ASTM E 90 SOUND TRANSMISSION LOSS
TEST REPORT

Rendered to:

COEUR D'ALENE WINDOW

SERIES/MODEL: 3221

TYPE: Single Hung Window

Summary of Test Results			
Data File No.	**Glazing Option (Nominal Dimensions)**	**STC**	**OITC**
E2102.01A	13/16" IG (3/32" annealed exterior, 19/32" air space, 1/8" annealed interior)	30	25
E2102.01B	3/4" IG (1/8" annealed exterior, 7/16" air space, 3/16" annealed interior)	33	27
E2102.01C	3/4" IG (1/8" annealed exterior, 3/8" air space, 1/4" laminated interior), Glass temperature 75°F	33	27

Reference should be made to Architectural Testing, Inc. Report No. E2102.01-113-11 for complete test specimen description. The complete test results are listed in Appendix B.

ACOUSTICAL PERFORMANCE TEST REPORT

Rendered to:

COEUR D'ALENE WINDOW
3808 North Sullivan Road, Building 18, Suite I
Spokane Valley, Washington 99216

Report No:	E2102.01-113-11
Test Date:	11/20/14
Report Date:	12/18/14

Test Sample Identification:

Series/Model: 3221

Type: Single Hung Window

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

Glazing (Nominal Dimensions):

Option A: 13/16" IG (3/32" Annealed Exterior, 19/32" Air Space, 1/8" Annealed Interior)

Option B: 3/4" IG (1/8" Annealed Exterior, 7/16" Air Space, 3/16" Annealed Interior)

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

Project Scope: Architectural Testing, Inc. was contracted by Coeur d'Alene Window to conduct sound transmission loss tests on Series/Model 3221, Single hung 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 adjust the test opening size. The reducing element consisted of two separate 2x6 wood frames filled with concrete to reduce 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. The sash 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		47-1/4" by 59"
Thickness		3-3/8"
Corners		Mitered
	Fasteners	Welds
	Seal Method	None
Material		Vinyl
	Reinforcement	Steel located in meeting rail
	Thermal Break Material	N/A
Daylight Opening Size		44-1/2" by 26-3/4"

Sash Construction:

		Bottom Sash
Size		45-1/4" by 28-1/2"
Thickness		1-1/8"
Corners		Mitered
	Fasteners	Welds
	Seal Method	None
Material		Vinyl
	Reinforcement	Steel located in meeting rail
	Thermal Break Material	N/A
Daylight Opening Size		42" by 25-1/2"

N/A-Non Applicable

Sample Descriptions: (Continued)

Glazing Option A:

Measured Overall Insulation Glass Unit Thickness	0.780"
Spacer Type	Stainless steel

	Exterior Sheet	**Gap**	**Interior Sheet**
Measured Thickness	0.085"	0.575"	0.120"
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

Glazing Option B:

Measured Overall Insulation Glass Unit Thickness	0.762"
Spacer Type	Stainless steel

	Exterior Sheet	**Gap**	**Interior Sheet**
Measured Thickness	0.120"	0.462"	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	Double-sided adhesive foam tape
Glazing Bead Material	Vinyl

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

Sample Descriptions: (Continued)

Glazing Option C:

Measured Overall Insulation Glass Unit Thickness	0.748"
Spacer Type	Stainless steel

	Exterior Sheet	**Gap**	**Interior Sheet**
Measured Thickness	0.120"	0.388"	0.105", 0.030", 0.105"
Muntin Pattern	N/A	N/A	N/A
Material	Annealed	Air*	Laminated
Laminate Material	N/A	N/A	PVB

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

Components:

	TYPE	**QUANTITY**	**LOCATION**
Weatherstrip			
	0.187" by 0.230" Polypile with center fin	1 Row	Perimeter of sash, fixed meeting rail
Hardware			
	Block and tackle balance	2	Jambs
	Cam lock	2	Lock rail
	Keeper	2	Fixed meeting rail
Drainage			
	1/2" by 1/8" Weep slot	2	Sill track
	5/8" by 3/16" Weep slot	2	Sill sash track
	5/8" by 3/16" Weep slot	2	Sill hollow
	1/2" by 1/8" Weep slot	2	Sill face

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

Comments: The weight of Option A was 80 lbs. The weight of Option B was 90 lbs. The weight of Option C was 100 lbs. The client did not supply report drawings on the Series/Model 3221, Single hung 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 3221, Single hung window is listed below.

