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FLEETWOOD WINDOWS & DOORS ACOUSTICAL PERFORMANCE TEST REPORT

SCOPE OF WORK
ASTM E90 SOUND TRANSMISSION LOSS TESTING ON A 3200-T, H-HINGED DOOR

REPORT NUMBER
I6982.03-303-11 R0

TEST DATE(S)
09/26/18

ISSUE DATE
10/12/18

RECORD RETENTION END DATE
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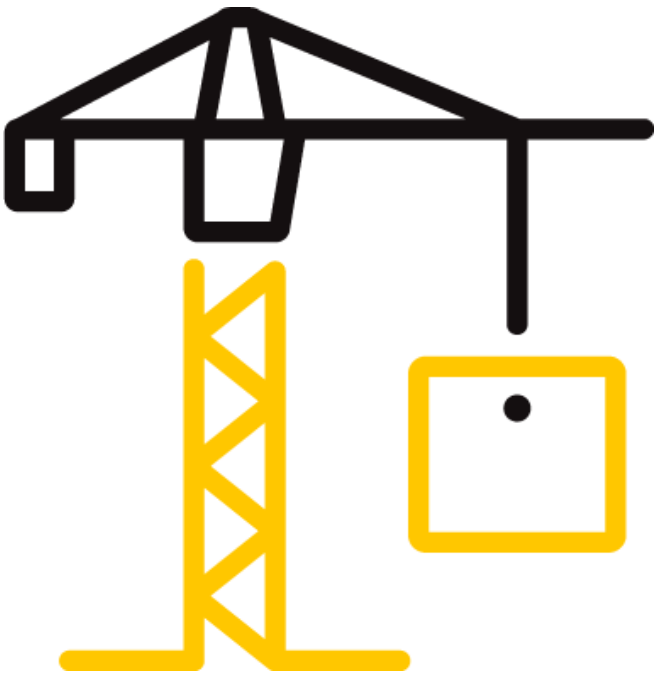

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TEST REPORT FOR FLEETWOOD WINDOWS & DOORS

Report No.: I6982.03-303-11 R0
Date: 10/12/18

REPORT ISSUED TO

FLEETWOOD WINDOWS & DOORS
P.O. Box 1086
Corona, California 92878

SECTION 1

SCOPE

Intertek Building & Construction (B&C) was contracted by Fleetwood Windows & Doors to conduct a sound transmission loss test. Results obtained are tested values and were secured by using the designated test method(s). The complete test data is included herein. The client provided the test specimen. All measurements were conducted in the HT test chambers at Intertek B&C located in Lake Forest, California.

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory.

For INTERTEK B&C:

COMPLETED BY:	Ryan R. Lau	**REVIEWED BY:**	Leeland S. Hoover
TITLE:	Technician II	**TITLE:**	Laboratory Manger
SIGNATURE:	Digitally Signed by: Ryan Lau	**SIGNATURE:**	Digitally Signed by: Leeland Hoover
DATE:	10/12/18	**DATE:**	10/12/18

RRL:LSH:ab

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SECTION 2

SUMMARY OF TEST RESULTS

Q-Lon Seals

SERIES/MODEL	3200-T
TYPE	H-Hinged Door
GLAZING (Nominal Dimensions)	1-1/2" IG (3/8" Laminated Exterior, 3/4" Air Space, 3/8" Laminated Interior), Glass Temperature 75° F
DATA FILE NO.	I6982.03A
STC	29
OITC	27

Bulb Vinyl Seals

SERIES/MODEL	3200-T
TYPE	H-Hinged Door
GLAZING (Nominal Dimensions)	1-1/2" IG (3/8" Laminated Exterior, 3/4" Air Space, 3/8" Laminated Interior), Glass Temperature 75° F
DATA FILE NO.	I6982.03C
STC	33
OITC	29

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SECTION 3
TEST METHOD(S)

The specimens were evaluated in accordance with the following with the exceptions stated in the Test Procedure section of this report:

ASTM E90-09 (2016), *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements*

ASTM E413-16, *Classification for Rating Sound Insulation*

ASTM E1332-16, *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*

SECTION 4
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 2x6 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-19 fiberglass insulation. The specimen was placed on an isolation pad 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.

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SECTION 5
EQUIPMENT

The equipment listed below meets the requirements of the test methods stated in Section 3 of this report.

