E5112.01-113-11-R0
ACOUSTICAL PERFORMANCE TEST REPORT
ASTM E 90 AND ASTM E 492

Rendered to

SENECA RADIANT TECHNOLOGIES

Series/Model: Floor/Ceiling Assembly

Specimen Type: Dimensional Lumber - 2x10

Overall Size: 3023 mm by 3632 mm

STC	**56**
IIC	**39**

Test Specimen Identification:
Floor Topping: 32 mm Seneca Radiant Technologies Radiant Thermal Mass Panel
Subfloor: 18.8 mm OSB Sheathing
Insulation: 88.9 mm Knauf EcoBatt® R13 Fiberglass Insulation
Joist: 235 mm 2x10 Dimensional Lumber
Ceiling Isolation: 12.7 mm ClarkDietrich RC Deluxe™ Resilient Channel
Ceiling: 16.3 mm CertainTeed Type C Gypsum Board

Reference should be made to Architectural Testing, Inc. Report E5112.01-113-11 for complete test specimen description.

Acoustical Performance Test Report

SENECA RADIANT TECHNOLOGIES
137 South Main Street
Salamanca, New York 14779

Report	E5112.01-113-11
Test Date	02/17/15
Report Date	02/26/15

Project Scope

Architectural Testing was contracted to conduct airborne sound transmission loss and impact sound transmission tests. The complete test data is included as attachments to this report. The client provided the test specimen.

Test Methods

The acoustical tests were conducted in accordance with the following standards. The equipment listed in the attachments meets the requirements of the following standards.

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 492-09, Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine
ASTM E 989-06 (2012), Classification for Determination of Impact Insulation Class (IIC)
ASTM E 2235-04 (2012) Standard Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods

Test Procedure

All testing was conducted in the VT test chambers at Architectural Testing, Inc. located in York, Pennsylvania. The microphones were calibrated before conducting the tests.

The airborne transmission loss test was conducted in accordance with the ASTM E 90 test method using the single direction method. Two background noise sound pressure level and twenty sound absorption measurements were conducted at each of five microphone positions.

Four sound pressure level measurements were made simultaneously in both rooms, at each of five microphone positions.

Test Procedure (Continued)

The impact sound transmission test was conducted in accordance with the ASTM E 492 test method. Two background noise sound pressure level, two sound pressure level measurements with the tapping machine operating at each position specified by ASTM E 492, and twenty sound absorption measurements were conducted at each of five microphone positions.

The air temperature and relative humidity conditions were monitored and recorded during all measurements.

Test Conditions

Source Room		Receive Room	
Average Temperature	21.3°C	Average Temperature	20.1°C
Average Relative Humidity	39%	Average Relative Humidity	35%

Test Calculations

The STC (Sound Transmission Class) and IIC (Impact Insulation Class) ratings were calculated in accordance with ASTM E 413 and ASTM E 989, respectively.

Test Specimen Materials and Installation Details

Material	Dimensions (mm)	Thickness (mm)	Manufacturer and Series	Quantity	Average Weight
Radiant Thermal Mass Panel	609.6 by 152.4	32.0	Seneca Radiant Technologies	10.98 m²	38.96 kg/m²
	Note: Attached with fasteners to the OSB sheathing.				
OSB Sheathing	1219 by 2438	18.8	N/A	10.98 m²	10.25 kg/m²
	Note: Fastened to joists with 76 mm by 3 mm framing nails on 203 mm centers along perimeter and 305 mm centers in the field.				
R13 Fiberglass Insulation	2940 by 406	88.9	Knauf EcoBatt®	10.98 m²	1.03 kg/m²
	Note: Laid directly over resilient channels.				
2x10 Dimensional Lumber	2940 by 38.1	235.0	N/A	26.5 lin m	4.3 kg
	Note: Fastened to perimeter frame on 406 mm centers using 18 gauge joist hangers and 9 gauge 31.75 mm nails.				
Resilient Channel	68.6 by 2902	12.7	ClarkDietrich RC Deluxe™	23.2 lin m	0.72 kg
	Note: Fastened perpendicular to joists on 406 mm centers with 25.4 mm type S screws. The thickness of the metal on the resilient channel was 0.7 mm.				
Type C Gypsum Board	1219 by 29.3	16.3	CertainTeed	10.35 m²	11.65 kg/m²
	Note: Fastened to resilient channels with 25.4 mm type S screws. Seams finished with joint compound. Perimeter sealed with acoustical caulk.				