Summary of Test Results			
Data File No.	**Glazing Option (Nominal Dimensions)**	**STC**	**OITC**
E2102.01A	13/16" IG (3/32" annealed exterior, 19/32" air space, 1/8" annealed interior)	30	25
E2102.01B	3/4" IG (1/8" annealed exterior, 7/16" air space, 3/16" annealed interior)	33	27
E2102.01C	3/4" IG (1/8" annealed exterior, 3/8" air space, 1/4" laminated interior), Glass temperature 75°F	33	27

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. 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 may not be reproduced, except in full, without the written approval of Architectural Testing.

For ARCHITECTURAL TESTING, INC:

Digitally Signed by: Daniel P. Platts

Daniel P. Platts
Senior Technician - Acoustical Testing

Digitally Signed by: Todd D. Kister

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: Photographs (1)

Revision Log

Rev. #	Date	Page(s)	Revision(s)
0	12/18/14	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	378B20	Microphone and Preamplifier	64902	11/13
Source Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64903	11/13
Source Room Microphone	PCB Electronics	378B20	Microphone and Preamplifier	65103	05/14
Source Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64905	11/13
Source Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64906	11/13
Receive Room Microphone	PBC Piezotronics	378B20	Microphone and Preamplifier	64907	11/13
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64908	11/13
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64909	11/13
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64910	11/13
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64911	11/13
Receive Room Environmental Indicator	Vaisala	HMW92	Temperature Humidity Sensor	64286	06/14
Source Room Environmental Indicator	Vaisala	HMW60Y	Temperature and Humidity Sensor	Y002653	06/14
Microphone Calibrator	Norsonic	1251	Pistonphone Calibrator	65105	04/14

**- 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

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AIRBORNE SOUND TRANSMISSION LOSS

ASTM E 90

Test Date	11/20/14
Data File No.	E2102.01A
Client	Coeur d' Alene Window
Description	Series/Model: 3221, Single hung window with 13/16" IG (3/32" annealed exterior, 19/32" air space, 1/8" annealed interior)
Specimen Area	1.80 m²
Technician	Daniel P. Platts

Freq (Hz)	**Background SPL** (dB)	**Absorption** (m²)	**Source SPL** (dB)	**Receive SPL** (dB)	**Specimen TL** (dB)	**95% Confidence Limit**	**Number of Deficiencies**
80	37.9	4.2	106	83	19.9	2.05	-
100	37.7	4.2	106	77	26.6	1.87	-
125	37.6	4.6	105	77	24.6	0.92	0
160	38.1	4.1	105	80	22.1	0.66	0
200	33.9	4.6	105	84	17.4	0.74	3
250	30.9	5.2	105	83	17.8	0.92	5
315	28.0	5.4	100	76	19.7	0.40	6
400	27.8	5.7	100	73	21.5	0.28	7
500	25.8	6.0	100	69	25.5	0.33	4
630	23.3	5.6	101	69	27.2	0.21	4
800	20.7	5.8	101	64	31.5	0.18	0
1000	16.8	6.1	99	60	33.5	0.24	0
1250	13.2	6.7	98	56	36.4	0.29	0
1600	9.7	7.0	101	58	36.9	0.21	0
2000	5.7	7.4	99	55	38.1	0.22	0
2500	4.9	8.3	98	52	39.0	0.17	0
3150	4.7	10.0	98	53	37.8	0.13	0
4000	5.3	12.0	98	51	38.1	0.15	0
5000	5.7	15.2	95	48	37.8	0.30	-

