Temp C	22.9	23.4	23.0	23.1	23.7	23.1
RH %	44.5	42.8	49.6	43.9	44.5	45.2

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	43.0	4.9	93.3	72.1	30.5	21	4.91	0	6.5
100	45.2	5.6	93.8	69.1	36.6	23	4.14	0	9.8
125	40.5	5.3	97.7	72.7	44.2	23	3.25	0	16.7
160	42.9	5.0	98.2	75.9	48.1	21	2.85	0	23.0
200	40.6	4.9	104.0	88.0	56.7	15	2.57	2	37.9
250	33.6	5.7	102.5	88.6	59.1	12	1.66	8	43.0
315	30.8	5.8	103.0	83.4	61.4	18	1.96	5	39.8
400	30.0	5.7	103.4	79.5	62.6	22	1.66	4	36.5
500	27.0	6.2	103.0	77.0	64.9	24	0.96	3	37.2
630	22.8	5.8	104.2	73.5	68.1	29	0.71	0	35.3
800	22.6	5.9	104.3	71.1	68.7	31	0.61	0	33.6
1000	17.6	6.1	104.0	68.7	71.6	33	0.32	0	34.4
1250	16.9	6.8	103.0	64.9	71.3	36	0.26	0	31.8
1600	12.9	6.9	105.1	65.8	73.6	37	0.45	0	33.0
2000	9.5	7.2	105.0	64.3	74.6	38	0.27	0	32.8
2500	8.6	8.5	105.0	64.3	78.3	37	0.30	0	37.1
3150	7.5	9.8	106.1	66.0	80.0	36	0.31	0	40.1
4000	8.4	12.1	105.9	71.9	82.3	29	0.29	2	49.4
5000	7.7	15.4	104.7	65.4	84.3	33	0.44	0	47.2

STC Rating = 27 (Sound Transmission Class)
Deficiencies = 24 (Number of deficiencies versus contour curve)
OITC Rating = 22 (Outdoor/Indoor Transmission Class)

Notes:

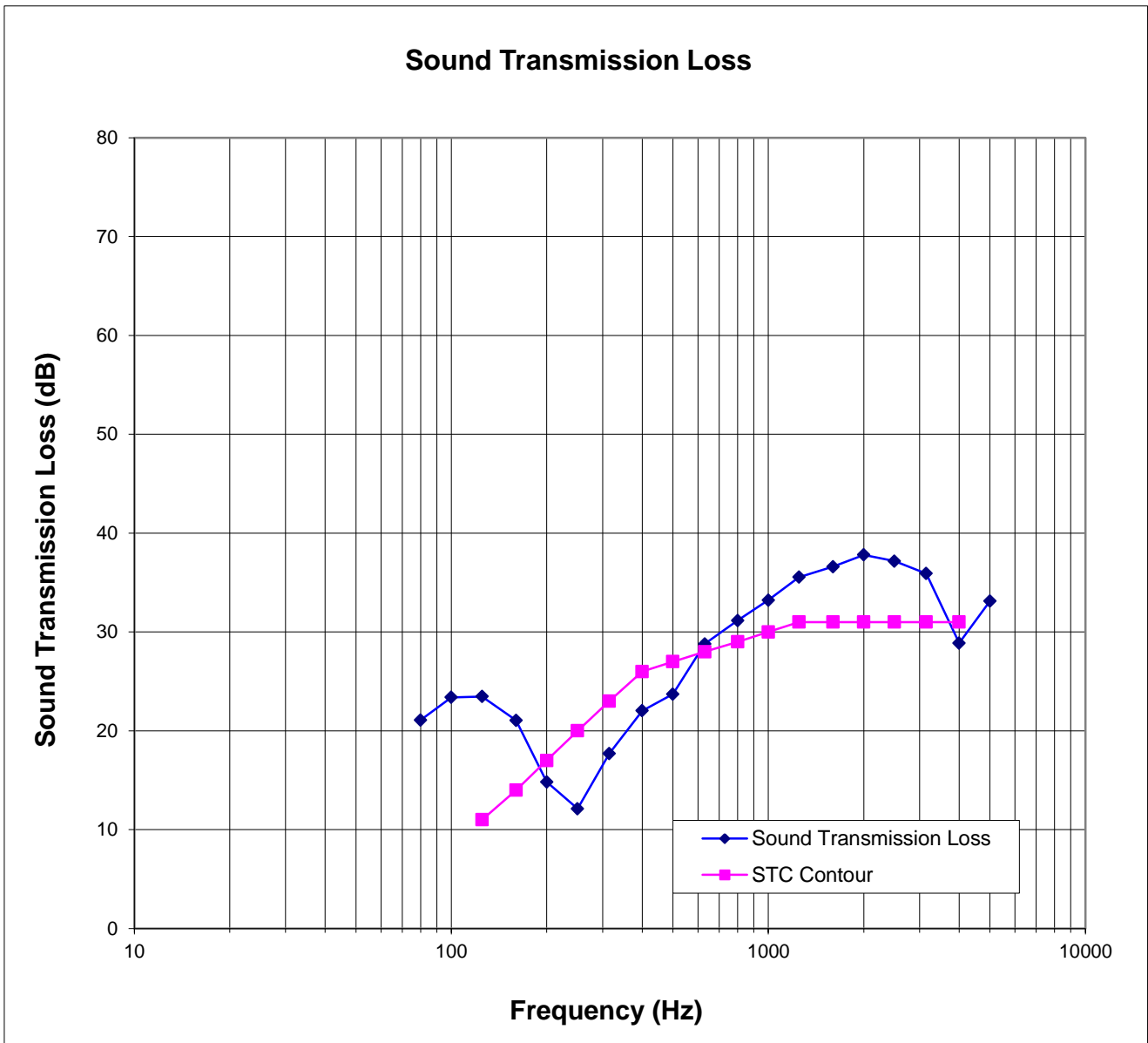
- 1) The acoustical chambers are qualified for measurements down to 80 hertz. Data reported below 80 hertz is for reference only.
- 2) Transmission loss coefficient differences less than 6 indicate the lower limit of the transmission loss for this specimen. These cells are highlighted red.
- 3) Transmission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