Comments

The total weight of the floor/ceiling assembly was 802.9 kg. Architectural Testing will store samples of the test specimen for four years. The client did not supply drawings of the test specimen.

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.

For ARCHITECTURAL TESTING, INC:

Digitally Signed by: Daniel Mohler

Daniel B. Mohler
Technician II - Acoustical Testing

Digitally Signed by: Bradlay Hunt

Bradlay D. Hunt
Project Manager - Acoustical Testing

Attachments (5)

** Stated by Client/Manufacturer*
N/A - Non Applicable

Revision Log

Revision	Date	Page(s)	Description
R0	02/26/15	N/A	Original Report Issue

Attachments

Instrumentation

Instrument	Manufacturer	Model	ATI Number	Date of Calibration
Data Acquisition Unit	National Instruments	PXI-1033	63763	06/14 *
Microphone Calibrator	Norsonic	1251	Y002919	06/14
Receive Room Microphone	PCB Piezotronics	378B20	64340	04/14
Receive Room Microphone	PCB Piezotronics	378B20	63744	04/14
Receive Room Microphone	PCB Piezotronics	378B20	63745	04/14
Receive Room Microphone	PCB Piezotronics	378B20	63746	04/14
Receive Room Microphone	PCB Piezotronics	378B20	63747	04/14
Receive Room Environmental Indicator	Comet	T7510	63810 63811	09/14 09/14
Source Room Microphone	PCB Piezotronics	378B20	63738	04/14
Source Room Microphone	PCB Piezotronics	378B20	63739	04/14
Source Room Microphone	PCB Piezotronics	378B20	63748	04/14
Source Room Microphone	PCB Piezotronics	378B20	63742	04/14
Source Room Microphone	PCB Piezotronics	378B20	63741	04/14
Source Room Environmental Indicator	Comet	T7510	63812	09/14
Tapping Machine	Norsonic	N-211	Y003242	03/14

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

Test Chambers

VT Receive Room Volume	190 m³
VT Source Room Volume	158 m³

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AIRBORNE SOUND TRANSMISSION LOSS

ASTM E 90

Test Date	02/17/15
Data File No.	E5112.01
Client	Seneca Radiant Technologies
Description	32 mm Seneca Radiant Technologies Radiant Thermal Mass Panel, 18.8 mm OSB Sheathing, 88.9 mm Knauf EcoBatt® R13 Fiberglass Insulation, 235 mm 2x10 Dimensional Lumber, 12.7 mm ClarkDietrich RC Deluxe™ Resilient Channel, 16.3 mm CertainTeed Type C Gypsum Board
Specimen Area	10.98 m²
Technician	Daniel B. Mohler

Freq (Hz)	**Background SPL** (dB)	**Absorption** (m²)	**Source SPL** (dB)	**Receive SPL** (dB)	**Specimen TL** (dB)	**95% Confidence Limit**	**Number of Deficiencies**
80	57.0	16.2	109	72	37	4.00	-
100	42.3	10.9	114	77	39	2.80	-
125	36.6	10.3	109	69	41	1.10	0
160	28.4	9.3	108	68	41	0.90	2
200	25.6	10.1	105	61	45	1.00	1
250	26.6	10.1	103	56	49	0.80	0
315	24.6	8.6	105	58	49	0.60	3
400	23.1	8.4	108	61	48	0.60	7
500	25.4	7.4	106	59	49	0.40	7
630	23.7	7.3	107	55	54	0.50	3
800	22.5	7.3	106	51	57	0.50	1
1000	23.1	7.2	106	50	59	0.40	0
1250	24.3	7.7	106	50	58	0.40	2
1600	23.9	7.8	106	48	60	0.30	0
2000	12.6	9.2	106	48	59	0.40	1
2500	11.0	10.3	106	46	61	0.30	0
3150	9.4	11.8	103	37	66	0.40	0
4000	7.5	14.4	103	34	68	0.70	0
5000	6.7	18.2	99	29	68	1.00	-
6300	6.5	24.5	96	22	72	1.40	-
8000	6.3	32.8	97	17	76	1.00	-
10000	6.3	41.3	91	8	79	0.80	-

