CONDUCTED: 2016-03-24

ON: 1/2" Wood Floor - Adhesive - 6" Concrete Slabs - Suspended Ceiling System

Impact Sound Transmission

RAL-IN16-016

TEST METHOD

Riverbank Acoustical Laboratories™ is accredited by the U.S. Department of Commerce, National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP) as an ISO 17025:2005 Laboratory (NVLAP Lab Code: 100227-0) and for this test procedure. The test reported in this document conformed explicitly with ASTM E492-09: "Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine." The single number rating of the specimen was calculated according to ASTM E989-06 (2012): "Standard Classification for Determination of Impact Insulation Class (IIC)." A description of the measuring procedure and room qualifications is available upon request.

DESCRIPTION OF THE SPECIMEN

The test specimen was designated by the manufacturer as 1/2" Wood Floor - Adhesive - 6" Concrete Slabs - Suspended Ceiling System. The building contractor and RAL staff compiled a detailed construction specification as follows:

Flooring

Material:	Engineered Wood - Red Oak Chocolate
Nominal Size:	126.93 mm (5.0 in.) wide, varied in length
Overall Thickness:	11.85 mm (0.47 in.)
Weight:	175.43 kg (386.75 lbs.)
Mass per Unit Area:	6.74 kg/m^2 (1.38 lbs./ft^2)

SINGULOCK Adhesive

Overall Thickness:	5.15 mm (0.20 in.)$^+$
Trowel:	V-notch (Notch Size: 15/32" deep, 1/2" apart
Weight:	117.93 kg (260.0 lbs.)
Mass per Unit Area:	4.53 kg/m^2 (0.93 lbs./ft^2)

The adhesive was applied to the slabs using a V-shaped trowel.

Concrete Slab

Overall Size:	Ten at 609.60 mm (24.0 in.) wide by 4.23 m (166.50 in.) long
Overall Thickness:	152.40 mm (6.0 in.)
Material:	Wire-reinforced concrete
Weight:	8640.93 kg (19,050.0 lbs.)
Mass per Unit Area:	332.22 kg/m^2 (68.04 lbs./ft^2)

Concrete Slab (continued)

Joints: Sealed with acoustical caulk (underside)
Filled with general purpose sand, sealed with ready mix compound.

Note: The slab surface was protected with a single layer of loose laid rosin paper.

Suspended Ceiling

Material 1: Cold rolled steel

Installation: Four rows were installed the length of the room spaced 1.22 m (48.0 in.) on center. The steel was suspended from the concrete slab using 12 gauge steel framing wire spaced 1.22 m (48.0 in.) on center. The wire ran through the preinstalled eyebolts on the concrete slab and wrapped around itself at least three revolutions. A 203.20 mm (8.0 in.) long gusset plate of the same material was used to joint adjacent channels together. Two pieces of 18 gauge framing wire were used per joint. Joints were staggered row to row.

Weight: 15.42 kg (34.0 lbs.)

Linear Mass Density: 0.63 kg/m (0.43 lbs./ft.)

Material 2: 7/8", 20 gauge, hat channel

Installation: Eleven channels were secured perpendicular to the cold rolled steel using 18 gauge framing wire. The outer two rows were 101.60 mm (4.0 in.) from the wall. The remaining rows were spaced 609.60 mm (24.0 in.) on center from the far end of the room. A 101.60 mm (4.0 in.) overlap at the joints was secured by two #8 wafer head self-tapping screws.

Weight: 28.0 kg (61.75 lbs.)

Linear Mass Density: 0.60 kg/m (0.40 lbs./ft.)

Material 3: 88.90 mm (3.50 in.), R-11, unfaced insulation

Installation: The insulation was installed atop of the hat channel.

Weight: 17.76 kg (38.50 lbs.)

Material 4: 16.0 mm (0.63 in.) Type X gypsum wallboard

Installation: The gypsum board was installed to the hat channels using 25.40 mm (1.0 in.) type S bugle head drywall screws spaced 304.80 mm (12.0 in.) on center. Joints and screw heads were surfaced with embedded paper tape using all-purpose joint compound.

Weight: 249.93 kg (551.5 lbs.)

Mass per Unit Area: 9.62 kg/m^2 (1.97 lbs./ft^2)

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Figure 1 – Specimen mounted in the test opening (receive side).

Figure 2 - Specimen mounted in the test opening (source side).