 ACCREDITED	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.
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Architectural Testing

ATI No. B4362.01A Date 11/02/11
Client MI Windows and Doors, Inc.
Specimen Series/Model: 390FR-EC190, sliding glass door with 7/8" IG (1/8" tempered, 5/8" air space, 1/8" tempered)
Specimen Area 3.71 Square Meters
Filler Area 9.28 Square Meters
Operator Daniel P. Platts



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SOUND TRANSMISSION LOSS

ASTM E 90

Architectural Testing

ATI No.	B4362.01B	Date	11/02/11
Client	MI Windows and Doors, Inc.		
Specimen	Series/Model: 390FR-EC190, sliding glass door with 7/8" IG (1/8" tempered exterior, 1/2" air space, 1/4" laminated interior), Glass temperature 75°F		
Specimen Area	3.71 Square Meters		
Filler Area	9.28 Square Meters		
Operator	Daniel P. Platts		


	Bkgrd	Absorp	Source	Receive	Filler	Specimen
Temp C	22.6	23.4	22.6	23.4	23.7	23.0
RH %	47.2	44.1	45.2	43.6	44.5	45.0

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	49.9	5.6	89.5	67.8	30.5	21	2.59	0	6.5
100	38.9	5.5	91.7	64.8	36.6	26	3.67	0	7.6
125	40.6	5.5	95.9	67.5	44.2	27	1.42	0	13.5
160	41.4	4.6	96.4	71.4	48.1	24	1.06	0	20.1
200	38.3	5.4	102.0	82.1	56.7	18	1.91	6	34.5
250	34.3	5.6	101.4	80.5	59.1	19	1.70	8	36.0
315	31.2	5.5	101.6	75.0	61.4	25	0.97	5	32.6
400	29.8	5.7	102.2	71.9	62.6	28	1.05	5	30.2
500	25.9	6.0	102.3	70.1	64.9	30	0.88	4	30.8
630	23.7	5.7	103.6	67.8	68.1	34	0.45	1	30.2
800	21.9	6.0	104.2	65.9	68.7	36	0.31	0	28.5
1000	19.6	6.3	104.0	64.1	71.6	38	0.31	0	30.1
1250	16.3	6.7	103.0	60.6	71.3	40	0.30	0	27.4
1600	13.7	7.0	105.2	61.8	73.6	41	0.59	0	29.0
2000	10.0	7.4	105.1	61.1	74.6	41	0.25	0	29.5
2500	8.4	8.3	105.1	61.3	78.3	40	0.21	0	33.9
3150	7.6	9.7	106.0	61.4	80.0	40	0.36	0	35.6
4000	7.5	11.8	106.0	62.1	82.3	39	0.31	0	39.5
5000	7.7	15.3	104.7	57.4	84.3	41	0.39	0	39.1