INSTRUMENT	MANUFACTURER	MODEL	DESCRIPTION	ASSET #	CAL DATE
Data Acquisition Card	National Instruments	PXIe-4464	Data Acquisition Card	INT00627	10/17 *
Data Acquisition Card	National Instruments	PXIe-4464	Data Acquisition Card	INT00395	10/17 *
Data Acquisition Card	National Instruments	PXIe-4464	Data Acquisition Card	INT00396	10/17 *
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	INT00239	04/17
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	INT00240	04/17
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	INT00241	04/17
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	INT00242	04/17
Source Room Microphone	PCB piezotronics	378C20	Microphone and Preamplifier	INT00243	04/17
Receive Room Microphone	PBC Piezotronics	378C20	Microphone and Preamplifier	INT00244	04/17
Receive Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	INT00245	04/17
Receive Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	INT00246	04/17
Receive Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	INT00247	04/17
Receive Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	INT00228	04/17
Receive Room Environmental Indicator	Comet	T7510	Receive Room	INT00299	10/17
Source Room Environmental Indicator	Comet	T7510	Source Room	INT00300	10/17
Microphone Calibrator	Norsonic	1251	Pistonphone Calibrator	INT00288	06/17

**- Note: The calibration frequency for this equipment is every two years per the manufacturer's recommendation.*

TEST CHAMBER

	VOLUME	DESCRIPTION
RECEIVE ROOM	231 m^3	Rotating vane and stationary diffusers Temperature and humidity controlled Isolation pads under the floor
SOURCE ROOM	196 m^3	Stationary diffusers only Temperature and humidity controlled

	MAXIMUM SIZE	DESCRIPTION
TL TEST OPENING	4.27 m wide by 3.05 m high	Vibration break between source and receive rooms

N/A-Not Applicable

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SECTION 6
LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
Corey Jones	Fleetwood Windows & Doors
Ryan R. Lau	Intertek B&C
David A. Pendleton	Intertek B&C

SECTION 7
TEST PROCEDURE

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.

Data for flanking limit tests, repeatability measurements, and reference specimen tests are available upon request.

Intertek B&C will store samples of test specimens for four years.

SECTION 8
ACOUSTICAL 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.

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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.

SECTION 9

SPECIMEN DESCRIPTION

	FRAME	ACTIVE
SIZE	36-1/8" by 96"	34" by 93-3/4"
THICKNESS	4-1/2"	2-1/4"
CORNERS	Butted	Butted
FASTENERS	Screws	Screws
SEAL METHOD	Sealant	Sealant
MATERIAL	Aluminum	Aluminum
REINFORCEMENT	N/A	N/A
THERMAL BREAK MATERIAL	Insulbar	Insulbar
DAYLIGHT OPENING SIZE	N/A	26-5/16" by 86-3/8"

MEASURED OVERALL INSULATION GLASS UNIT THICKNESS	1.492"
SPACER TYPE	Aluminum Box

	EXTERIOR SHEET	GAP	INTERIOR SHEET
MEASURED THICKNESS	0.156", 0.059", 0.151"	0.758"	0.151", 0.060", 0.157"
MUNTIN PATTERN	N/A	N/A	N/A
MATERIAL	Laminated	Air*	Laminated
LAMINATE MATERIAL	PVB	N/A	PVB

GLAZING METHOD	Exterior
GLAZING MATERIAL	Gasket
GLAZING BEAD MATERIAL	Aluminum

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Q-Lon Seals

	TYPE	QUANTITY	LOCATION
WEATHERSTRIP	Q-Lon Seals	2	Perimeter of frame except for sill
	Q-Lon Seals	2	Perimeter of frame
	Q-Lon Seals	1	Sill of frame
	Q-Lon Seals	1	Perimeter of active
HARDWARE	Mortise lock	1	Lock stile
	Metal keepers	2	Lock jamb
	Metal hinges	4	Jamb to stile
DRAINAGE	Weep slots (5/8" by 1/8")	2	Sill

Bulb Vinyl Seals

	TYPE	QUANTITY	LOCATION
WEATHERSTRIP	Bulb Vinyl Seals	2	Perimeter of frame except for sill
	Bulb Vinyl Seals	2	Perimeter of frame
	Bulb Vinyl Seals	1	Sill of frame
	Bulb Vinyl Seals	1	Perimeter of active
HARDWARE	Mortise lock	1	Lock stile
	Metal keepers	2	Lock jamb
	Metal hinges	4	Jamb to stile
DRAINAGE	Weep slots (5/8" by 1/8")	2	Sill

TOTAL WEIGHT (lbs)	**AVERAGE WEIGHT** (lbs / ft^2)
258	10.71

** - Stated per Client/Manufacturer, N/A-Not Applicable*
The client did not supply a report drawing of the test specimen.