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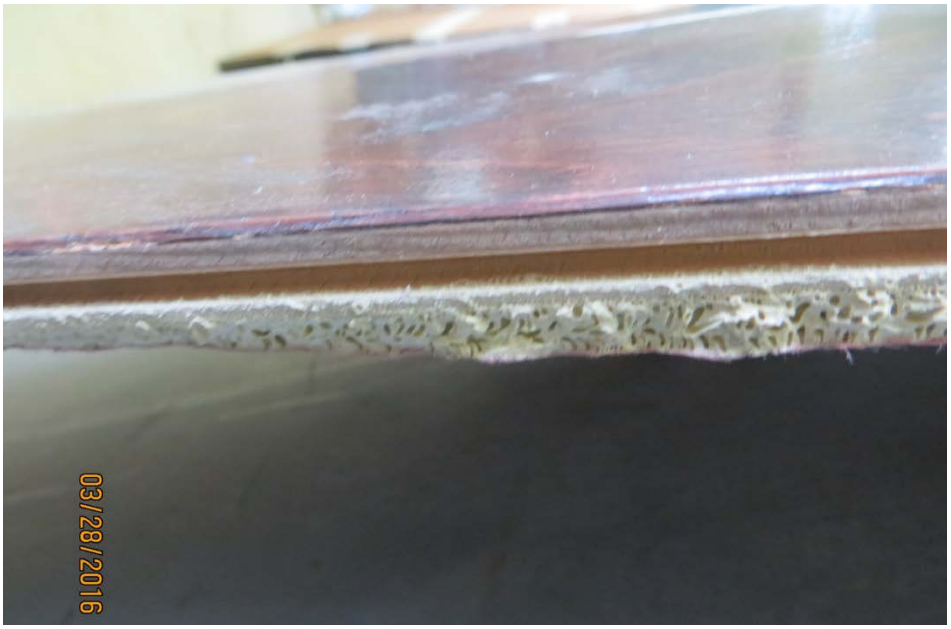

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The impact sound pressure levels, normalized to 10 m^2, are tabulated at the sixteen standard frequencies. A graphic presentation of the data and additional information appear on the following pages. The precision of the test data is within the limits set by the ASTM Standard E989-06 (2012).

FREQ.	Ln	C.L.	DEV	FREQ.	Ln	C.L.	DEV
100	63	0.75	8	800	36	0.37	
125	52	1.13		1000	36	0.34	
160	53	0.82		1250	29*	0.35	
200	50	0.68		1600	22*	0.62	
250	50	0.81		2000	21	0.43	
315	50	0.72		2500	16*	0.53	
400	45	0.57		3150	10*	3.66	
500	41	0.45					
630	37	0.43					

IIC=57

ABBREVIATION INDEX

FREQ. = FREQUENCY, HERTZ, (cps)
Ln = NORMALIZED IMPACT SOUND PRESSURE LEVEL, dB
C.L. = UNCERTAINTY IN dB, FOR A 95% CONFIDENCE LIMIT
DEV. = DEVIATION, dB > IIC CONTOUR (SUM OF DEV = 8)
IIC = IMPACT INSULATION CLASS
* = INDICATES A CORRECTION HAS BEEN APPLIED TO DATA DUE TO BACKGROUND NOISE LEVELS