STC Rating **56** *(Sound Transmission Class)*

Deficiencies 27 *(Sum of Deficiencies)*

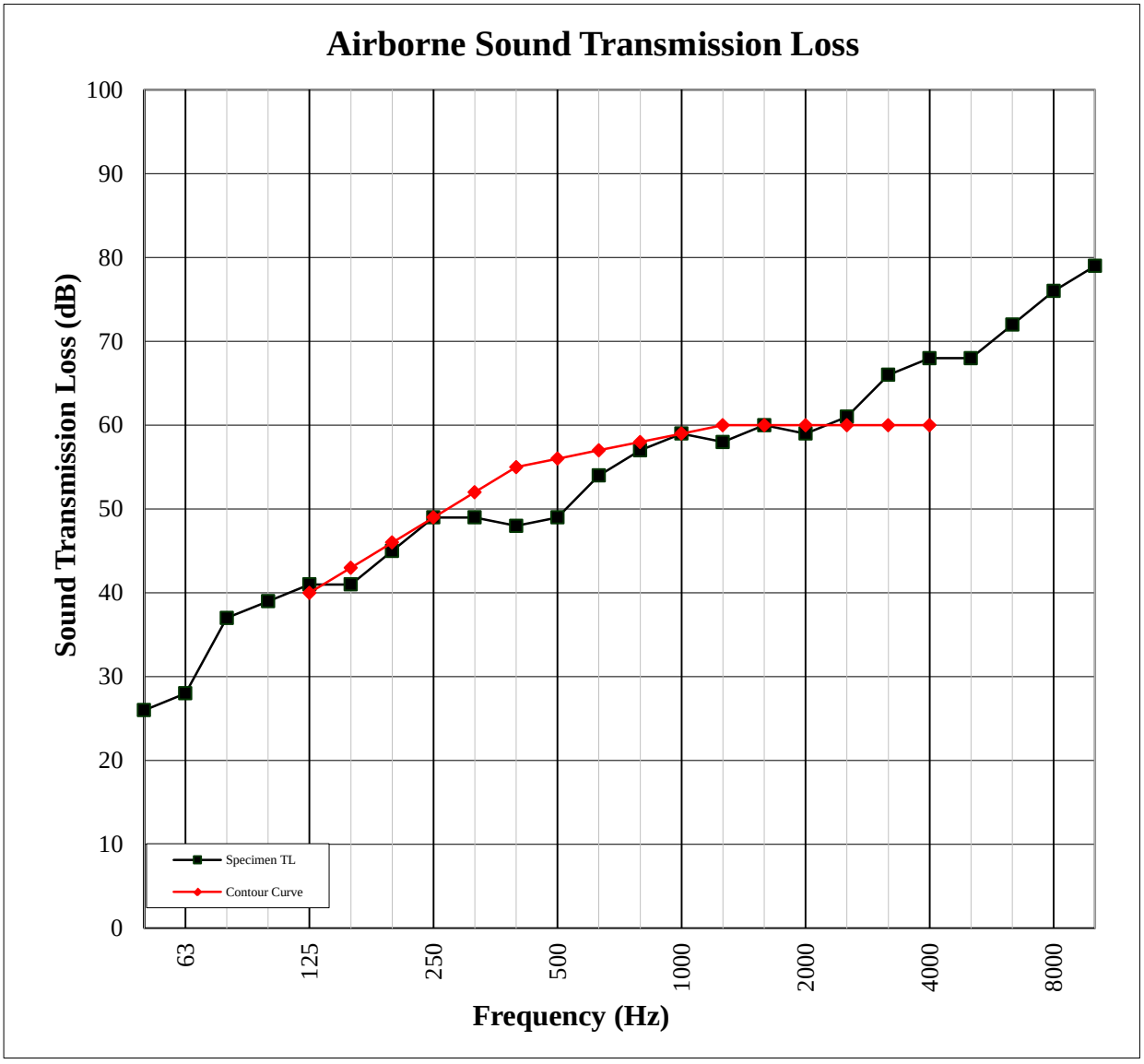
Notes: *1) Receive Room levels less than 5 dB above the Background levels are highlighted in yellow.*
2) Specimen TL levels listed in red indicate the lower limit of the transmission loss.
3) Specimen TL levels listed in green indicate that there has been a filler wall correction applied