STC Rating	**30**	*(Sound Transmission Class)*
Deficiencies	29	*(Sum of Deficiencies)*
OITC Rating	**25**	*(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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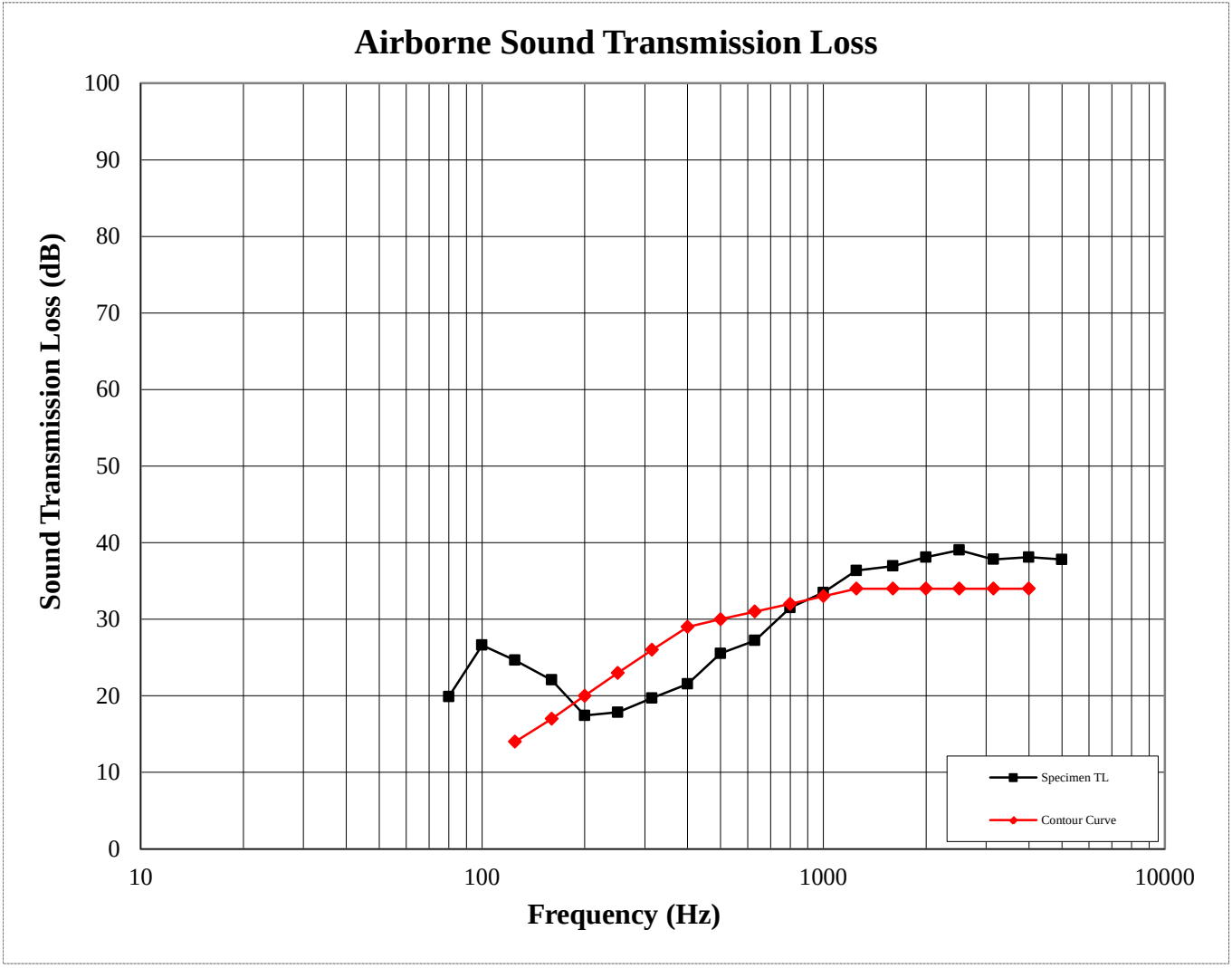
AIRBORNE SOUND TRANSMISSION LOSS

ASTM E 90

Test Date	11/20/14
Data File No.	E2102.01A
Client	Coeur d' Alene Window
Description	Series/Model: 3221, Single hung window with 13/16" IG (3/32" annealed exterior, 19/32" air space, 1/8" annealed interior)
Specimen Area	1.80 m²
Technician	Daniel P. Platts



AIRBORNE SOUND TRANSMISSION LOSS

ASTM E 90

Test Date	11/20/14
Data File No.	E2102.01B
Client	Coeur d' Alene Window
Description	Series/Model: 3221, Single hung window with 3/4" IG (1/8" annealed exterior, 7/16 air space, 3/16" annealed interior)
Specimen Area	1.80 m²
Technician	Daniel P. Platts