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SECTION 10
TEST RESULTS AND RESULTS GRAPH

Q-Lon Seals

ASTM E90
AIRBORNE SOUND TRANSMISSION LOSS

ACCREDITED Testing Laboratory

TEST DATE	09/19/18				
DATA FILE NO.	I6982.03A				
CLIENT	Fleetwood Windows & Doors				
DESCRIPTION	Series/Model: 3200-T H-Hinged Door with 1-1/2" IG (3/8" Laminated Exterior, 3/4" Air Space, 3/8" Laminated Interior), Glass Temperature 75°F				
SPECIMEN AREA	2.25 m²	**RECEIVE TEMP.**	22.7 °C	**SOURCE TEMP**	20.0 °C
TECHNICIAN	RRL	**RECEIVE HUMIDITY**	50%	**SOURCE HUMIDIT**	53%

FREQ (Hz)	BACKGROUND SPL (dB)	ABSORPTION (m²)	SOURCE SPL (dB)	RECEIVE SPL (dB)	SPECIMEN TL (dB)	95% CONFIDENCE LIMIT	NUMBER OF DEFICIENCIES
80	40.7	4.8	100	70	28	1.79	-
100	35.5	4.5	102	75	25	1.18	-
125	43.1	5.2	104	82	18	1.91	0
160	45.7	5.2	104	78	22	0.86	0
200	37.0	6.4	102	70	27	0.59	0
250	25.4	7.1	102	70	27	0.59	0
315	21.7	6.9	103	70	28	0.62	0
400	24.3	6.1	103	68	31	0.72	0
500	18.2	5.4	103	69	30	0.38	0
630	18.1	5.9	103	69	30	0.21	0
800	18.2	6.1	103	70	29	0.20	2
1000	11.5	6.1	104	74	25	0.26	7
1250	10.7	6.2	101	72	25	0.21	8
1600	9.4	6.7	101	67	29	0.16	4
2000	9.6	7.8	103	64	33	0.23	0
2500	6.8	8.7	103	62	35	0.19	0
3150	5.9	9.7	101	62	34	0.24	0
4000	5.2	11.7	101	57	37	0.31	0
5000	5.3	14.9	100	52	40	0.41	-
STC RATING	29	*(Sound Transmission Class)*					
DEFICIENCIES	21	*(Sum of Deficiencies)*					
OITC RATING	27	*(Outdoor-Indoor Transmission Class)*					

Notes: *1) Receive Room levels less than 5 dB above the Background levels are red.*
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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ASTM E90
AIRBORNE SOUND TRANSMISSION LOSS