STC Rating = 34 *(Sound Transmission Class)*
Deficiencies = 29 *(Number of deficiencies versus contour curve)*
OITC Rating = 27 *(Outdoor/Indoor Transmission Class)*

Notes:

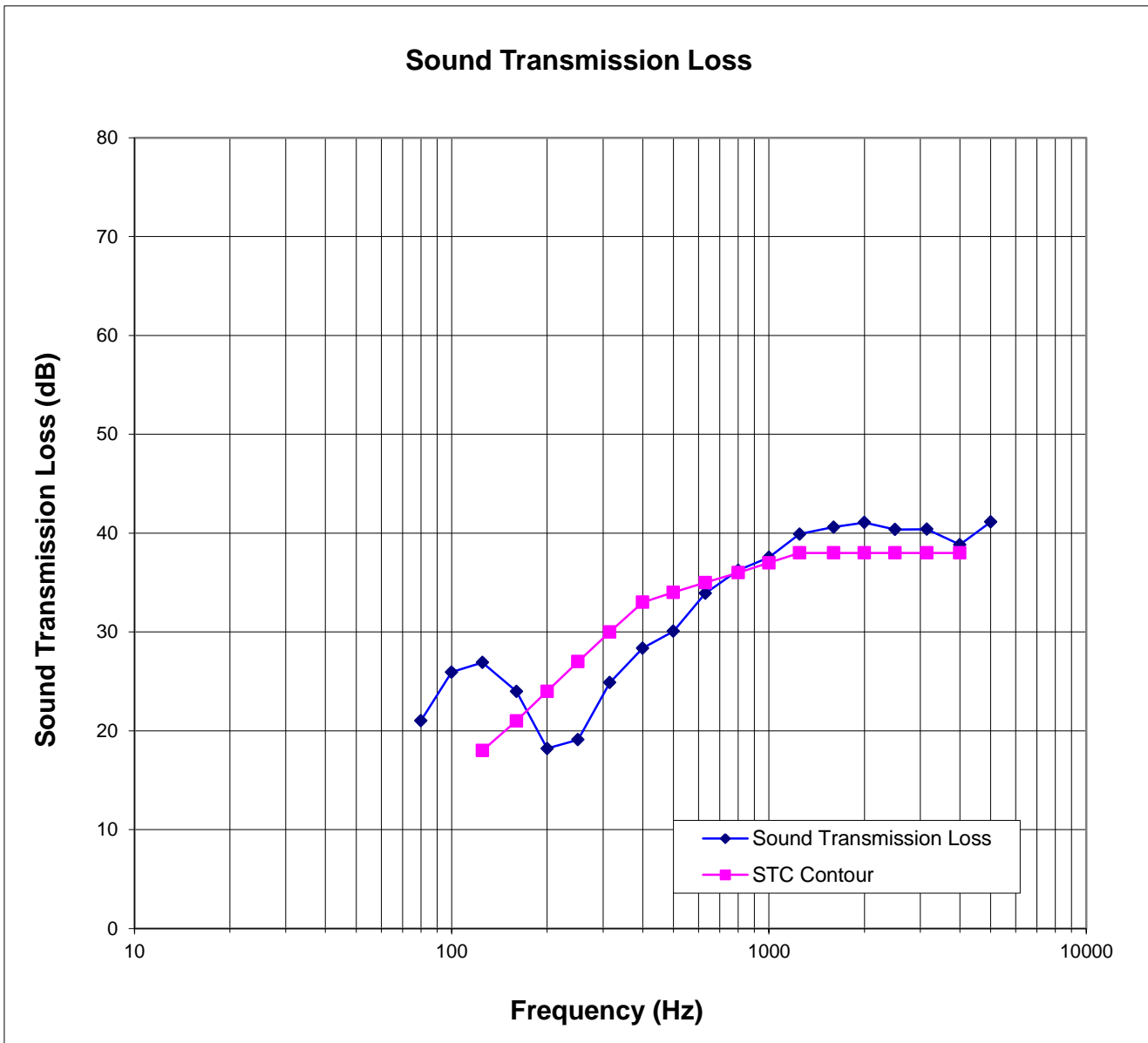
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- 2) Transmission loss coefficient differences less than 6 indicate the lower limit of the transmission loss for this specimen. These cells are highlighted red.
- 3) Transmission loss coefficient differences between 6 and 15 indicate there has been 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. B4362.01B **Date** 11/02/11
Client MI Windows and Doors, Inc.
Specimen Series/Model: 390FR-EC190, sliding glass door with 7/8" IG (1/8" tempered exterior, 1/2" air space, 1/4" laminated interior), Glass temperature 75°F
Specimen Area 3.71 Square Meters
Filler Area 9.28 Square Meters
Operator Daniel P. Platts