Freq (Hz)	**Background SPL** (dB)	**Absorption** (m²)	**Source SPL** (dB)	**Receive SPL** (dB)	**Specimen TL** (dB)	**95% Confidence Limit**	**Number of Deficiencies**
80	38.4	4.2	105	81	22.4	2.09	-
100	39.7	4.6	106	75	27.7	1.69	-
125	39.5	4.5	106	75	27.0	0.90	0
160	41.0	4.4	105	75	25.8	0.62	0
200	37.7	4.7	106	82	19.3	0.73	4
250	32.0	5.3	106	81	20.0	0.98	6
315	27.1	5.5	100	73	22.6	0.45	6
400	26.3	5.6	100	69	25.9	0.32	6
500	24.1	5.9	100	66	29.1	0.37	4
630	20.5	5.6	101	65	31.5	0.22	3
800	17.6	5.8	101	61	34.4	0.20	1
1000	13.9	6.0	99	58	35.7	0.20	0
1250	13.3	6.6	98	54	37.9	0.28	0
1600	9.2	7.1	101	57	37.9	0.20	0
2000	6.4	7.5	99	55	38.3	0.19	0
2500	5.6	8.5	98	54	37.3	0.17	0
3150	5.3	10.1	98	54	36.5	0.15	1
4000	5.8	12.3	98	52	37.3	0.17	0
5000	6.2	15.7	96	48	37.9	0.28	-

STC Rating	**33**	*(Sound Transmission Class)*
Deficiencies	31	*(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.
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	11/20/14
Data File No.	E2102.01B
Client	Coeur d' Alene Window
Description	Series/Model: 3221, Single hung window with 3/4" IG (1/8" annealed exterior, 7/16 air space, 3/16" annealed interior)
Specimen Area	1.80 m²
Technician	Daniel P. Platts

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AIRBORNE SOUND TRANSMISSION LOSS

ASTM E 90

Test Date	11/20/14
Data File No.	E2102.01C
Client	Coeur d' Alene Window
Description	Series/Model: 3221, Single hung window with 3/4" IG (1/8" annealed exterior, 3/8 air space, 1/4" laminated interior), Glass temperature 75°F
Specimen Area	1.80 m²
Technician	Daniel P. Platts

Freq (Hz)	**Background SPL** (dB)	**Absorption** (m²)	**Source SPL** (dB)	**Receive SPL** (dB)	**Specimen TL** (dB)	**95% Confidence Limit**	**Number of Deficiencies**
80	37.7	4.3	106	81	22.9	1.92	-
100	38.0	4.1	106	74	29.4	1.37	-
125	36.8	4.7	106	75	27.3	0.92	0
160	40.2	4.3	105	74	27.7	0.78	0
200	37.0	4.6	106	81	20.9	0.70	2
250	32.0	5.1	106	82	19.1	0.93	7
315	25.6	5.5	100	75	20.7	0.51	8
400	23.2	5.6	100	68	27.0	0.37	5
500	19.4	5.8	100	65	30.2	0.34	3
630	17.5	5.5	101	63	33.1	0.21	1
800	15.1	5.8	101	60	36.0	0.16	0
1000	12.0	6.1	99	58	36.5	0.26	0
1250	9.0	6.7	98	54	38.2	0.28	0
1600	7.2	7.1	101	57	38.1	0.22	0
2000	5.4	7.4	99	54	38.9	0.19	0
2500	5.1	8.4	98	52	39.0	0.13	0
3150	5.0	10.0	98	52	38.7	0.12	0
4000	5.5	12.1	98	49	40.0	0.17	0
5000	6.0	15.4	96	47	39.2	0.30	-

STC Rating	**33**	*(Sound Transmission Class)*
Deficiencies	26	*(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.
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	11/20/14
Data File No.	E2102.01C
Client	Coeur d' Alene Window
Description	Series/Model: 3221, Single hung window with 3/4" IG (1/8" annealed exterior, 3/8 air space, 1/4" laminated interior), Glass temperature 75°F
Specimen Area	1.80 m²
Technician	Daniel P. Platts

Appendix C

Photographs

Receive Room View of Installed Specimen

Source Room View of Installed Specimen