AIRBORNE SOUND TRANSMISSION LOSS

ASTM E 90

ACCREDITED TL-144

Test Date	02/17/15
Data File No.	E5112.01
Client	Seneca Radiant Technologies
Description	32 mm Seneca Radiant Technologies Radiant Thermal Mass Panel, 18.8 mm OSB Sheathing, 88.9 mm Knauf EcoBatt® R13 Fiberglass Insulation, 235 mm 2x10 Dimensional Lumber, 12.7 mm ClarkDietrich RC Deluxe™ Resilient Channel, 16.3 mm CertainTeed Type C Gypsum Board
Specimen Area	10.98 m²
Technician	Daniel B. Mohler



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ACCREDITED TL-144

IMPACT SOUND TRANSMISSION

ASTM E 492

Test Date	02/17/15
Data File No.	E5112.01
Client	Seneca Radiant Technologies
Description	32 mm Seneca Radiant Technologies Radiant Thermal Mass Panel, 18.8 mm OSB Sheathing, 88.9 mm Knauf EcoBatt® R13 Fiberglass Insulation, 235 mm 2x10 Dimensional Lumber, 12.7 mm ClarkDietrich RC Deluxe™ Resilient Channel, 16.3 mm CertainTeed Type C Gypsum Board
Specimen Area	10.98 m²
Technician	Daniel B. Mohler

Freq (Hz)	**Background SPL** (dB)	**Absorption** (m²)	**Normalized Impact SPL** (dB)	**95% Confidence Limit**	**Number of Deficiencies**
80	50.4	17.1	62	1.2	-
100	41.0	11.4	63	1.7	0
125	37.5	10.6	63	0.9	0
160	31.4	9.6	61	0.8	0
200	25.3	10.0	59	1.4	0
250	25.3	10.1	60	1.6	0
315	22.6	8.6	61	0.8	0
400	19.9	8.2	60	0.5	0
500	24.5	7.4	60	0.9	0
630	22.6	7.3	61	1.0	0
800	21.3	7.3	57	0.5	0
1000	21.5	7.2	56	0.3	0
1250	18.3	7.7	56	0.1	0
1600	14.3	7.9	60	0.2	0
2000	8.3	9.1	64	0.6	5
2500	5.8	10.2	64	0.3	8
3150	5.6	11.8	57	0.5	4
4000	5.8	14.5	52	1.0	-
5000	5.6	18.0	47	1.1	-
6300	5.9	24.3	42	1.2	-
8000	6.1	32.7	35	1.2	-
10000	6.1	40.3	27	2.6	-

IIC Rating **39** *(Impact Insulation Class)*

Deficiencies 17 *(Sum of Deficiencies)*

Note: *Receive Room levels less than 5 dB above the Background levels are highlighted in yellow.*

Architectural Testing

ACCREDITED TL-144

IMPACT SOUND TRANSMISSION

ASTM E 492

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