ACCREDITED Testing Laboratory

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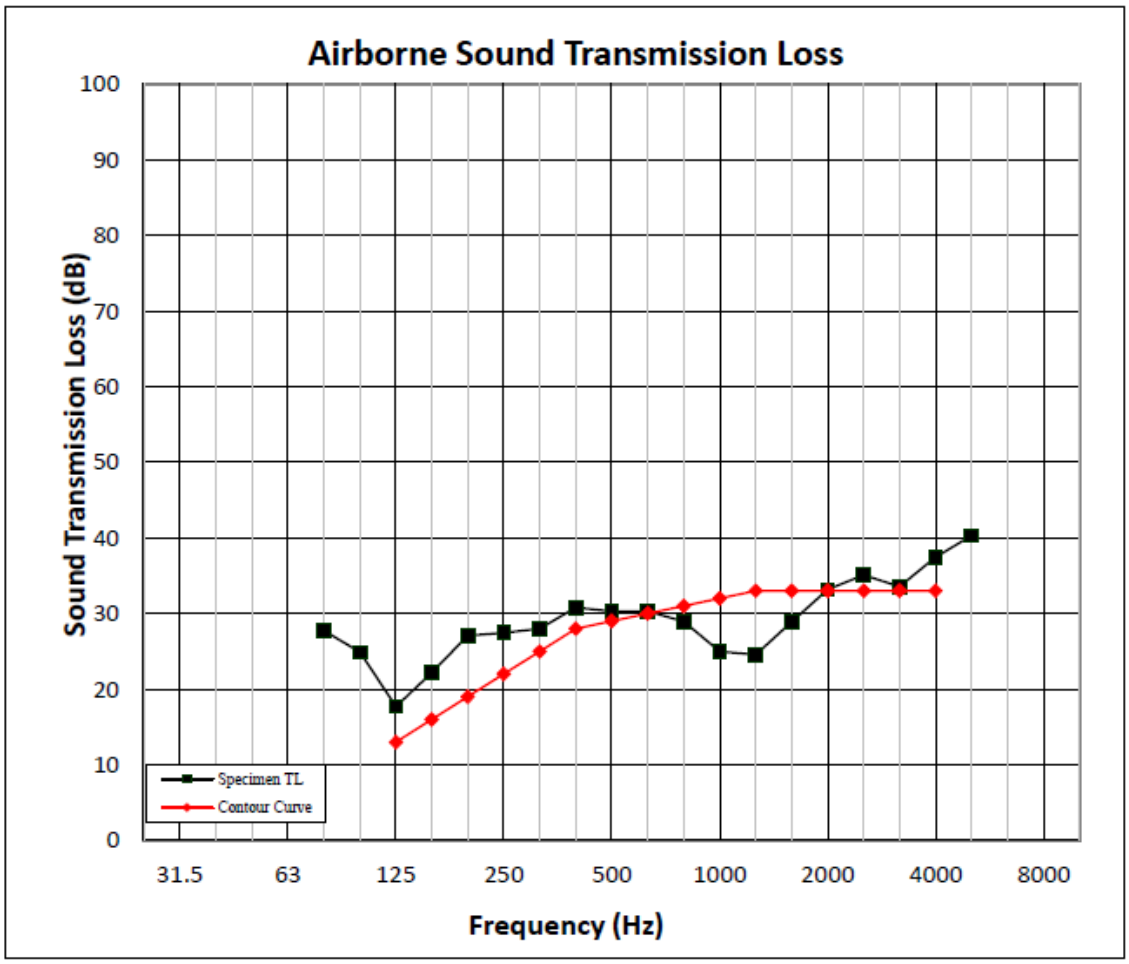
CLIENT	Fleetwood Windows & Doors				
DESCRIPTION	Series/Model: 3200-T H-Hinged Door with 1-1/2" IG (3/8" Laminated Exterior, 3/4" Air Space, 3/8" Laminated Interior), Glass Temperature 75°F				
SPECIMEN AREA	2.25 m²	**RECEIVE TEMP.**	22.7 °C	**SOURCE TEMP**	20.0 °C
TECHNICIAN	RRL	**RECEIVE HUMIDITY**	50%	**SOURCE HUMIDIT**	53%



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Bulb Vinyl Seals

ASTM E90
AIRBORNE SOUND TRANSMISSION LOSS

ACCREDITED Testing Laboratory

TEST DATE	09/26/18				
DATA FILE NO.	I6982.03C				
CLIENT	Fleetwood Windows & Doors				
DESCRIPTION	Series/Model: 3200-T H-Hinged Door with 1-1/2" IG (3/8" Laminated Exterior, 3/4" Air Space, 3/8" Laminated Interior), Glass Temperature 75°F				
SPECIMEN AREA	2.25 m^2	RECEIVE TEMP.	22.2 °C	SOURCE TEMP	21.7 °C
TECHNICIAN	RRL	RECEIVE HUMIDITY	62%	SOURCE HUMIDIT	65%

FREQ (Hz)	BACKGROUND SPL (dB)	ABSORPTION (m^2)	SOURCE SPL (dB)	RECEIVE SPL (dB)	SPECIMEN TL (dB)	95% CONFIDENCE LIMIT	NUMBER OF DEFICIENCIES
80	41.1	4.3	100	69	29	1.97	-
100	34.5	4.5	102	75	25	1.36	-
125	40.3	5.0	104	82	18	1.89	0
160	44.6	4.8	104	78	24	0.88	0
200	37.1	6.5	103	71	28	0.60	0
250	24.5	7.1	103	67	31	0.48	0
315	19.1	6.9	103	68	30	0.51	0
400	20.7	6.1	104	65	34	0.66	0
500	18.0	5.5	103	65	34	0.38	0
630	17.9	5.8	104	65	34	0.34	0
800	19.6	5.9	103	65	34	0.18	1
1000	11.6	6.1	103	71	29	0.21	7
1250	5.9	6.3	101	68	29	0.27	8
1600	4.9	6.7	101	63	33	0.35	4
2000	6.0	7.7	103	61	37	0.28	0
2500	4.1	8.4	103	60	37	0.17	0
3150	4.3	9.4	102	58	38	0.31	0
4000	4.7	11.3	102	53	42	0.34	0
5000	5.2	14.1	101	48	45	0.43	-
STC RATING	33	*(Sound Transmission Class)*					
DEFICIENCIES	20	*(Sum of Deficiencies)*					
OITC RATING	29	*(Outdoor-Indoor Transmission Class)*					