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SOUND TRANSMISSION LOSS

ASTM E 90

Architectural Testing

ATI No.	B4362.01C	Date	11/02/11
Client	MI Windows and Doors, Inc.		
Specimen	Series/Model: 390FR-EC190, sliding glass door with 7/8" IG (1/4" laminated, 3/8" air space, 1/4" laminated), Glass temperature 75°F		
Specimen Area	3.71 Square Meters		
Filler Area	9.28 Square Meters		
Operator	Daniel P. Platts		

	Bkgrd	Absorp	Source	Receive	Filler	Specimen
Temp C	22.6	23.5	23.3	23.0	23.7	23.1
RH %	46.2	43.7	45.2	45.0	44.5	45.0

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	42.0	5.1	89.4	66.5	30.5	23	3.63	0	5.0
100	38.3	5.2	91.8	63.4	36.6	28	3.19	0	5.7
125	39.9	5.5	96.3	65.4	44.2	30	2.29	0	11.0
160	40.4	5.1	96.5	69.0	48.1	26	1.62	0	18.0
200	38.7	5.3	101.7	78.7	56.7	21	2.03	6	31.3
250	36.1	5.6	101.2	76.3	59.1	23	1.80	7	32.0
315	33.5	5.7	101.4	72.2	61.4	27	1.38	6	30.1
400	30.3	5.6	102.0	68.1	62.6	32	1.06	4	26.5
500	26.3	5.9	102.0	66.4	64.9	34	0.83	3	27.3
630	23.1	5.8	103.3	65.2	68.1	36	0.84	2	27.9
800	21.5	5.8	104.0	64.3	68.7	38	0.69	1	27.0
1000	17.4	6.1	103.6	62.7	71.6	39	0.60	1	28.8
1250	14.1	7.1	102.6	59.7	71.3	40	0.49	1	27.3
1600	11.2	6.9	104.6	61.3	73.6	41	0.75	0	29.0
2000	8.1	7.3	104.7	60.8	74.6	41	0.47	0	29.6
2500	6.9	8.3	104.8	60.9	78.3	40	0.42	1	33.8
3150	6.3	9.9	105.7	60.7	80.0	41	0.37	0	35.2
4000	6.7	11.9	105.6	59.0	82.3	42	0.40	0	36.7
5000	6.8	15.3	104.2	55.5	84.3	43	0.38	0	37.7

STC Rating = 37 (Sound Transmission Class)
Deficiencies = 32 (Number of deficiencies versus contour curve)
OITC Rating = 30 (Outdoor/Indoor Transmission Class)

Notes:

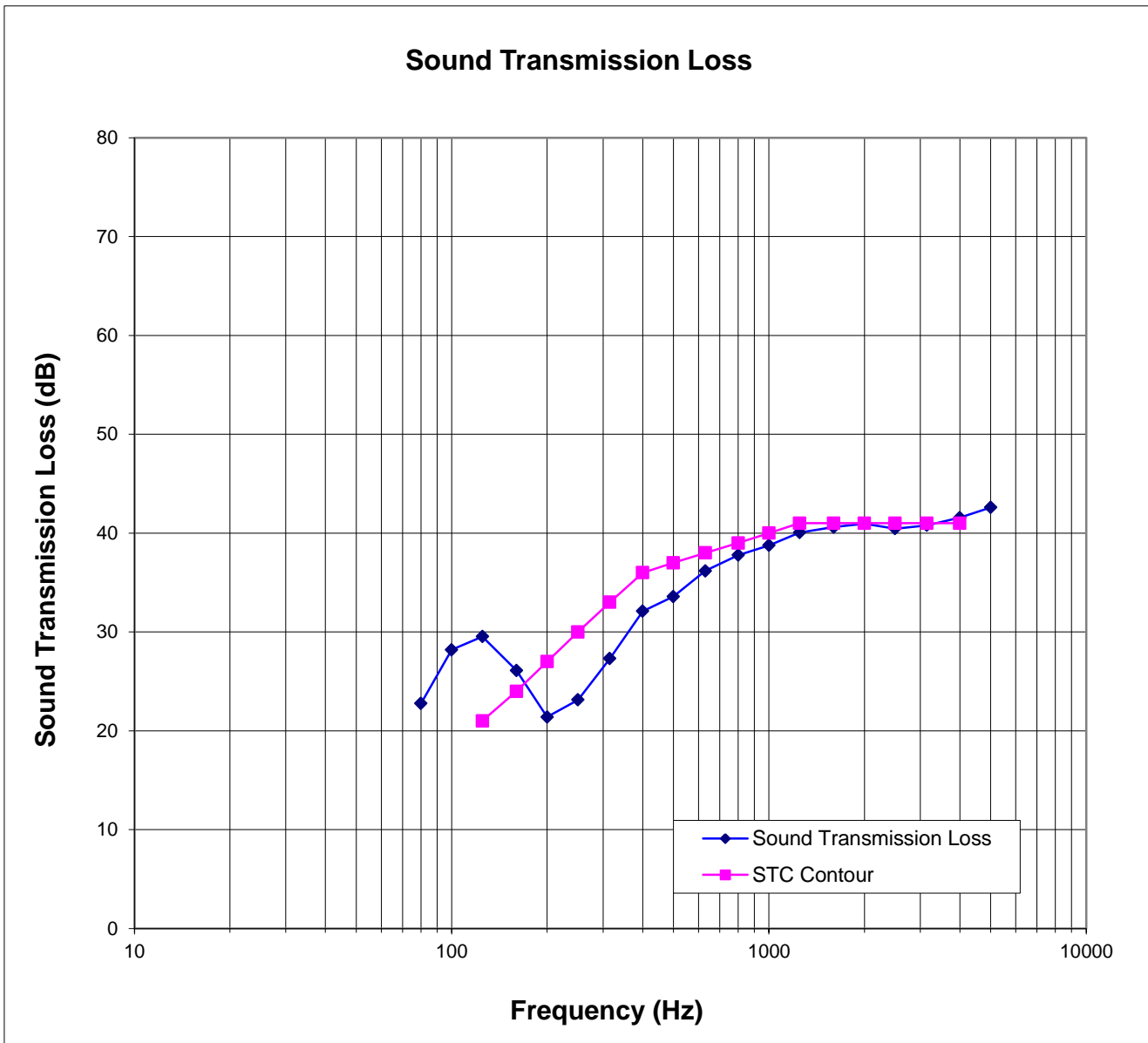
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Architectural Testing

ATI No. B4362.01C Date 11/02/11
Client MI Windows and Doors, Inc.
Specimen Series/Model: 390FR-EC190, sliding glass door with 7/8" IG (1/4" laminated, 3/8" air space, 1/4" laminated), Glass temperature 75°F
Specimen Area 3.71 Square Meters
Filler Area 9.28 Square Meters
Operator Daniel P. Platts



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Appendix C
Design Drawings

Note: Complete drawings packet on file with Architectural Testing, Inc.

Appendix D

Photographs



Receive Room View of Installed Specimen



Source Room View of Installed Specimen