Tested by _____
Marc Sciaky
Experimentalist

Report by _____
Chris Nottoli
Acoustician

Approved by _____
Eric P. Wolfram
Laboratory Manager

NVLAP LAB CODE 100227-0

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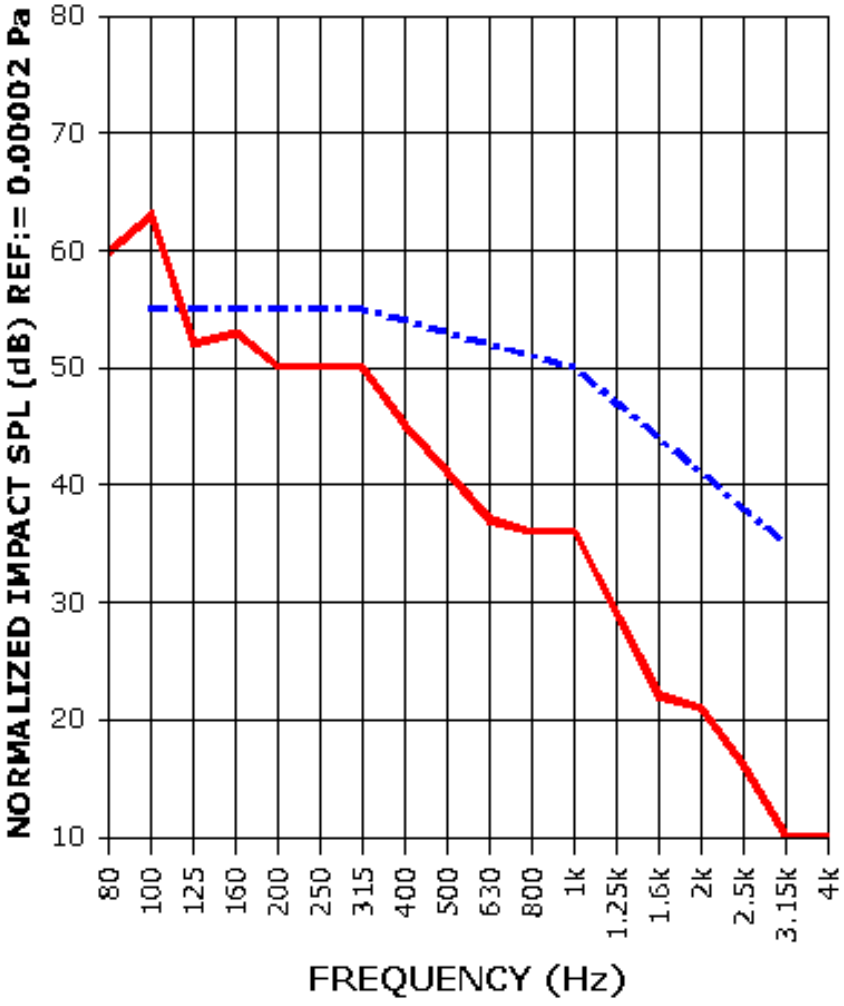
IMPACT SOUND TRANSMISSION REPORT

1/2" Wood Floor - Adhesive - 6" Concrete Slabs - Suspended Ceiling System



IIC=57

IMPACT SOUND PRESSURE LEVEL
IMPACT INSULATION CLASS CONTOUR

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APPENDIX A: Extended Frequency Range Data

Specimen: 1/2" Wood Floor - Adhesive - 6" Concrete Slabs - Suspended Ceiling System (See Full Report)

The following non-accredited data were obtained in accordance with ASTM E989-06 (2012), but extend beyond the defined frequency range of 100Hz to 3,150Hz. These unofficial results are representative of the RAL test environment only and intended for research & comparison purposes.

1/3 Octave Band Center Frequency (Hz)	**Normalized Impact Sound Pressure Level** (dB)	**Repeatability** (95% ±)
31.5	65	0.56
40	65	3.12
50	64	1.09
63	63	0.76
80	60	0.64
100	63	0.75
125	52	1.13
160	53	0.82
200	50	0.68
250	50	0.81
315	50	0.72
400	45	0.57
500	41	0.45
630	37	0.43
800	36	0.37
1000	36	0.34
1250	29*	0.35
1600	22*	0.62
2000	21	0.43
2500	16*	0.53
3150	10*	3.66
4000	6*	1.52
5000	7*	1.51
6300	9*	1.20
8000	9*	0.75
10000	11*	0.56
12500	12*	0.45

*= CORRECTION APPLIED TO DATA DUE TO BACKGROUND NOISE LEVELS
DUE TO BACKGROUND NOISE LEVELS

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APPENDIX B: Instruments of Traceability

Specimen: 1/2" Wood Floor - Adhesive - 6" Concrete Slabs - Suspended Ceiling System (See Full Report)

Description	Model	Serial Number	Date of Certification	Calibration Due
Bruel & Kjaer Pulse Analyzer	Type 3560-C	2639093	2015-07-23	2016-07-23
Bruel & Kjaer Mic And Preamp	Type 4943-B-001	2311428	2015-09-14	2016-09-14
Bruel & Kjaer Tapping Machine	Type 3207	2724862	2015-11-24	2016-11-24
G.R.A.S Pistonphone	Type42AF-1	80001	2015-08-14	2016-08-14
Omega Digital Thermo-Hygrometer	Model # RH411	H0100711	2015-12-28	2016-12-28
Omega Digital Thermo-Hygrometer	Model # RH411	H0103273	2015-06-30	2016-06-29

END