Notes: *1) Receive Room levels less than 5 dB above the Background levels are red.*
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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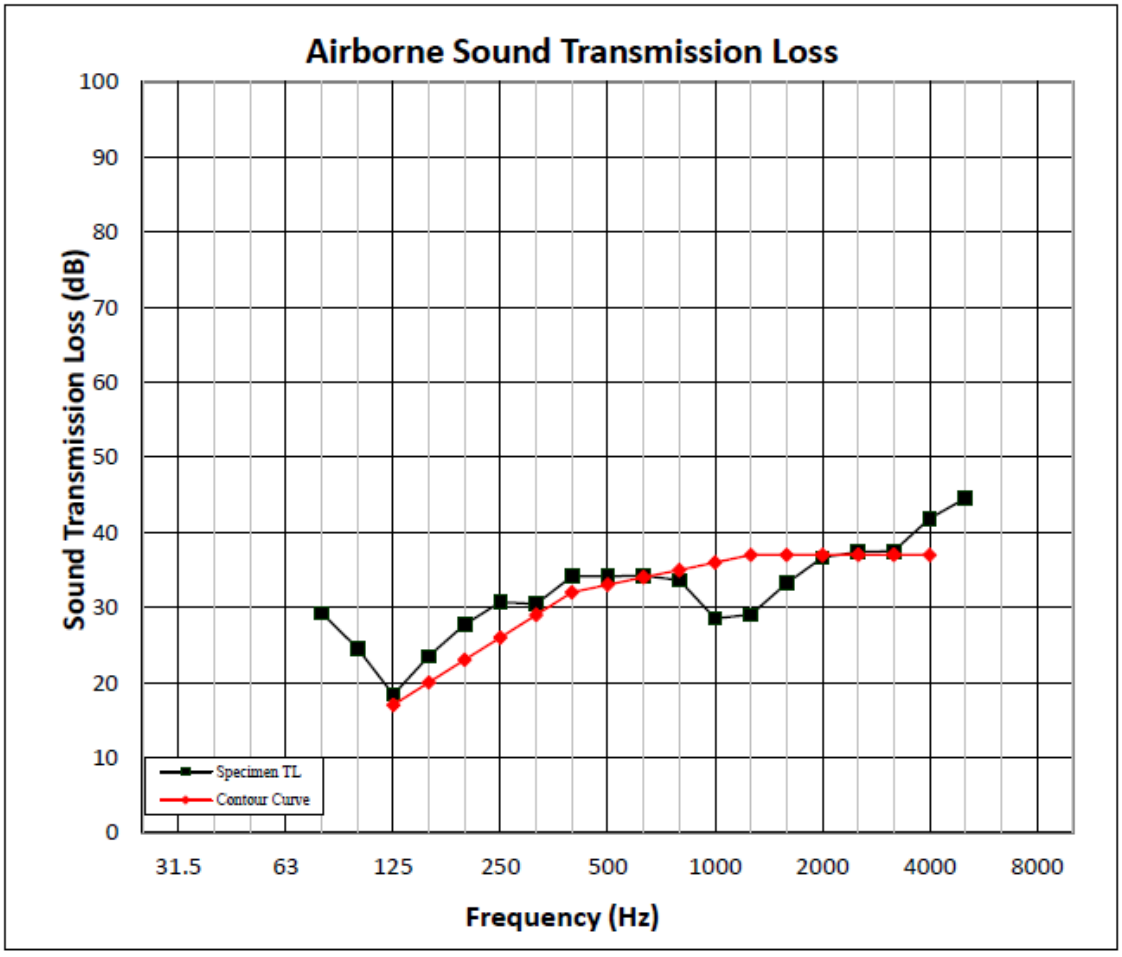
TECHNICIAN	RRL	RECEIVE HUMIDITY	62%	SOURCE HUMIDIT	65%



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SECTION 11
PHOTOGRAPHS

Source Room View of Test Specimen

Receive Room View of Test Specimen

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SECTION 12
REVISION LOG

REVISION #	DATE	PAGES	REVISION
0	10/12/18	N/A	Original Report Issue